RACE/ETHNIC DISPARITY IN HYPERTENSION-RELATED HOSPITALIZATION IN FLORIDA

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Objectives: While racial disparity in the treatment of hypertension has been documented, disparity among hospitalized patients is relatively understudied. Our objective was to compare the characteristics among Black, White, and Hispanic patients hospitalized for hypertension.

Methods: The de-identified, public use hospital discharge file of the Florida Agency for Health Care Administration (AHCA) in 2001 was utilized. Discharge records with primary diagnosis of essential hypertension using the International Classification of Diseases code were included. The differences between three groups were tested using the chi-square tests and the multiple regression models.

Results: Discharge records that belonged to White, Black or Hispanic in-patients ($N=7,102$) were included. Average age (years) and standard error (SE) of patients were 53.1 ± 0.4 (Blacks), 63.6 ± 0.5 (Hispanics), and 66.7 ± 0.3 (Whites). Most patients were discharged home, but more Whites (15.9%) were discharged to another facility followed by Hispanics (11.3%) and Blacks (9.6%). More Blacks and Hispanics were underinsured or uninsured compared with Whites. The adjusted length of stay was 3.2 (Blacks), 3.1 (Hispanics), and 2.9 (Whites) days ($P<.01$). The adjusted total hospital charges were not different.

Conclusions: Although the prevalence of hypertension was the highest among Blacks followed by Whites and Hispanics in Florida, more Whites (57.1%) were hospitalized followed by Blacks (28.6%) and Hispanics (14.3%). Further, the discharge status, insurance type and adjusted length of stay varied by race/ethnicity. Future studies should examine potential causes (severity of hypertension, comorbidity, and access to preventive care) of disparity between race/ethnic groups of Florida. (*Ethn Dis*. 2007;17:453–460)

Key Words: Ethnicity, Hispanic, White, Black, Hypertension, Hospitalization

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INTRODUCTION

Hypertension or high blood pressure (HBP) is a serious risk factor for several chronic diseases. It also is a predictor of premature death and disability from cardiovascular complications.[1] More than 60% of American adults have hypertension and certain minority populations such as African Americans are affected disproportionately.[2] A Center for Disease Control and Prevention (CDC) report indicated that the prevalence, treatment, and control of hypertension had increased in all three major race/ethnic groups: Hispanics, non-Hispanic Whites, non-Hispanic Blacks.[3–5] However, proportions of those who were aware of having, and received treatment for, HBP varied by race/ethnicity in the United States.[3]

During 1999 to 2002 in the United States, non-Hispanic Blacks (70.3%) were more likely to be aware of having HBP, followed by non-Hispanic Whites (62.9%), and Mexican Americans (49.8%).[3] The age-adjusted proportion of those having received treatment for HBP also followed the same pattern with the highest proportion among non-Hispanic Blacks (55.4%) followed by non-Hispanic Whites (48.6%), and Mexican Americans (34.9%).[3] The prevalence of controlled hypertension, however, was similar between non-Hispanic Whites (29.8%) and Blacks (29.8%) but lower among Mexican Americans (17.3%).[3]

In Florida, 31% Blacks, 28% Whites, and 22.4% Hispanics were aware of having HBP.[6] The same Behavioral Risk Factor Surveillance System (BRFSS) data in 2001 revealed that the prevalence of HBP was highest among Blacks (32%), followed by Whites (26%) and Hispanics (19.4%) in Florida.[6] The Hispanics surveyed in the nation and the state of Florida may likely belong to different Hispanic subgroups. For example, it is likely that more Cuban Americans were included in the Florida data compared with the national data. Recent data indicated that certain Hispanic subgroups including Cuban Americans were characterized by low levels of hypertension awareness, and treatment.[7] Because Hispanics are the fastest growing population in the United States,[8] health-related information on Hispanic ethnicity in relation to Whites and/or Blacks are warranted.

