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Racial and Ethnic Differences in 30-Day Readmission and 1-Year Mortality among Patients Hospitalized for Heart Failure

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Abstract

Objective: Contemporary outcomes data among heart failure (HF) patients younger than age 65 are limited, especially among Hispanics. This study evaluated the association between race/ethnicity, 30-day readmission, and 1-year mortality among a diverse cohort of hospitalized HF patients overall and by age group.

Methods: This was a 1-year prospective study of consecutively hospitalized patients with an admission diagnosis of HF who participated in a NHLBI clinical outcomes study (N=407; 52% white, 25% Hispanic, 20% black, 3% Asian; 38% female; mean age 65 ± 15 years). Demographics, comorbidities, medications, and outcomes (30-day readmssion; death at 1-year) were systematically obtained by clinical information system. Multivariate logistic regression was used to evaluate associations between race/ethnicity and outcomes, adjusted for covariates.

Results: The 30-day readmission rate was 10% (n=41). By 1-year, 23% (n=94) of patients died. Hispanics had significantly higher odds of readmission versus whites/Asians (adjusted OR=3.1; 95% CI=1.4-6.9) and blacks (adjusted OR=3.6; 95%CI=1.2-10.3). These race/ethnic differences were observed among patients ≥ 65, but not <65 years old. In contrast, Hispanics had a lower 1-year death rate versus whites/Asians (16% versus 27%; p=0.03), not significant after covariate adjustment (adjusted OR=0.6; 95% CI=0.3-1.1), observed among patients ≥ 65 (OR=0.3; 95% CI=0.1-0.7), but not <65 years (OR=1.2; 95% CI=0.5-2.8).

Conclusion: Among patients hospitalized for HF, older, but not younger, Hispanics had a higher 30-day readmission rate versus others. In contrast, 1-year death rate was lower among older, but not younger, Hispanics versus whites/Asians.

Keywords: Heart failure; Race/Ethnicity; Rehospitalization; Mortality; Health policy; Outcomes research

Introduction

Heart failure (HF) is a leading cause of hospitalization in the United States (U.S.), resulting in over 1 million hospital discharges, and approximately $30.7 million in total costs annually [1]. Blacks and Hispanics may experience higher hospital readmission rates compared with whites [1,2], attributable in part to differences in several factors including socioeconomic status, hospital characteristics, and quality of care [3-6]. In contrast, 1-year mortality rates among hospitalized black and Hispanic HF patients have not been shown to substantially differ from, and may be lower than, rates among whites [3-6].

Research in this area has primarily been conducted among older HF patients ≥ 65 years of age. Contemporary outcomes data are limited for younger HF patients not enrolled in Medicare, especially among Hispanics. Prior data suggests that the race/ethnic differences in HF outcomes that exist among patients ≥ 65 years of age, may not be as great among HF patients <65 years old [7,8]. The purpose of this study was to evaluate the association between race/ethnicity and 30-day readmission, 1-year mortality, and demographic and clinical confounders in a diverse population of hospitalized HF patients with a wide age range above and below 65 years.

Methods

Study design and population

This was a 1-year prospective study of hospitalized patients with HF who participated in the National Heart, Lung, & Blood Institute-sponsored family cardiac caregiver investigation to evaluate outcomes (FIT-O) study. The design and methods of FIT-O have been previously described [9,10]. Briefly, FIT-O was an observational study to evaluate patterns of caregiving among cardiac patients and the association between having a caregiver and clinical outcomes of consecutively admitted cardiovascular service inpatients at a university medical centre (93% enrolment rate; N=4500) [9,10]. Patients were excluded from participation if: 1) they were unable to read or understand English or Spanish; 2) they lived in a full-time nursing facility; 3) mental status precluded participation; or 4) they refused to participate. FIT-O participants with an admission/primary diagnosis of HF (based on International Classification of Disease, Ninth Revision billing codes 425 or 428) and documented race/ethnicity were included in this analysis [study N=407; 20% black (n=83), 25% Hispanic (n=101), 55% white (n=213)/Asian (n=10)]. All research staff

members were Health Insurance Portability and Accountability Act trained. The study was approved by the Institutional Review Board of Columbia University Medical Centre (CUMC).

