Discharges Against Medical Advice:

Are Race/Ethnicity Predictors?

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BACKGROUND: Prior literature suggests that blacks are more likely to be discharged against medical advice (DAMA).

OBJECTIVE: We examined whether DAMA from general hospitals varies by race/ethnicity and whether this variation is explained by individual and hospital factors.

DESIGN, SUBJECTS, AND MEASUREMENTS: We conducted cross-sectional analyses of 1998 to 2000 hospital discharge data, linked to the American Hospital Association data, on adults admitted for acute general hospital care in California, Florida, and New York. A series of hierarchical logistic regression analyses explored factors associated with DAMA, initially adjusting for age and gender, then sequentially adding adjustment for comorbidities, individual socio-economic factors, and finally hospital characteristics.

RESULTS: Compared with whites, blacks had a 2-fold higher age-gender adjusted odds of DAMA, a risk that progressively diminished with increasing adjustment (final adjusted odds ratio [OR] =0.95, 95% confidence interval [CI] =0.91, 1.00). While Hispanics had an increased risk of DAMA in age-gender-adjusted analyses, the final model revealed a protective effect (adjusted OR=0.66, 95% CI=0.62, 0.70), similar to that observed for Asians.

CONCLUSIONS: Disparities in DAMA affecting minority patients in general hospitals are largely accounted for by individual and hospital socio-economic factors. The absence of any adjusted disparity affecting blacks, and the protective effect observed for Hispanics and other minorities suggest that individual discrimination and poor communication are not primary determinants of DAMA, but where patients are admitted does contribute to disparities in DAMA.

KEY WORDS: doctor-patient communication; disparities; socio-economic factors; race/ethnicity.
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Patent discharge against medical advice (DAMA) from hospitals is associated with increased patient morbidity and risk for hospital readmission.[1–5] There has been longstanding, but sporadic research on contributing factors to DAMA, but most research has targeted admissions for alcohol, drug abuse, and psychiatric problems, where the DAMA rates have been found to exceed 20%.[6] In contrast, rates of DAMA have typically been less than 4% for medical admissions.[7] Most,[4,8–10] but not all, studies[3] have found that black patients have an increased risk of DAMA compared with white patients. Such potential disparity in care is consistent with a large and diverse literature documenting disparities in care affecting black patients.[11]

Discharge against medical advice reflects a failure to reach consensus between the attending physician and patient regarding the need for continued inpatient care. This failure may reflect, in part, poor communication and lower trust between the physician and the patient. Given lower levels of trust, partnership, and communication[12–18] between minority patients and their physicians, it is plausible that higher rates of DAMA among minority patients reflect worse communication and lower trust between physicians and their minority patients.[19] Existing findings regarding the role of race and ethnicity in DAMA are limited by small sample sizes, single hospital, or single disease studies, and inadequate adjustment for comorbidity and confounders, particularly hospital characteristics.

To address these limitations, we conducted an analysis using the 1998 to 2000 State Inpatient Databases (SID), developed by the Agency for Healthcare Research and Quality (AHRQ), for 3 large, culturally diverse states: New York, Florida, and California. We examined whether: (1) race/ethnicity was related to DAMA risk; and (2) the extent to which any disparity might be explained sequentially by individual demographic, morbidity, and socio-economic factors, and by hospital characteristics. We hypothesized that if higher rates of DAMA reflect poorer communication and lower trust between doctors and minority patients, then adjusting for hospital and other noncommunication-related variables should not eliminate this relationship. Conversely, if disparities are attenuated by adjustment for those other factors, then the locus of disparities lies in those other factors.

METHODS

Inpatient data were abstracted from 25,126,154 discharges recorded in the SID for 1998 to 2000, including approximately 11.3, 6.4, and 7.3 million discharges from California, Florida, and New York states, respectively. The states were selected because of their size, representation of different regions of the country, and availability of patient race/ethnicity. The total number of discharges increased annually from 8.3 million in 1998 to 8.5 million in 2000.