While racial/ethnic disparity in awareness, prevalence, treatment, and control of hypertension has been documented among the noninstitutionalized population, disparity among hospitalized patients is relatively understudied. Conceivably, hospitalized patients may be systematically different from the noninstitutionalized citizens or outpatients in terms of the severity and sequelae associated with HBP. Hypertension is one of the leading causes of morbidity and mortality in the United States and it was responsible for $55.5 billion in direct and indirect medical expenditures in 2004.[9] In Florida alone, total inpatient and outpatient cost due to essential hypertension was $122,993,840 in 2003.[10] Published reports on hypertension-related hospitalizations in Florida are scant. Florida is the fourth largest state in the country and it consists of highly diverse populations. Studies relating to hypertension care among the multiethnic population of Florida are essential for future health education, prevention, control, resource allocation, cost-effectiveness analysis, and estimation of societal impact. Thus, this report examines racial/ethnic differences among those hospitalized for essential hypertension in Florida hospitals. Specifically, we evaluated characteristic differences in hospital records that belonged to Whites, Blacks and Hispanics.

Hypertension is one of the leading causes of morbidity and mortality in the United States and it was responsible for $55.5 billion in direct and indirect medical expenditures in 2004.[9]

METHODS

Study Sample

The in-patient data from the Florida Agency for Health Care Administration (AHCA) in 2001 was the source of the sample. From the public use hospital discharge file, records with a principal discharge diagnosis of essential hypertension were extracted. The diagnoses in the AHCA database were coded using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM). Records with ICD-9-CM codes of 401.0 or malignant hypertension, 401.1 or benign hypertension, and 401.9 or unspecified hypertension were included. Among 7,308 discharge records with essential hypertension, records that belonged to White, Black or Hispanic in-patients were included (N=7,102).

Three subcategories under the ICD-9-CM code (401) of essential hypertension or HBP with no identifiable cause are defined below. Malignant essential hypertension (401.0) is defined as very high blood pressure with swelling of the optic nerve (papilledema – grade IV Keith-Wagner hypertensive retinopathy) and usually accompanied by other organ damage such as heart failure, kidney failure, and hypertensive encephalopathy. Benign essential hypertension (401.1) is defined as mild-to-moderate elevation in blood pressure of prolonged duration without target organ (kidney, retina, heart) damage. Unspecified essential hypertension (4019.9) is used only when benign or malignant essential hypertension is not specified. The coders were instructed not to assume that hypertension was either malignant or benign without physician documentation.[11–13]

Measurements

The AHCA public use file contained clinical and demographic information with no personal identifiers. Therefore, the records are number of discharges and not the number of individual patients. Sociodemographic characteristics included were age (years), sex, race/ethnicity, and insurance status. The principal payer code or insurance status variable contains 14 categories. These 14 categories were collapsed into four mutually exclusive groups: 1) commercial (Health Maintenance Organizations or HMO and Preferred Provider Organizations or PPO); 2) federal/Medicare which included Medicare and other major federal carriers such as the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) and Veterans Administration (VA); 3) state/Medicaid, which included Medicaid and other state payers such as Worker's Compensation; and 4) others, which included underinsured, uninsured or charity. In addition, type of admission, discharge status, length of hospital stay (or LOS in days), and total hospital charges (USD) were included. All characteristics except age, LOS, and total charges were categorical in nature. Age was also dichotomized as above and below the median age of the hospitalized patients. Type of admission was dichotomized as emergency vs other reasons (urgent or elective). Discharge status was collapsed into three categories: 1) discharged home; 2) expired; and 3) discharged to another facility (short-term general hospital, intermediate-care or skilled nursing facility, and home health-care organization).

Statistical Analysis

Secondary analysis of the 2001 Florida Agency for Health Care Administration (AHCA) data was performed. The study sample was stratified into three race/ethnic groups: Whites, Blacks, and Hispanics. The SAS system for Windows, Release 10.0 (The SAS Institute, Cary, NC) was used to manage and analyze data. Racial/ethnic differences were evaluated using the chi-square tests. In addition, the mean (± standard error or SE) variations in age, LOS, and total charges by race/ethnicity were assessed using the univariate procedures and multiple regression models. Variations in LOS were adjusted for age, sex, and insurance status. Variations in total charges were adjusted for age, sex, insurance status and LOS.

RESULTS

The majority (68.7%) of the hospital records had a diagnosis of unspecified essential hypertension. About 2.0% and 29.3% of the records had benign and malignant essential hypertension, respectively. More than half of the records belonged to Whites (57.1%), 28.6% to Blacks and 14.3% to Hispanics. The majority of the patients were female (64.6%) and 35% of the patients were <54 years old. The average and median ages were 62.4, and 64 years, respectively (data not shown). About 68.8% of the admissions were due to emergency reasons and the majority of patients were discharged home (86.4%). Less than 1% expired in 2001 (Table 1).