Baseline measures

Participant medical records were accessed via a secure and comprehensive electronic clinical information system. Race/ethnicity (white, black, Hispanic, Asian, Native American, and Pacific Islander, not reported/unknown) and other demographic variables (age, sex, and health insurance type), clinical conditions, and prescribed discharge medications were documented by standardized electronic chart review conducted by systematically trained research assistants. Race/ethnicity, age, sex and health insurance type were obtained from patient self-reported registration data. Caregiver status (i.e. having a paid professional or informal (nonpaid) person who assists the patient with medical and/or preventive care), which we have previously shown to be associated with rehospitalisation [10,11], was assessed by standardized questionnaire administered to each participant at baseline.

Clinical conditions documented at baseline included HF etiology (ischemic versus non-ischemic), hypertension, diabetes, renal failure/dialysis, and peripheral vascular disease, and were determined using International Classification of Disease, Ninth Revision billing codes and physician or nurse practitioner notes. Prescribed discharge medication types (inotrope, statin, angiotensin converting enzyme inhibitor (ACE I)/angiotensin II receptor blocker (ARB), beta blocker, calcium channel blocker, and diuretic) were obtained from discharge notes and supplemented by the ambulatory electronic records.

Clinical outcomes

The primary clinical outcomes of interest were all-cause 30-day readmission to the medical centre, and 1-year mortality. Readmissions and deaths were systematically obtained using the hospital electronic clinical information systems which are updated daily with admission data and monthly with death dates obtained from the Social Security Death Index [12,13]. The patients' admission date, admission diagnosis, and primary diagnosis for the index hospitalization and for each readmission were recorded. Readmission diagnoses were categorized (for HF versus not for HF) using International Classification of Disease, Ninth Revision codes. To supplement readmission data obtained using the clinical information system, patients were systematically interviewed by telephone or mailed survey 1 year after the index hospitalization and queried regarding rehospitalisation in the previous year (82% response rate). Analyses supplemented by survey data yielded similar results to those obtained using clinical information system data only; therefore clinical information system data were utilized to evaluate 30-day readmission. Readmission was defined as readmission to the medical centre for HF or other reasons (all cause). To minimize the chance of missing data, vital status or death date was accessed from the system 6 months after each participant's 1-year follow-up date.

Statistical analysis

Descriptive data are presented as frequencies and percentages. Race/ethnic group was categorized as black, Hispanic, or white/Asian. Health insurance type was defined as Medicaid versus other/no health insurance type. Paid caregiving was defined as having a paid caregiver prior to admission and/or planning to have a paid caregiver after discharge versus no paid caregiver.

Chi-square statistics were utilized to determine the associations between race/ethnic group and demographics, clinical conditions, discharge medications, and outcomes. Participants who were both readmitted at 30-days and dead at 1-year were included in estimates for both outcomes. Odds ratios were calculated to estimate the effect size of associations. The independent association between race/ethnic group and clinical outcomes, adjusted for demographics, caregiving, clinical conditions, and prescribed discharge medications, was estimated using logistic regression. Logistic regression models were built in 5 stages: 1) a base model of the association between race/ethnic group (black or Hispanic versus white/other) and each clinical outcome, 2) the base model adjusted for demographics (demographic adjusted model), 3) the base model adjusted for having a paid caregiver (caregiving adjusted model), 4) the base model adjusted for clinical conditions and discharge medications (clinical condition adjusted model), and 5) the base model adjusted for demographics, paid caregiving, clinical conditions and discharge medications (fully adjusted model). The Hosmer-Lemeshow test was used to evaluate goodness of fit for each model.