The large difference in the prevalence of DAMA for drug abuse and psychiatric admissions compared with general hospital admissions suggests differences in the factors affecting DAMA in the 2 settings. Thus, our analysis addressed only

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general hospital admissions, an area where less work has been performed. Discharges that were missing patient disposition (N=1,011) were necessarily excluded, as were those that were missing patient age, gender, or diagnosis (N= 7,137; DAMA rate=0.49%). Children aged less than 18 were excluded (N=4,623,129; DAMA rate=0.13%) as factors affecting DAMA in children are likely to reflect parental involvement. Discharges for the primary treatment of mental diseases or disorders (N=1,053,667; DAMA rate =2.65%), alcohol/drug use disorders (N=443,365; DAMA rate =15.48%), and obstetric discharges (N=3,080,331; DAMA rate =0.28%) were excluded as our focus was on general medical admissions. Transfers (N=934,665; DAMA rate=0.53%) and records with missing admission source (N=67,484; DAMA rate =1.00%) were excluded because we had no way to link patient records between hospitals in all 3 states. Patients who died before discharge (N=555,429) were also excluded.

Characteristics of the hospitals were obtained by matching the hospital discharge data to the American Hospitals Association (AHA) database, using a state hospital identifier variable common to both datasets. Because our objective included examining hospital factors that may influence DAMA, discharges from hospitals with missing AHA information were excluded from further analysis. Hospital data were available for 875 of 898 (97%) hospitals represented in the restricted discharge dataset. Information was missing for all federally operated hospitals (e.g., VA and military hospitals and federal prison hospitals) and hospitals that had opened after 1998. The 23 (2.6%) hospitals with missing information accounted for 246,885 (1.7%) of all remaining discharges (DAMA rate = 1.24%). Finally, 179,805 (DAMA rate =0.49%) discharges from 98 specialty hospitals, including 44 psychiatric and 12 children's hospitals, were excluded. Records from 13,933,397 discharges remained for analysis (DAMA rate =1.23%).

The dependent variable was DAMA or not. Race/ethnicity was coded as black, Hispanic, Asian, other, and missing, with white non-Hispanic as the reference group.

Individual demographic variables included gender and age. Individual morbidity variables were derived using all the diagnoses coded on the uniform discharge summary data. We used the algorithm developed and validated by AHRQ to assign all discharge diagnoses to 1 or more of 30 diagnostic categories.[20] We also examined the role of length of stay in days, as an additional measure of severity of illness, and scheduled versus unscheduled admission (in California) or emergent versus planned (in New York and Florida).

Individual social and economic factors included insurance status (self-pay, Medicaid, Medicare, other, with private as the reference group), and Zip code-derived median household income (by quartile, within state).

Hospital characteristics derived from the SID included the following: percent nonwhite discharges; percent Medicaid discharges; logarithm of annual number of discharges; and hospital Herfindahl Index (sum of squared shares of the 25 Major Diagnostic Category groupings of DRG-18 diagnosis codes). Such indices have been previously used to measure physician and hospital specialization.[21–23] High indexes indicate concentration of discharge diagnoses in 1 area, suggesting a more specialized hospital. Low indexes indicate a greater range and distribution of diagnoses.

Hospital characteristics derived from the AHA file included the following: hospital ownership (for profit, public [state/county/city]) with nonprofit other as the reference group); teaching status; hospital location (nonurban, small urban [< 1 million], medium urban [1 to 2.5 million, reference group] vs large urban [population > 2.5 million]); and occupancy rate, calculated using bed size and the annual number of discharges.

Analyses

All analyses were conducted using STATA (Version 8.1, STATA CORP, College Station, TX) at the patient level, accounting for the nesting of patients within hospital (using robust sandwich estimators of variance and an independent working correlation structure) and adjusting for the sampling probability of the patient record.