No differences in sex distribution between three race/ethnic groups were found. However, all other characteristics were statistically significant between the three race/ethnic groups (P<.01). Fewer Hispanics (18.6%) were diagnosed with malignant hypertension then their Black (30.8%) and White (31.2%) counterparts (P<.01). More than three-quarters of the Black patients were younger than the median age (64 years) whereas the majority of Whites (60.3%) and Hispanics (50.4%) were >64 years. More Whites (35.9%) were admitted due to

Table 1. Discharge Records Relating to Essential Hypertension in Florida in 2001 (*N*=7,102)

	n	%	χ^2	*p*
Essential Hypertension: ICD-9-CM			478.64[a]	*
401.0: Malignant	2080	29.29		
401.1: Benign	144	2.03		
401.9: Unspecified	4878	68.68		
Sex			602.17[b]	*
Male	2517	35.44		
Female	4585	64.56		
Race/Ethnicity			2025.716[a]	*
Black	2029	28.57		
White	4057	57.12		
Hispanic	1016	14.31		
Sex, race/ethnicity			2927.40[c]	*
Black male	758	10.67		
Black female	1271	17.90		
White male	1352	19.04		
White female	2705	38.09		
Hispanic male	407	5.73		
Hispanic female	609	8.58		
Age (years)			1271.29[d]	*
≤ 54	2486	35.00		
55–64	1179	16.60		
65–74	1327	18.68		
75–84	1465	20.63		
> 84	645	9.08		
Type of admission†			1003.18[b]	*
Non-emergency	2216	31.21		
Emergency	4885	68.79		
Discharge Status			9177.94[a]	*
Discharged to home	6134	86.37		
Discharged to another care facility	956	13.46		
Expired	12	0.17		
Primary payer: insurance			2802.63[e]	*
Commercial: HMO & PPO	2117	25.40		
Federal: Medicare etc.	3452	23.56		
State: Medicaid etc.	687	25.98		
Others: underinsured and uninsured	846	25.06		

[a] 2 degrees of freedom or df; [b] 1 df; [c] 5 df; [d] 4 df; [e] 3 df
* $P<.01$
† 1 missing

a non-emergency reason compared with Blacks (24.2%) and Hispanics (26.5%). Similarly, more Whites (15.9%) were discharged to another care facilities followed by Hispanics (11.3%) and Blacks (9.7%). Minorities (Blacks and Hispanics) were more likely to be underinsured or uninsured compared with their White counterparts (Table 2).

The LOS and total hospital charges tend to vary by demographic indicators such as age, sex, and race/ethnicity. Conceivably, the LOS and charges may also vary by primary payer types or insurance status. There were no racial/ethnic differences in length of stay (LOS in days) among under-/uninsured or those with commercial insurance. Within the federal/Medicare group, Hispanics (3.7) and Blacks (3.4) stayed slightly longer than Whites (3.1). In the state/Medicaid group, the difference was significant only between Hispanics (3.6) and Whites (2.9) ($P<.05$). Blacks with federal/Medicare (3.4) payer tended to stay the longest in the hospital followed by the state/Medicaid (3.3), commercial (2.8), and under-/uninsured (2.7) groups. In Hispanic patients, the LOS varied between federal/Medicare (3.7), state/Medicaid (3.6), under-/uninsured (2.6) and commercial (2.5) payers. Among Whites, significant differences were found between federal/Medicare (3.1) with commercial (2.7) and under-/uninsured (2.5) groups (Figure 1). Significant variations in hospital charge (USD) by race/ethnicity were not detected among those with commercial insurance or that were under-/uninsured. Among those with federal/Medicare payer, charges for Whites were significantly less than their Black and Hispanic counterparts. Similarly, charges for Whites with state/Medicaid payer were significantly less compared with Hispanics only ($P<.01$). There were no significant differences between Blacks with commercial insurance and other insurance or payer types. Among Whites, those with commercial insurance were charged the highest followed by federal/Medicare, state/Medicaid, and under-/uninsured groups although the variations between state/Medicaid and other payer groups were not significant. Hispanics with federal/Medicare or state/Medicaid payers were charged higher than their under-/uninsured counterparts (Figure 2). Based on these findings, it was necessary to adjust for insurance status when racial/ethnic comparisons in length of stay and total charges were made.

