ETHNIC DISPARITIES, HOSPITAL QUALITY, AND DISCHARGES AGAINST MEDICAL ADVICE AMONG PATIENTS WITH CARDIOVASCULAR DISEASE

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Background: Nationally, cardiovascular disease is the third-ranked disease category in terms of discharges against medical advice (AMA). Disparities in discharges AMA have not been examined among patients with cardiovascular disease, nor has the moderating role of hospital quality been studied.

Methods: We examined the dual effect of race/ethnicity and hospital quality on discharges AMA by retrospectively analyzing hospital discharge data of patients who were admitted with a primary diagnosis of cardiovascular disease from 2000 through 2005.

Results: A total of 2619 of the 312,183 hospitalizations for cardiovascular disease (.8%) resulted in a discharge AMA. The sample was 50% male, 32% non-White, and an average age of 68 years of age. Non-White race was associated with a higher probability of a discharge AMA in a high-quality hospital (adjusted odds ratio [AOR] 1.2, P<.001). Non-White race/ethnicity was associated with a lower probability of a discharge AMA in a low-quality hospital (AOR .8, P=.01). A discharge AMA was less likely at a high-quality hospital (AOR .7, P<.001), regardless of race/ethnicity. The modifying effect of hospital quality is more apparent at the highest levels of hospital quality.

Conclusions: Hospital quality is negatively correlated with discharges AMA and moderates the relationship between race/ethnicity and discharges AMA. (*Ethn Dis*. 2009;19:172–178)

Key Words: Cardiovascular Diseases, Discharges Against Medical Advice, Disparities, Hospital Quality

INTRODUCTION

Discharges against medical advice (AMA) may be correlated with adverse health outcomes and higher costs. National inpatient data from the Healthcare Cost and Utilization Project Nationwide Inpatient Sample show that diseases of the circulatory system rank third in terms of discharges AMA. Disparities in discharges AMA among patients with cardiovascular disease (CVD) may contribute to disparities in clinical outcomes. The patient who leaves AMA is more likely to be readmitted,[1–10] which implies a worsened health state after discharge. In addition, there may be race/ethnic differences in the propensity to discharge oneself AMA. Several studies have examined race/ethnic differences in the likelihood of leaving AMA and found that African Americans,[11,12] non-Whites,[13,14] Hispanics,[15] and those of Aboriginal descent[16] are more likely to discharge themselves AMA. One study[17] found that African Americans, Hispanics, and Asians are less likely than Whites to discharge themselves AMA after controlling for the influence of variation in hospital characteristics on the likelihood of a discharge AMA. Other patient factors identified include male sex, unmarried status, and younger age.

Early literature on patient noncompliance with medication therapy recognized that it is ''inappropriate to ascribe the problem of noncompliance entirely to the patient without fully considering physician-related factors and their impact on the issue of patient noncompliance.''[18] The patient's experience during a hospital stay will depend on the patient's perceptions regarding the quality of care received, the quality of interaction with care providers, and the physical surroundings.[19] Similarly, discharges AMA may be better understood by considering both patient and system-related factors.

Compared to patient-related factors, the institutional factors affecting health decision making have received relatively less attention in the literature. Some evidence suggests that hospital characteristics influence patient decision making regarding whether or not to leave AMA.[7,14,17] Previous studies have focused on the size, ownership, location, patient mix, and teaching status of the hospitals. Information on the influence of modifiable factors, such as hospital quality, can be useful to decision makers interested in designing interventions to reduce the occurrence of self-discharges AMA.

Hospital quality is measured by using process data from the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO). Hospital quality is also measured by using data on the patient's hospital experience available from the Consumer Assessment of Healthcare Provider Systems (CAHPS) survey. It is hypothesized that high-quality hospitals will see fewer discharges AMA compared with low-quality hospitals, regardless of race/ethnicity. It is also hypothesized that the relationship between ethnicity and dis-

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This study examines the evidence of a dual effect of ethnicity and hospital quality on the likelihood of a discharge against medical advice in patients with CVD.

charges AMA varies with hospital quality.