Our modeling approach was designed to understand the factors contributing to racial/ethnic disparities in DAMA. We view racial/ethnic disparities (that is, potentially mutable differences in care related to race/ethnicity, specifically worse care adversely affecting disadvantaged minorities) as primarily socially determined. To explore the contribution of the various factors to predicting DAMA, we used a series of hierarchical logistic regression models to control sequentially for patient and hospital characteristics. The sequence chosen was designed to follow a bio-psycho-social model,[24] reflecting the mutability of factors from biological to individual-social to community-social. The initial model examined the relationship between race/ethnicity and DAMA. It adjusted only for admission year (1998 to 2000) and state (California, Florida, and New York), to avoid contamination by secular trends in DAMA. The second model added patient demographic characteristics (patient age, age squared [to adjust for nonlinear effects of age, included as (age-mean age)^2 to avoid collinearity with age], and gender). The third model added biomedical characteristics (the presence or absence of a series of comorbidities derived from the AHRQ algorithm and elective vs non-elective admission). The fourth model added patient social and economic characteristics (insurance and Zip code-derived income). The fifth and final model included all hospital characteristics (derived from both the SID and AHA files, see above).

Because of the large number of observations and variables, and the adjustment for nesting of observations within hospitals, analysis of the complete dataset proved computationally prohibitive. Thus, the analysis was conducted on a random sample of events. We selected each DAMA discharge and a 10% random sample of the non-DAMA discharges for inclusion in the analysis.

We conducted a number of additional sensitivity analyses to explore ambiguities. These included the following: length of stay, squared terms for percent of minorities, and percent patients with Medicaid admitted (to explore nonlinearities), a more finely graded hospital location population size, and distinguishing among the different kinds of public hospitals. An analysis of California discharges was conducted using Nonpublic [Hospital] Patient Discharge Data provided by the California Office of Statewide Health Planning and Development for the years 1998 to 2000. Using encrypted patient identifiers and dates of discharge, we were able to link repeated admissions and transfers together to conduct patient-level analyses. All these analyses produced results quite consistent with the main analyses and are not presented here. Finally, we con-

ducted regression diagnostics including examining for collinearity and heteroskedasticity.

RESULTS

Patient Characteristics and DAMA

Table 1 presents the distribution of patient characteristics, together with the DAMA rate associated with each factor. Compared with whites, DAMA rates were higher for blacks and Hispanics, but lower for other groups. Other patient risk factors for DAMA included younger age, male gender, nonelective admission, Medicaid insurance, no insurance, and less comorbidity. Specific comorbidities (data not shown) were also associated with DAMA risk, notably: HIV/AIDS, liver disease, alcohol, drug abuse, and psychiatric diagnoses other than depression. Conversely, the following diagnostic categories were associated with a markedly lower than average risk of DAMA: arrhythmia, pulmonary circulatory, parathyroid disorders, hypothyroid disorders, lymphatic disorders, metastatic cancer, and tumors.

Hospital Characteristics and DAMA

Hospital risk factors for DAMA (Table 1) included the following: location in large urban areas; hospitals with a greater proportion of minorities and patients with Medicaid; and hospitals with the lowest and highest Herfindahl indices. Patients admitted to non-profit hospitals had lower DAMA risk.

Adjusted Relationships Between Race/Ethnicity and DAMA

In the first logistic model (adjusting only for study year and state), compared with whites, blacks (adjusted odds ratio [OR] =2.74, 95% confidence interval [CI] =2.50, 2.99), Hispanics (adjusted OR=1.82, 95% CI=1.60, 2.07), and those with other race/ethnicity (adjusted OR=1.98, 95% CI=1.59, 2.48) were more likely to have a DAMA. For Asians, there was no significant effect (adjusted OR=0.94, 95% CI=0.84, 1.05).

In the second model (additional adjustment for demographic factors), compared with whites, blacks (adjusted OR=2.04, 95% CI=1.88, 2.21), Hispanics (adjusted OR=1.36, 95% CI=1.20, 1.53), and those with other race/ethnicity (adjusted OR=1.44, 95% CI=1.17, 1.79) were still more likely to have a DAMA. For Asians, there was a protective effect (adjusted OR=0.85, 95% CI=0.76, 0.95).