When age was compared, Blacks were the youngest with the mean age (years) of 53.1 followed by Hispanics (63.6) and Whites (66.7). Racial/ethnic differences were statistically significant ($P<.01$) between all three pairs. Age-, sex-, and insurance-status-adjusted LOS varied, with White patients' stay being the shortest (2.9 days). The adjusted LOS was not different between Black and Hispanic patients. Statistically significant differences in LOS were found

Table 2. Race/ethnic variations in patient records of Florida in 2001

	Black (*n*=2029)		White (*n*=4057)		Hispanic (*n*=1016)			
	n	%	*n*	%	*n*	%	χ^2	*P*
Essential Hypertension: ICD-9-CM							76.77[a]	*
401.0: Malignant	625	30.80	1266	31.21	189	18.60		
401.1: Benign	28	1.38	80	1.97	36	3.54		
401.9: Unspecified	1376	67.82	2711	66.82	791	77.85		
Sex							20.67[b]	ns
Male	758	37.36	1352	33.33	407	40.06		
Female	1271	62.64	2705	66.67	609	59.94		
Age (years)								
≤ 54	1174	57.86	1017	25.07	295	29.04	914.72[c]	*
55–64	378	18.63	593	14.62	208	20.47		
65–74	280	13.80	818	20.16	229	22.54		
75–84	148	7.29	1121	27.63	196	19.29		
> 84	49	2.41	508	12.52	88	8.66		
Age group (years)							735.77[b]	*
≤ 64	1552	76.49	1610	39.68	503	49.51		
> 64	477	23.51	2447	60.32	513	50.49		
Type of admission†							97.48[b]	*
Non-emergency	492	24.25	1455	35.87	269	26.48		
Emergency	1537	75.75	2601	64.13	747	73.52		
Discharge Status							50.01[a]	*
Discharged to home	1830	90.19	3405	83.93	899	88.48		
Discharged to another care facility	196	9.66	645	15.90	115	11.32		
Expired	3	0.15	7	0.17	2	0.20		
Primary payer: insurance							880.62[d]	*
Commercial: HMO & PPO	684	33.71	1126	27.75	307	30.22		
Federal: Medicare etc.	548	27.01	2480	61.13	424	41.73		
State: Medicaid etc.	380	18.73	174	4.29	133	13.09		
Others: underinsured and uninsured	417	20.55	277	6.83	152	14.96		

[a] 4 degrees of freedom or df; [b] 2 df; [c] 8 df; [d] 6 df
ns=not significant
* $P<.01$
† 1 missing

between Whites and each race/ethnic minority group ($P<.01$). Total hospital charges appeared to vary between White and Hispanic groups. However, when total charges were adjusted for age, sex, insurance status, and LOS, they did not vary between any of the race/ethnicity pairs. Nonetheless, the charges were the highest among Hispanics, followed by Blacks and Whites (Table 3).

Proportional to the sample sizes, there were 7, 3, and 2 deaths among White, Black, and Hispanic patients, respectively, in 2001 (Table 2). Out of 12 deaths, 7 were females. Sex-, race/ethnic-specific frequency revealed that 33.3% (4 out of 12) were White females and 25.0% (3 out of 12) were White males. One-third of expired cases were in the 65–74 year-age range. The majority (75%) were admitted to hospitals for emergency reason. About 58.3% and 41.7% were admitted with unspecified and malignant essential hypertension, respectively. Eight of twelve (66.7%) individuals had Medicare as their primary payer (data not shown).

DISCUSSION

The AHCA report revealed that there were a total of 2,343,136 hospital discharge records from all nonfederal Florida hospitals in 2001.[14] Hospitalization for essential hypertension accounted for 0.3% of all hospitalization for the year. Outpatient and emergency department treatments for hypertension were not included in this report. This report presented data based on 7,102 hospital records for a racially and ethnically diverse sample in Florida. The findings indicated that Hispanics and Blacks were hospitalized less frequently than Whites. However, the prevalence of hypertension in Florida in 2001 was higher among Blacks compared with Whites or Hispanics.[6] Such discrepancy between self-reported disease prevalence and proportions that received hospital care should be evaluated in future studies in relation to insurance, or lack of, among Florida patients.