Hospital quality as defined by using the JCAHO core measures is particularly relevant to a study of CVD patients since two-thirds of the JCAHO core measures relate to the treatment of patients with CVD. Defining hospital quality by using self-reported hospital experiences from the CAHPS survey is particularly relevant to CVD patients who leave AMA. Compared to other disease settings in which discharges AMA occur, patients admitted with a primary diagnosis of CVD are less likely to be under the influence of drugs or alcohol at the time of the self-discharge. They are more likely to be aware of the personal and external contributing factors that are relevant in shaping their hospital experience.

The ability to design effective interventions to reduce avoidable discharges AMA in this patient population will depend on the availability of population-based information on the patient- and hospital-level correlates of discharges AMA. This study examines the evidence of a dual effect of ethnicity and hospital quality on the likelihood of a discharge AMA in patients with CVD.

METHODS

Sample

The study is based on the retrospective analysis of confidential inpatient hospital discharge data maintained by the Maryland Health Services Cost Review Commission. The database contains information on all discharges from nonfederal short-stay hospitals in Maryland from January 2000 through December 2005. Study inclusion criteria were: 1) all hospitalizations with a primary admission diagnosis of CVD as identified by the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 390–459[20] and 2) patients aged ≥18 years. Discharges were excluded for the following reasons: nature of admission is listed as delivery, in-hospital death, no information on patient disposition among those discharged alive, invalid or missing provider Medicare number, invalid or missing patient medical record number. Co-morbid conditions were identified by searching the 2nd through 15th ICD-9-CM diagnosis fields. The discharge dataset was augmented with information from the CAHPS survey, JCAHO, and the American Hospital Directory.

The initial cohort was chosen as patients who met the inclusion and exclusion criteria. The longitudinal dataset was collapsed to a dataset containing the most recent hospitalization of each unique patient at a given hospital. In collapsing the dataset from multiple observations per patient per hospital to a single observation per patient per hospital, the following information from past hospitalizations was retained: the total number of past admissions and the number of past admissions during which the patient discharged himself AMA. This study was approved by the University of Maryland Baltimore's institutional review board.

Outcome Measures and Explanatory Variables

An indicator variable for the outcome, a discharge AMA, was created for those who were discharged AMA in the most recent hospitalization during the study period. Measures of hospital quality were calculated by using 2 distinct datasets, the JCAHO data and the CAHPS survey data. Both datasets were merged to the hospital discharge dataset at the institutional level. The JCAHO data included 9 hospital process measures from 3 aggregate categories: acute myocardial infarction care, heart failure care, and pneumonia care.[21] The JCAHO data provided information on each hospital's reported rate (ie, the number of patients who received a specific type of care as a proportion of the number of patients who were eligible to receive the specific type of care) and the state average rate. In order to ensure the reliability of reported rates, data that were based on <25 eligible patients were excluded from the analysis.[21] These measures were used in creating the indicator for a high-quality hospital. A high-quality hospital was a hospital with all reported rates above the state average for the given measure.

Data on the hospital experience was provided by the CAHPS survey. Data from the national survey were released in March 2008 and encompassed eligible discharges from October 2006 through June 2007. The survey provides information on various hospital experience domains: communication with doctors, communication with nurses, responsiveness of hospital staff, cleanliness and quietness of hospital environment, pain management, communication about medicines, and discharge information. The survey also collects information on the patient's overall rating of the hospital. High quality was defined by comparing the most desirable subcategory of each measure to the state or national average for that subcategory. For example, the proportion of patients who rated a hospital as a 9 or 10 out of 10 (best) was compared to the state average for the proportion that reported a rating of 9 or 10.