In the third model (additional adjustment for biomedical factors), the ORs were attenuated: blacks (adjusted OR=1.63, 95% CI=1.52, 1.76), Hispanics (adjusted OR=1.17, 95% CI=1.05, 1.30), other race/ethnicity (adjusted OR=1.29,

Table 1. Patient and Hospital Characteristics by Discharge Status

	Discharge Status				Discharge Status		
	Normal	DAMA	Rate*(%)		Normal	DAMA	Rate*(%)
Race/ethnicity				Admission type			
White	942,219	89,578	0.94	Nonelective	1,054,805	167,207	1.56
Black	157,421	43,924	2.71	Elective admission	320,020	8,894	0.28
Hispanic	163,821	26,249	1.58	Hospital MSA size			
Asian/PI	40,819	3,335	0.81	Nonmetropolitan	64,869	6,669	1.02
Other	38,342	8,716	2.22	<1 M	365,134	28,550	0.78
Missing	32,203	4,299	1.32	1 M to 2.5 M	421,504	41,854	0.98
Gender				>2.5 M	523,318	99,028	1.86
Male	625,357	110,852	1.74	Hospital ownership			
Female	749,468	65,249	0.86	Public	182,828	40,986	2.19
Age group				Not-for-profit	936,745	103,048	1.09
18 to 34	120,452	34,534	2.79	Private	255,252	32,067	1.24
35 to 49	238,884	60,533	2.47	Hospital % minority discharges			
50 to 64	294,725	41,427	1.39	<16%	357,733	28,582	0.79
65 to 79	443,602	28,128	0.63	16% to 30%	356,519	31,393	0.87
80+	277,162	11,479	0.41	31% to 55%	348,014	38,929	1.11
Primary payer				56%+	312,559	77,197	2.41
Medicare	694,301	51,570	0.74	Hospital % medicaid discharges			
Medicaid	139,662	54,279	3.74	<8%	361,388	25,098	0.69
Private	421,173	31,406	0.74	8% to 14%	357,100	31,438	0.87
Self-pay	56,162	27,994	4.75	15% to 27%	346,698	39,719	1.13
No charge and other	63,527	10,852	1.68	27%+	309,639	79,846	2.51
Median household income of patient Zip code				Herfindahl Index			
< $32,000	305,745	64,103	2.05	<0.06	325,052	61,434	1.85
$32,000 to < $40,000	331,112	37,911	1.13	0.06 to 0.09	349,678	37,460	1.06
$40,000 to <$53,000	335,863	34,934	1.03	0.10 to 0.12	350,035	37,007	1.05
$53,000 +	342,110	27,437	0.80	>0.12	350,060	40,200	1.14
Missing patient Zip code	59,995	11,716	1.92	State			
Comorbidity count				CA	561,655	57,367	1.01
0	348,261	45,050	1.28	FL	411,536	42,049	1.01
1	353,955	49,656	1.38	NY	401,634	76,685	1.87
2	301,942	40,097	1.31	Year			
3	196,718	23,690	1.19	1998	454,084	58,372	1.27
4+	173,949	17,608	1.00	1999	455,241	57,275	1.24
Overall	1,374,825	176,101	1.26	2000	465,500	60,454	1.28

*Discharged against medical advice (DAMA) rate adjusted for 10% sampling of controls. Differences across each variable all significant, P<.001.

95% CI=1.07, 1.54), and Asians (adjusted OR=0.88, 95% CI=0.79, 0.97).

Table 2 summarizes the results of the final 2 steps in the sequence of logistic regression analyses, the fourth model (additional adjustment for patient socio-economic factors), and the fifth model (additional adjustment for hospital characteristics). The increased risk of DAMA for blacks became smaller (fourth model) and was eliminated (fifth model) with full adjustment. The increased risk for Hispanics became a protective effect with full adjustment.

There was modest collinearity among some of the hospital characteristics, especially percent Medicaid (variance inflation factor [VIF]=2.35) and percent minority (VIF=2.80). We examined which hospital characteristics contributed to attenuating the racial/ethnic disparities in DAMA by including each of the hospital characteristics individually and in various combinations (details not shown). Only when specific hospital characteristics (namely, metropolitan size, percent Medicaid, or percent minorities) were included did the ORs for race/ethnicity change substantially.