The results further indicated that the disparity existed in the type of hospital admission. Whereas the majority of patients in each race/ethnic group were admitted for emergency reason, substantially higher proportions were observed in Blacks and Hispanics compared with their White counterparts. It is possible that this reflects lowered utilization and access to preventive care (possibly due to lack of health insurance) among the minority populations (including Blacks and Hispanics), as documented in other contexts.[15–17]

The primary payer of more than 40% and 60% of Whites and Hispanics, respectively, was federal/Medicare type. Interestingly, the largest group that carried commercial HMO or PPO insurance was Blacks (33.7%) followed by Hispanics (30.2%), and Whites (27.7%). However, the proportions of

The findings indicated that Hispanics and Blacks were hospitalized less frequently than Whites.

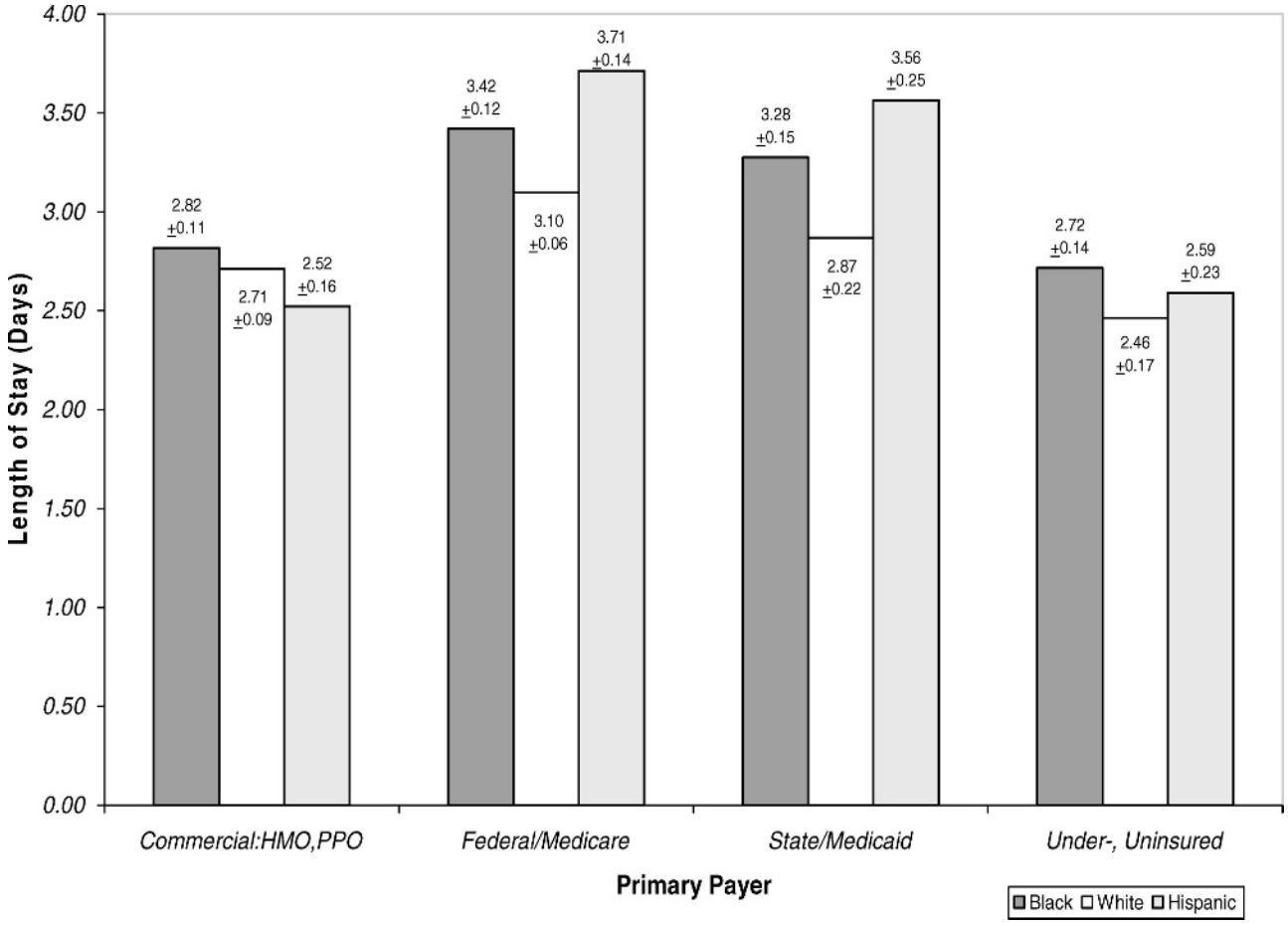

Fig 1. Unadjusted mean length of stay ± standard error by race/ethnicity and primary payer types

Groups	*Significant Pairs: Between Race/Ethnicity*
Commercial: HMO,PPO	None
Federal/Medicare	Black vs White†; Black vs Hispanic†; White vs Hispanic*
State/Medicaid	White vs Hispanic†
Others: Under-, Uninsured	None
	Significant Pairs: Between Primary Payer Types
Black	Commercial vs Federal*; Commercial vs State*; Federal vs Under/Uninsured†; State vs Under/Uninsured*
White	Commercial vs Federal*; Federal and Under/Uninsured†
Hispanic	Commercial vs Federal*; Commercial vs State*; Federal vs Under/Uninsured*; State vs Under/Uninsured*

* $P<.01$; † $P<.05$

under-/uninsured also followed the same pattern: Blacks (20.6%), Hispanics (15.0%) and Whites (6.8%). Variations in health status by insurance type within a race/ethnic group (eg, Blacks) should be explored in the future.

It should be noted that Blacks and Hispanics were more likely to be under-/uninsured and stay longer in hospitals compared with Whites. Persons without health coverage impose hidden costs upon society. The shorter lives and poorer health of those without insurance account for most of these costs.[18] Additional investment in health services that would remedy the worse health outcomes of under-/uninsured minorities in Florida is needed. Further, government and policymakers should consider the societal benefits and costs of, and investing in, universal health coverage or other alternative scenarios in order to reduce health disparities.

The employment status of hospitalized patients was not available in the database. However, while more than half of Whites and Hispanics were ≥65 years, substantially higher proportion of Blacks were ≤54 years compared with Whites or Hispanics. It is likely that more Blacks may be in the active workforce, which enables them to purchase commercial HMO or PPO as their primary health insurance. Blacks in this study were younger than the