Two measures of hospital quality based on overall ranking were available from the CAHPS survey, depending on

whether the state average or the national average was used as the comparator. Survey measures based on the other hospital experience domains were defined relative to the national average. The other key covariate was an indicator for non-White race/ethnicity, which included African American, Hispanic, Asian American, and other; non-Hispanic White was the referent category. In addition to the key covariates, the following information was available for analysis: age, sex, marital status, comorbidities, payer status, nature of admission, number of past admissions, prior discharge AMA.

Statistical Analysis

We used 2- and 3-way associations to examine the relationship between discharges AMA, race/ethnicity, and hospital quality. Multivariate regression models were estimated to examine the confounding effect of various factors on the relationship between ethnicity, hospital quality, and a discharge AMA. A generalized linear model of the binary outcome of interest was estimated by using the logit link function. Generalized estimating equations accounted for clustering at the hospital level. The threshold for significance was set a priori at .05. All statistical analysis was conducted by using SAS version 9.1.3 (SAS Institute, Inc, Cary, NC).

Table 1. Descriptive statistics for the study sample (*N*=312,183)

Variable	All	Ethnicity		*P* Value
		White	Non-White	
Non-White ethnicity	31.7	-	-	-
African American	26.2	-	-	-
Hispanic	1.0	-	-	-
Asian American/Pacific Islander	1.2	-	-	-
Other	2.8	-	-	-
Discharged AMA	.8	.7	1.2	<.001
Demographics				
Single	16.0	10.5	27.9	<.001
Male sex	50.4	52.3	46.2	<.001
Age, years				<.001
18–29	.6	.4	1.0	
30–39	2.4	1.5	4.4	
40–49	8.3	6.3	12.7	
50–59	16.5	14.4	21.0	
60–69	20.9	20.0	23.0	
70–79	26.7	28.8	22.1	
80–89	20.3	23.7	12.9	
≥90	4.3	5.0	2.9	
Charlson co-morbidity index ≥1	60.8	59.4	64.0	.001
Admission characteristics				
Uninsured/self pay	2.6	1.7	4.6	.001
Emergency or urgent care	84.5	82.6	88.4	.001
At least one CVD	28.1	28.1	28.0	.458
History of AMA discharge	.4	.3	.6	.001
Hospital quality				
High-quality hospital–JCAHO	14.3	16.1	10.3	.001
High-quality overall–CAHPS, state	47.0	50.5	39.4	.001
High-quality overall–CAHPS, national	15.7	16.0	15.0	.001
High-quality, MD interaction–CAHPS	21.1	20.5	22.4	.001
High-quality, RN interaction–CAHPS	22.4	24.2	18.6	.001
High-quality, helpful staff–CAHPS	7.4	9.3	3.3	.001
High-quality, explain meds–CAHPS	16.3	17.1	14.7	.001
High-quality, pain control–CAHPS	24.3	26.0	20.7	.001
High-quality, quiet location–CAHPS	25.7	21.0	35.8	.001
High-quality, clean room–CAHPS	7.9	9.2	4.9	.001
High-quality, recommend–CAHPS	28.9	29.2	28.3	.001

AMA=against medical advice, CVD=cardiovascular disease, CAPHS=Consumer Assessment of Healthcare Provider Status.

RESULTS

The final dataset contained 312,183 unique patients with complete data from the most recent admission and selected data from previous admissions. The sample was 50% male, 32% non-White, and had an average age of 68 years (Table 1). Discharges AMA occurred in .8% of current admissions (n=2619), and .4% of current admissions were linked to a previous admission that ended in an inadvised discharge AMA. Twenty-eight percent of the current admissions were linked to at least one prior CVD-related admission. Fourteen percent of the hospitalizations occurred in high quality hospitals as defined using the JCAHO measure. Forty-seven percent of hospital discharges were from CAHPS high quality hospitals (using the overall ranking) defined relative to the state average, while 15.6% of hospitalizations occurred in CAHPS high quality hospitals defined relative to the national average. Results for the case where high quality was defined based on the other domains (percentage) were: communication with doctors (21%), communication with nurses (22%), responsiveness of hospital staff (7%), cleanliness (8%), quietness of hospital environment (26%), pain management (24%), and communication about medicines (16%).