DISCUSSION

Higher DAMA rates among blacks and Hispanics are accounted for by sociodemographic factors including type of insurance, morbidity, and hospital of admission. Neither minority race nor ethnicity status is independently associated with increased risk for DAMA at the individual level. Interestingly, in

Table 2. Adjusted Predictors of DAMA, Including All Patient Characteristics (Model 4), and with Hospital Characteristics Added (Model 5)

	Model 4: All Patient Characteristics			Model 5: Hospital Characteristics Added		
	OR	*P*	95% CI	OR	*P*	95% CI
Patient characteristics						
Race/ethnicity						
White	1.00	–		1.00	–	
Black	1.23	<.001	1.16 to 1.31	0.95	.05	0.91 to 1.00
Hispanic	0.90	.03	0.82 to 0.99	0.66	<.001	0.62 to 0.70
Asian	0.76	<.001	0.69 to 0.84	0.60	<.001	0.55 to 0.65
Other	0.95	.49	0.81 to 1.10	0.69	<.001	0.61 to 0.78
Missing	0.88	.24	0.72 to 1.09	0.72	.001	0.60 to 0.87
Female gender	0.62	<.001	0.61 to 0.63	0.62	<.001	0.61 to 0.63
Patient age	0.84	<.001	0.83 to 0.84	0.83	<.001	0.82 to 0.84
Patient age squared	0.997	<.001	0.997 to 0.998	0.997	<.001	0.997 to 0.998
Elective admission	0.23	<.001	0.21 to 0.26	0.24	<.001	0.22 to 0.27
Primary payer						
Private insurance	1.00	–		1.00	–	
Self-pay	3.39	<.001	3.16 to 3.62	3.08	<.001	2.89 to 3.29
Medicare	1.97	<.001	1.89 to 2.05	1.96	<.001	1.89 to 2.03
Medicaid	3.15	<.001	2.99 to 3.32	2.81	<.001	2.66 to 2.96
Other	1.60	<.001	1.45 to 1.77	1.57	<.001	1.44 to 1.70
Patient median Zip code income						
<$32,000	1.47	<.001	1.33 to 1.63	1.30	<.001	1.19 to 1.42
$32,000 to <$40,000	1.20	<.001	1.10 to 1.32	1.15	.001	1.06 to 1.25
$40,000 to <$53,000	1.16	<.001	1.07 to 1.25	1.12	.001	1.05 to 1.20
$53,000+	1.00	–		1.00	–	
Missing patient Zip code	1.83	<.001	1.69 to 1.99	1.80	<.001	1.67 to 1.95
Hospital attributes						
Log of total annual discharges				0.85	<.001	0.80 to 0.90
Herfindahl Index*				1.01	.15	1.00 to 1.02
Hospital ownership						
Not-for-profit				1.00	–	
Public				0.95	.47	0.84 to 1.09
Private				1.20	<.001	1.09 to 1.33
Teaching hospital				1.06	.04	1.00 to 1.13
Hospital utilization rate						
Quartile 1				1.00	–	
Quartile 2				1.02	.73	0.92 to 1.12
Quartile 3				1.07	.28	0.94 to 1.22
Quartile 4				0.94	.33	0.84 to 1.06
Hospital environment						
Hospital MSA size						
Nonmetropolitan				1.74	<.001	1.57 to 1.93
<1 M				1.28	<.001	1.17 to 1.41
1 M to 2.5 M				1.00	–	
>2.5 M				1.02	.80	0.89 to 1.16
Hospital percent Medicaid discharges†				1.03	.001	1.01 to 1.05
Hospital percent Nonwhite discharges‡				1.03	<.001	1.02 to 1.04

Models also adjusted for individual patient co-morbidities, year of discharge, and state (not shown). ORs for age are for 5-year increments in age.
**The Herfindahl index (0 to 1) is multiplied by 100. (Sample inter-quartile range 6 to 12.)*
†ORs for percent Medicaid discharges are for 5% increments in hospital percent Medicaid discharges.
‡ORs for percent nonwhites discharges are for 5% increments in hospital percent nonwhite discharges.
DAMA, discharged against medical advice; OR, odds ratio; CI, confidence intervals.

fully adjusted models, Hispanic ethnicity and other race membership were associated with a statistically significant "protective" effect against DAMA. Other patient risk factors identified are consistent with prior research.[3] Our findings suggest that patient (insurance type and income) and hospital (percent minority and percent Medicaid) factors associated with economic resources are important risk factors for DAMA.