Stratified analyses were conducted to evaluate whether the association between race/ethnic group and 1) 30-day readmission or 2) death at 1-year, varied by age group (≥ 65 years versus <65 years); the Breslow-Day test for homogeneity of the odds ratios was used to determine whether there were significant differences in stratum specific odds ratios. Small stratum specific cell counts rendered the validity of logistic models with interaction terms questionable, therefore crude results of the stratified analyses are reported. Analyses were conducted using SAS software (version 9.3, SAS Institute, Cary, NC). Statistical significance was set at $p<0.05$.

Results

The baseline characteristics of the study population are presented in Table 1. Participants excluded due to missing race/ethnicity data (n=30) did not significantly differ from included participants based on demographics, clinical conditions, or prescribed discharge medications, except excluded participants were more likely than included participants to have a paid caregiver, diabetes, or peripheral vascular disease.

	White/ Asian* (N=223) [A]	Black (N=83) [B]	Hispanic (N=101) [C]	p-value
	n (%)	n (%)	n (%)	
Demographic conditions				
Age ≥ 65	126 (57)^{BC}	34 (41)^{A}	44 (44)^{A}	0.02
Men	158 (71)^{BC}	45 (54)^{A}	51 (51)^{A}	0.0005
Medicaid vs. other/No health insurance	20 (9)^{BC}	20 (24)^{A}	26 (26)^{A}	<0.001
Paid caregiver prior to admission or post discharge	52 (23)^{C}	23 (28)	38 (38)^{A}	0.03
Clinical conditions				
Ischemic heart failure	87 (39)	24 (29)	33 (33)	0.21

Hypertension	119 (54)[C]	53 (64)	71 (70)[A]	0.01
Diabetes	74 (33)	23 (28)[C]	44 (44)[B]	0.06
Renal failure/Dialysis	73 (33)	29 (35)	34 (34)	0.93
Peripheral vascular disease	32 (14)	7 (8)	11 (11)	0.31
Medications at discharge				
Inotrope	63 (28)	30 (36)[C]	23 (23)[B]	0.13
Statin	132 (59)	40 (48)	57 (56)	0.23
Ace/ARB	109 (49)	50 (60)	52 (52)	0.21
Beta blocker	161 (72)	65 (78)	75 (74)	0.55
Calcium channel blocker	29 (13)	17 (21)	17 (17)	0.25
Diuretic	173 (78)	65 (78)	78 (77)	0.98

Table 1: Baseline characteristics of the study population by race/ethnic group (N=407). Superscript letter denotes statistically significant difference between column percentages at p<0.05. *n=10 Asian.

The mean participant age was 65 ± 15 years. Black and Hispanic patients were younger and more likely to be female compared with white/Asian patients. There was no statistically significant difference in rates of ischemic etiology of HF by racial/ethnic group. Hypertension and diabetes were most prevalent among Hispanic patients. The prevalence of end-stage renal disease and peripheral vascular disease, as well as the frequency of prescriptions for standard HF medication, was similar among all three groups.

The overall 30-day readmission rate was 10% (n=41) and the majority of 30-day readmissions were for HF (61%). At 1-year, 23% (n=94) of patients had died. In the univariate analysis (Table 2), Hispanic patients had a higher all-cause 30-day readmission rate compared with whites/Asians and blacks (20% versus 7% and 6%, respectively; p<0.001). Odds of readmission at 30-days were not significantly different between blacks and whites/Asians. Additional significant predictors of higher all-cause 30-day readmissions included having a paid caregiver, diabetes, and peripheral vascular disease.