A self-discharge AMA was negatively correlated with a JCAHO high-quality hospital and with a CAHPS high-quality hospital defined according to overall ranking, communication with nurses, responsiveness of hospital staff, cleanliness, pain management, and communication about medicines. A self-discharge AMA was positively correlated with a CAHPS high-quality hospital defined according to the quietness of the hospital environment.

In bivariate analyses, a self-discharge AMA occurred less often at high-quality hospitals than at lower-quality hospitals, regardless of whether JCAHO or CAHPS measures (based on overall ranking) were used. A self-discharge AMA was less likely among Whites than among non-Whites (.66% vs 1.22%, P<.001). A discharge from a high-quality hospital occurred less often among non-Whites than among Whites, regardless of whether JCAHO or CAHPS measures were used.

After adjusting for confounding variables, non-White race/ethnicity was associated with higher adjusted odds of discharge AMA in a JCAHO high-quality hospital (adjusted odds ratio [AOR] 1.18, P<.001) (Table 1). Non-White race/ethnicity was associated with a lower AOR of discharge AMA in a low-quality hospital (AOR .87, P=.045) (Table 2). Discharge AMA was less likely at a high-quality hospital (AOR .7, P=.03), and the effect did not vary with race/ethnicity (Table 2). Given that the outcome (discharge AMA) is infrequent, the AORs closely approximate the relative risks.[22]

After adjustment for confounding variables, we did not find a statistically significant association between non-White ethnicity, a high-quality hospital (compared to *state* rates), and a self-discharge AMA. We found that non-White race was protective for a discharge AMA (AOR .81, P=.04) and that a high-quality hospital was not associated with discharges AMA (AOR .74, P=.05) (Table 3). After adjustment for confounding variables, we found a significant association between non-White ethnicity, a high-quality hospital (compared to *national* rates), and discharge AMA. Non-White race/ethnicity was associated with higher adjusted odds of a self-discharge AMA in a high-quality hospital (AOR 1.21, P<.001) (Table 3). Non-White race/ethnicity was associated with a lower adjusted odds of a self-discharge AMA in a low-quality hospital (AOR .84,

Table 2. Generalized estimating equation model of discharges AMA (*N*=254,382)

Variable*	Unadjusted OR (main effect)		Unadjusted OR - JCAHO	Adjusted OR - JCAHO
Non-White for low-quality hospital	1.37	-	1.32	.87‡
Non-White for high-quality hospital	1.37	-	2.11§	1.18§
High-quality hospital for White	-	.56	.48‡	.7§
High-quality hospital for non-White	-	.56	.77	.94
Single	-	-	-	1.46§
Male sex	-	-	-	1.32§
Age 30–39	-	-	-	1.07
Age 40–49	-	-	-	.84
Age 50–59	-	-	-	.60§
Age 60–69	-	-	-	.40§
Age 70–79	-	-	-	.38§
Age 80–89	-	-	-	.35§
Age ≥90	-	-	-	.53
Co-morbid condition	-	-	-	1.01
Uninsured/self pay	-	-	-	2.21§
Emergency or urgent care	-	-	-	1.46§
At least one CVD disease readmission	-	-	-	.88‡
History of AMA discharge	-	-	-	9.91§
Median household income	-	-	-	.99‡

AMA=against medical advice, OR=odds ratio, Joint Commission on the Accreditation of Healthcare Organizations, CVD=cardiovascular disease.

* Additional covariates include intercept and year fixed effects.

‡ Significant at 5% level.

§ Significant at 1% level.