Thus, while disparities in DAMA, adversely affecting minorities, occur at the population level, they were not evident within hospitals in this study. In other words, blacks and Hispanics are more likely to be admitted to hospitals with higher DAMA rates, but after controlling for other patient characteristics, neither group shows higher rates of DAMA within these general hospitals. This finding suggests that racial discrimination and poor communication at the individual level are not primary factors in DAMA, but that place of hospitalization, income, and insurance, collectively referred to as "structural racism," do contribute to DAMA.[25] However, we cannot determine whether poor communication and trust contribute to higher rates of DAMA among patients with lower income, Medicaid, or no insurance.

Although we anticipated lower DAMA among hospitals that served more minorities and poor patients, we observed the opposite. These hospitals have been shown to be under greater financial pressure than hospitals with fewer minority and Medicaid-insured patients.[26] The finding of higher DAMA rates in hospitals with higher proportions of minority Medicaid-insured patients is consistent with a growing literature on the effects of resource constraints on quality among hospitals that serve these patients.[27–30] Some of these studies have also noted that racial/ethnic disparities are eliminated within hospitals after adjusting for the proportion of minority patients admitted[29,30]; our findings emphasize the importance of accounting for the role of hospital characteristics in understanding racial/ethnic disparities.

The protective effect for Hispanics and other minorities suggests that unmeasured factors associated with race/ethnicity contribute to a lower risk of DAMA. Other research has suggested that persons with less social support are at a greater risk of DAMA.[31] We were unable to determine living status in the database we used, but it is possible that members of these minority groups have access to more family support than white patients,[32] making DAMA a less pressing issue. It is also possible that cultural factors affect decisions to leave against physician advice. Further exploration of this unexpected finding is warranted as it echoes another health-related paradoxical finding observed for Hispanics: despite lower socio-economic status than whites, on average, Hispanics report higher health status and lower mortality.[33]

The finding that for-profit hospitals are associated with a higher risk of DAMA seems to be an exception to the finding that socioeconomic pressure contributes to DAMA. However, it is also conceivable that hospital organizational culture affects rates of DAMA. For example, some hospitals may promote policies affecting the likelihood that a patient who wants to be discharged early is required to sign a formal notice of DAMA. This may reflect differences in the extent to which physicians at the hospital are concerned about malpractice risk, although there is little evidence that DAMA provides any such protection.[34] For-profit hospitals potentially have more established clinical pathways, which might include requiring agreeing to DAMA for patients who wish to be discharged early.

Our large study, while allowing for precise estimates of DAMA risk, has a number of limitations. Most importantly, given the apparent dominant effect of economic factors, we were unable to measure those factors precisely or directly. Missing variables may have precluded better understanding of the protective effects observed for Hispanics and other minorities. Because the data were collected as part of a routine database, we are unable to specify the validity of the various variables used in the study. Absent patient tracking identifiers may have produced biases in our estimates of effects (although our analysis of the California data suggests that this was not a problem). It is also possible that error in hospital classification of race and ethnicity attenuated effects. Misclassification of race/ethnicity may also have been selective. For example, it is possible that Hispanics reporting their ethnicity may been more compliant and less likely to be DAMA. Race/ethnicity coding errors may be less pronounced aggregated by hospital and could conceivably have contributed to hospital effects for percent minority discharges.

Despite these limitations, our findings make it unlikely that DAMA in general hospitals represents another significant area of health care disparities adversely affecting minorities, at least at the individual level. Instead, the findings suggest that disparities in DAMA are related primarily to socio-economic factors, partially reflecting institutional segregation.[27] These adverse socio-economic individual and hospital effects are among several challenging the delivery of optimal care to those who are socio-economically disadvantaged. Efforts to combat this disadvantage, as well as research exploring the protective effects observed in Hispanics and other minorities, are warranted.

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