	Readmission (All cause) 30-Days (n=41)	**Death (All cause) 1-Year (n=94)**
Demographics		
Race/Ethnicity		
Black vs. White/Asian	0.83 (0.29, 2.34)	0.75 (0.41, 1.37)
Hispanic vs. White/Asian	3.19 (1.58, 6.47)	0.51 (0.28, 0.94)
Hispanic vs. Black	3.85 (1.38, 10.77)	0.68 (0.32, 1.43)
Age ≥ 65	1.05 (0.55, 2.00)	2.07 (1.29, 3.33)
Men	1.18 (0.60, 2.33)	1.08 (0.67, 1.75)
Medicaid vs. Other/No health insurance type	1.07 (0.45, 2.53)	1.08 (0.58, 2.00)
Paid caregiver prior to admission or post discharge	1.99 (1.03, 3.87)	1.90 (1.67, 3.10)
Clinical conditions		
Ischemic heart failure	1.49 (0.78, 2.87)	1.25 (0.78, 2.01)
Hypertension	1.96 (0.95, 4.03)	0.84 (0.52, 1.33)
Diabetes	2.15 (1.12, 4.12)	1.03 (0.63, 1.67)
Renal failure/Dialysis	1.84 (0.96, 3.53)	1.04 (0.64, 1.69)
Peripheral vascular disease	2.23 (0.99, 5.00)	1.51 (0.78, 2.90)
Discharge medications		
Inotrope	0.79 (0.37, 1.67)	1.24 (0.75, 2.04)
Statin	1.57 (0.80, 3.08)	0.68 (0.43, 1.08)
Ace/ARB	1.21 (0.63, 2.32)	0.39 (0.24, 0.63)
Beta blocker	0.73 (0.36, 1.48)	0.49 (0.30, 0.81)
Calcium channel blocker	1.14 (0.48, 2.70)	0.44 (0.20, 0.95)
Diuretic	0.88 (0.41, 1.87)	0.93 (0.54, 1.60)

Table 2: Univariate associations between participant characteristics, 30-day readmission and 1-year mortality.

	Age ≥ 65 years		**Age <65 years**		**Breslow-Day p**
	n/N	**OR (95% CI)**	**n/N**	**OR (95% CI)**	
30-day readmission					
Hispanic versus White/Asian	14/44 7/126	7.9 (2.9-21.4)	6/57 9/97	1.2 (0.4-3.4)	0.008
Hispanic versus Black	14/44 0/34	31.7 (1.8-555.9)*	6/57 5/49	1.0 (0.3-3.6)	0.004
Black versus White/Asian	0/34 7/126	0.3 (0.01-4.5)*	5/49 9/97	1.1 (0.4-3.5)	0.16
1-Year mortality					
Hispanic versus White/Asian	6/44 45/126	0.3 (0.1-0.7)	10/57 15/97	1.2 (0.5-2.8)	0.03
Hispanic versus Black	6/44 9/34	0.4 (0.1-1.3)	10/57 9/49	0.9 (0.3-2.6)	0.32
Black versus White/Asian	9/34 45/126	0.6 (0.3-1.5)	9/49 15/97	1.2 (0.5-3.1)	0.31

Table 3: Age-stratified analysis of the associations between race/ethnic group, 30-day readmission and 1-year mortality. *OR estimated by imputing value of 0.5 to replace zero count for number of blacks ≥65 years readmitted at 30-days.

Hispanic patients had significantly lower frequency of death at 1-year compared with white/Asian patients (16% versus 27%; p=0.03). Odds of death for Hispanic versus black and black versus white/Asian patients were not significantly different (Table 2). Other predictors of 1-year mortality include age ≥ 65 years and having a paid caregiver.

Lower odds of 1-year mortality were associated with ACE-I/ARB, beta-blocker, and calcium channel blocker prescription at discharge.

In the age-stratified analysis, significantly higher odds of readmission at 30-days was observed among Hispanic patients ≥ 65 years, but not among those <65 years compared to their white/Asian and black counterparts (Table 3). Odds of 30-day readmission among blacks versus white/Asians did not vary by age group. Odds of death at 1-year were significantly lower among Hispanics compared to whites/Asians ≥ 65 years old; odds of death at 1-year were similar among Hispanics versus whites <65 year old and did not vary by age group among blacks versus whites/Asians or among blacks versus Hispanics.

In the multivariate analysis, the increased odds of 30-day all-cause readmission for Hispanics versus blacks and whites/Asians remained statistically significant after adjustment for demographic and clinic conditions (Table 4a).