Table 3. Generalized estimating equation models of discharges AMA (*N*=312,183)

Variable	Unadjusted OR - CAHPS state	Adjusted* OR - CAHPS state	Unadjusted OR - CAHPS national	Adjusted* OR - CAHPS national
Non-White for low-quality hospital	1.17	.81‡	1.27	.84‡
Non-White for high-quality hospital	1.87§	1.02	2.49§	1.21§
High-quality hospital for White	.48‡	.74	.37‡	.66§
High-quality hospital for non-White	.76	.93	.72	.95
Single	-	1.53§	-	1.53§
Male sex	-	1.39§	-	1.39§
Age 30–39	-	1.05	-	1.05
Age 40–49	-	.79	-	.79
Age 50–59	-	.57§	-	.57§
Age 60–69	-	.36§	-	.36§
Age 70–79	-	.33§	-	.33§
Age 80–89	-	.29§	-	.29§
Age ≥90	-	.39	-	.39
Co-morbid condition	-	1.02	-	1.02
Uninsured/self pay	-	2.26§	-	2.27§
Emergency or urgent care	-	2.25§	-	2.24§
At least one CVD disease readmission	-	.82§	-	.82§
History of AMA discharge	-	9.98§	-	10.06§
Median household income	-	.99§		.99§

AMA=against medical advice, OR=odds ratio, CAHPS=Consumer Assessment of Healthcare Provider Status, CVD=cardiovascular disease.

* Additional covariates include intercept and year fixed effects.

‡ Significant at 5% level.

§ Significant at 1% level.

P=.01). Discharge AMA was less likely at a high-quality hospital (AOR .7, P<.001), and the effect did not vary with race/ethnicity.

DISCUSSION

The task of reducing avoidable discharges AMA is simplified when modifiable factors can be identified. In identifying modifiable factors, we allowed that patient nonadherence is not only due to patient-level factors but also may be influenced by system-level factors that include the hospital experience. We examined hospital quality as a modifiable factor in the decision-making process that culminates in a self-discharge AMA. We characterized hospitals as high or lower quality on the basis of their relative performance on available measures from JCAHO and the CAHPS survey. The maintained assumption is that the quality measures are correlated with the quality of services that the patient receives at the hospital. We used an overall measure of hospital quality in the case of the CAHPS measures. In bivariate analyses, the overall measure was correlated with several of the individual components that also were assessed in the survey, which indicated that the overall measure was an acceptable summary measure of the hospital experience of the average survey respondent at the given hospital.

Hospitals that excel at a system level are more likely to excel in the case of each patient, compared with an otherwise similar hospital that does not excel at a system level. A systemwide measure of quality is likely to reflect the type of care that many patients receive. With this relationship in mind, the deliberate decision was made to aggregate all process measures into 1 measure of hospital quality in the case of the JCAHO measures. By requiring that a hospital perform above the state average on each component, we developed a stringent rule that only rewarded hospitals for excelling on a systemwide basis. This approach is conceptually similar to the ''all-or-none'' approach[23] used in aggregating across hospital process and outcome measures.

The JCAHO measure and the CAHPS measure relative to the national average defined high-quality by using stringent criteria and yielded quantitatively similar results. Using either measure, we found that non-White ethnicity is protective for a discharge AMA in low-quality hospitals and is a risk factor for a discharge AMA in high-quality hospitals. Discharges from high-quality hospitals make up ≈15% of the sample; therefore, for most discharges, Non-White status is protective for a discharge AMA. Auxiliary regressions indicated that this relationship was robust to controlling for hospital-level characteristics, such as teaching hospital status and the percentage of Medicaid discharges.

Together, our findings suggest that the modifying effect of hospital quality is more likely to be evidenced at the highest levels of hospital quality. When ≈15% of hospitals are designated as high-quality hospitals, we find that non-White ethnicity is protective for the outcome in most hospitals (the lower-quality hospitals). When ≈50% of hospitals are designated as high-quality hospitals, we find no modifying effect, so that non-White ethnicity is protective for the outcome across all hospitals.