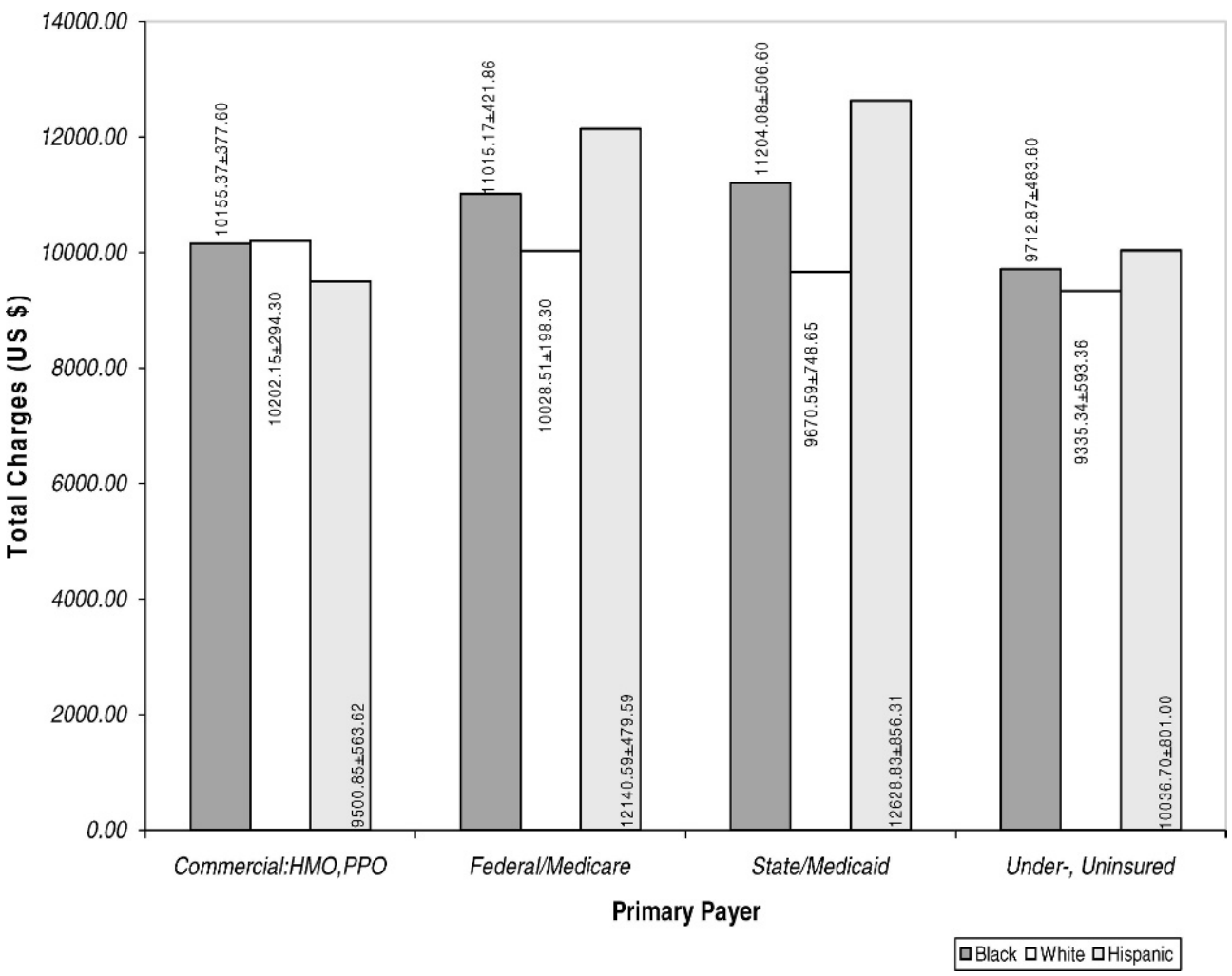

Fig 2. Unadjusted mean total charges ± standard error by race/ethnicity and primary payer types

Groups	*Significant Pairs: Between Race/Ethnicity*
Commercial: HMO,PPO	None
Federal/Medicare	Black vs White†; White vs. Hispanic*
State/Medicaid	White vs Hispanic*
Others: Under-, Uninsured	None
	Significant Pairs: Between Primary Payer Types
Black	Federal vs Under/Uninsured*; State vs. Under/Uninsured†
White	Commercial vs Federal*; Federal vs. Under/Uninsured†
Hispanic	Federal vs Under/Uninsured*; State vs. Under/Uninsured†

* $P<.01$ † $P<.05$;

median age of 64 years. This finding is consistent with prior studies[19–20] which documented that African Americans developed hypertension earlier in life and had higher rates of more severe hypertension (>180 systolic or >110 diastolic blood pressure in mmHg) than Whites. African Americans had significantly higher odds of uncontrolled hypertension than Whites after controlling for socioeconomic status.[21] Further, African Americans were about two times more likely not to adhere to medications compared with their White counterparts.[20] The disproportionate rates of premature morbidity and mortality from complications of uncontrolled hypertension among Blacks have significant public health implications. As a result, more Blacks suffered from complications such as left ventricular hypertrophy, end-stage renal disease and stroke.[22] Programs to improve hypertension management should focus on a better understanding of variations in the determinants of hypertension control among ethnic minorities to greatly

Table 3. Variations in age, length of stay and charges by race/ethnicity

	Black (n= 2029)		White (n=4057)		Hispanic (n=1016)		Significant
	Mean	SE	Mean	SE	Mean	SE	Pairs
Age (years)	53.08	0.36	66.73	0.25	63.58	0.5	Black & White (*) Black & Hispanic (*) White & Hispanic (*)
Unadjusted Length of Stay (days)	3.04	0.06	2.94	0.04	3.16	0.09	White & Hispanic (†)
Adjusted ‡ Length of Stay (days)	3.19	0.07	2.87	0.05	3.15	0.09	Black & White (*) Hispanic & White (*)
Unadjusted Total Charges (USD)	$10,493.05	$219.51	$10,014.03	$155.23	$11,092.11	$310.20	White & Hispanic (*)
Adjusted § Total Charges (USD)	$10,278.92	$156.72	$10,227.74	$107.85	$10,666.38	$210.43	None

* $P < .01$
† $P < .05$
‡ Adjusted for sex, age, and insurance status
§ Adjusted for sex, age, insurance status and length of stay

reduce the cardiovascular health disparities in Florida.

Although not all variations between race/ethnicity by insurance status were significant, Whites with commercial insurance incurred the highest hospital charge followed by federal/Medicare, state/Medicaid, and under-/uninsured types. Among Blacks and Hispanics, the highest charges were observed in state/Medicaid and federal/Medicare groups. Given the current fiscal realities at federal and state levels, this finding has important economic implications to society. Also, the finding is consistent with another study[23] that stated that minorities generally relied more heavily on public programs for assistance for medical care than the Whites. For example, more Black (29%) and Hispanic (25%) beneficiaries received drug benefits from Medicaid compared with Whites (5%).[23]

Death due to hypertension was highest among Whites followed by Blacks and Hispanics and the number of deaths was proportional to the sample size of each race/ethnic group. However, frequencies of discharge to another facility followed a different pattern with the highest frequency among the Whites, followed by Hispanics, and Blacks. Discharge status to another facility may be a surrogate indicator for severity of the condition. However, prolonged length of stay may be a more reliable surrogate indicator of disease severity. A better understanding of the reasons (lack of social support or severe disease condition) for prolonged length of stay could lead to effective reduction in the risk of extended hospital care. The AHCA database is limited in that information on disease severity and social support are not available. Considering the current healthcare financial realities, it seems likely that prolonged stay in hospital would be due to patients' conditions that need medical justification.

Another limitation is that the total number of recorded admissions/discharges could include persons who were discharged from one hospital and readmitted to another hospital in Florida during 2001. As unique personal-identifier (such as social security number) information was not available, it was not possible to identify individual admission/discharge. Transfer or discharge to another care facility in Florida may possibly inflate the sample size. Along the same line, those admitted to hospitals outside Florida, and those who moved out of Florida and subsequently died would not be included in the database. The missing data were thus likely to bias the reported results.

In addition, the accuracy of data collected for administrative purposes is uncertain. It is possible that some patients with essential hypertension treated in the Florida hospitals were not ascertained. While diseases of the cardiovascular system remain the most frequent reason for hospitalization, hypertension is the most common comorbidity in the United States.[24] Analysis of this report was restricted to the records with principal diagnosis of essential hypertension only. Hence, proportion of essential hypertension-related hospitalization in Florida may be underestimated. Future studies should link both inpatient and ambulatory/emergency department (ED) patient data to capture all patients treated for essential hypertension in the state. The State Center for Health Statistics should also collect or link to data that contain common complications associated with essential hypertension to assess the severity of illness.

In summary, differences by race/ethnicity in diagnostic codes, type of admission, discharge status, insurance status, and length of hospital stay existed for essential hypertension inpatients of Florida. Variations by race/ethnicity in length of stay remained significant after controlling for age, sex, and insurance status. However, there were no differences in age-, sex-, insurance type-, and length of stay-adjusted hospital charges (USD) between White, Black and Hispanic patients of Florida.

The existence of racial and ethnic disparities in health care represents an inefficient healthcare system and fails to provide equal health care to all individuals. Additionally, other social factors may contribute to race/ethnic disparities. The Institute of Medicine (IOM) committee reported that even among individuals with access to care, significant racial/ethnic disparities existed in the United States. The disparities were related to several factors such as discrimination, a fragmented US system for health care, and historic and contemporary social and economic inequality.[25] Policy makers have established a national goal of reducing cardiovascular disease health disparities by 2010.[26–27] To achieve this goal, further studies are needed to identify the causes of race/ethnic disparity in patients who receive medical care for essential hypertension. Such causes may include, but are not limited to, severity of disease, comorbidity, differential access to preventive care, and disproportionate levels of socioeconomic status, education, and health literacy between race/ethnic subgroups. Public health research models[28] to evaluate multi-factorial causation of disparities between race/ethnic groups are warranted.

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AUTHOR CONTRIBUTIONS

Design concept of study: Hlaing
Acquisition of data: Hlaing
Data analysis and interpretation: Hlaing
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