We also find that after controlling for the number of previous admissions, the risk of a discharge AMA in the current admission when a prior admission ended in a discharge AMA was 10 times that of the comparator group. This finding underscores the importance of maintaining patient discharge records and consulting them during triage as a way to reliably identify patients who are likely to leave AMA. Patients with CVD who leave AMA may be readmitted to a different hospital for treatment or to the emergency department. The estimated association between previous unauthorized discharges and current unauthorized discharges may be biased downward because of the inability to capture readmissions to the emergency department of the same hospital (without a subsequent inpatient admission) or readmissions to a different hospital.

When ≈15% of hospitals are designated as high-quality hospitals, we find that non-White ethnicity is protective for the outcome in most hospitals (the lower-quality hospitals).

Alcohol abuse, drug abuse, and psychoses as primary diagnoses are positively correlated with the likelihood of discharge AMA.[7,13,15,24–27] The results here indicate that these remain predictors as co-morbid conditions in the CVD setting. As with studies in other disease settings, we find that men, single patients, and younger patients are more likely to leave AMA.

There are a few limitations worth noting. One limitation concerns the grouping of all non-White patients into 1 category. This grouping assumes homogeneity of effect on the outcome across all covariates in the model, whereas this may not be the case. An examination into the differential effects of race on discharges AMA by hospital quality and across racial categories was not possible with the current dataset because of sample size constraints. Frequencies for the various racial/ethnic groups in the current dataset suggest that the current findings are most applicable to African Americans.

The design of this study, which uses the most recently observed hospitalization, permitted us to adjust current event rates of discharges AMA for the

known influence of previous discharges AMA. This approach is warranted on the basis of evidence indicating that discharges AMA are more likely among those with previous experience discharging themselves AMA.[3,25] One limitation of this approach is that it may bias results against patients who do not readmit to the same hospital (and thus do not have the chance to contribute historical data) and thus may be healthier. If sicker patients are more likely to have ''history,'' then the estimated relationship between a previous discharge AMA and a current discharge AMA will be inflated. In order to account for any confounding effect of differences between patients with history and patients without history, we controlled for previous admissions in the multivariate regression model. A related limitation of the study is the inability to identify previous admissions to a different hospital. This limitation is potentially relevant given the parametric structure imposed on the data, whereby observations are correlated within clusters (eg, hospitals) but assumed to be independent across clusters (eg, hospitals). If a large proportion of patients with multiple admissions were readmitted to different hospitals, then a different modeling structure (eg, clustering on patients, random effects) may have been more appropriate for the data. Also, the inability to identify past admissions to any hospital may weaken the estimated effect of historical behavior on the current admission.

There are concerns with characterizing the full spectrum of hospital services provided to a patient using these measures. Other attributes like waiting time and racial diversity among hospital staff may affect a patient's experience and may be poorly approximated by the JCAHO and CAHPS process measures. In addition, the static measures may not appropriately characterize a given institution in a given study year. A static measure also may mask improvements in the 6-year period at the institutional level and the effect of these improvements on the frequency of hospital discharges AMA. The use of dynamic measures of hospital quality may provide more insight into the relationship between hospital quality, race/ethnicity, and discharges AMA.

The study is generalizable only to Maryland. A strength of the study, as concerns studying an infrequent outcome such as a discharge AMA, is that it includes 6 years of data. The availability of 6 years of data leads to a more complete picture of admissions and readmissions for CVD, including those ending in a discharge AMA.

Conclusion

We conclude that 1) racial/ethnic disparities exist in discharges AMA, 2) non-White race is a protective factor in lower-quality hospitals and a risk factor in high-quality hospitals when hospital quality is defined according to strict criteria, 3) a high-quality hospital is associated with a lower risk of a self-discharge AMA, regardless of the person's race/ethnicity. The results suggest that both patient- and system-level factors are relevant for understanding self-discharges AMA. Future studies using longitudinal designs and other potentially more informative proxies of hospital quality are necessary to test the robustness of these results.

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