	All-cause readmission at 30-days post-discharge				
	Base model	**Demographic adjusted model**	**Caregiving adjusted model**	**Clinical condition adjusted model**	**Fully adjusted model**
	OR (95%CI)	**OR (95%CI)**	**OR (95%CI)**	**OR (95%CI)**	**OR (95%CI)**
Race/Ethnicity					
Black vs. White/Asian	0.83 (0.29, 2.34)	0.93 (0.32, 2.68)	0.81 (0.29, 2.28)	0.87 (0.30, 2.53)	0.88 (0.30, 2.63)
Hispanic vs. White/Asian	3.20 (1.58, 6.47)	3.65 (1.73, 7.72)	2.96 (1.45, 6.05)	3.18 (1.52, 6.66)	3.14 (1.43, 6.88)
Hispanic vs. Black	3.85 (1.38, 10.77)	3.93 (1.40, 11.03)	3.67 (1.31, 10.31)	3.65 (1.27, 10.49)	3.55 (1.23, 10.27)
Age ≥ 65	-	1.20 (0.61, 2.34)	-	-	0.79 (0.37, 1.67)
Men	-	1.48 (0.72, 3.02)	-	-	1.49 (0.70, 3.18)
Medicaid vs. Other/No health insurance type	-	0.84 (0.34, 2.07)	-	-	0.91 (0.36, 2.32)
Paid caregiver prior to admit or post discharge vs. None	-	-	1.74 (0.88, 3.44)	-	1.74 (0.83, 3.65)
Ischemic heart failure	-	-	-	1.23 (0.59, 2.57)	1.22 (0.58, 2.58)
Hypertension	-	-	-	1.33 (0.59, 2.99)	1.42 (0.61, 3.28)
Diabetes	-	-	-	1.40 (0.67, 2.92)	1.35 (0.64, 2.83)
Renal failure/Dialysis	-	-	-	1.52 (0.73, 3.15)	1.48 (0.70, 3.13)
Peripheral vascular disease	-	-	-	1.87 (0.76, 4.59)	1.88 (0.76, 4.63)
Inotrope	-	-	-	1.09 (0.48, 2.47)	1.17 (0.51, 2.70)
Statin	-	-	-	1.25 (0.57, 2.76)	1.27 (0.58, 2.81)
Ace/ARB	-	-	-	1.32 (0.64, 2.74)	1.37 (0.65, 2.85)
Beta blocker	-	-	-	0.65 (0.30, 1.41)	0.64 (0.29, 1.42)
Calcium channel blocker	-	-	-	0.75 (0.29, 1.93)	0.72 (0.27, 1.92)
Diuretic	-	-	-	0.86 (0.37, 2.01)	0.81 (0.34, 1.91)

Table 4a: Multivariate adjusted association between race/ethnic group and all-cause readmission 30-days post discharge.

In the multivariate analysis of the association between race/ethnicity and 1-year mortality, the decreased odds of death among Hispanic patients versus whites/Asians did not retain statistical significance after adjustment for demographic factors, including age, sex, and health insurance type (Table 4b). Age ≥ 65 and having a paid caregiver remained significant independent predictors of higher 1-year mortality in the fully adjusted model. Discharge prescription of ACE-I/ARBs, beta-blockers, and calcium channel blockers, were significant predictors of lower 1-year mortality in the fully adjusted model.

Discussion

In this prospective evaluation of clinical outcomes among diverse HF patients up to 1-year after hospital discharge, we documented 3-fold higher odds of hospital readmission at 30-days among Hispanic patients compared with blacks and whites/Asians, which was limited to individual's ≥ 65 years old. In contrast, 1-year mortality among Hispanic patients was approximately 50% lower compared with white/Asian patients; this result was explained, in part, by younger age.

	Death at 1-year post-discharge				
	Base model	**Demographic adjusted model**	**Caregiving adjusted model**	**Clinical condition adjusted model**	**Fully adjusted model**
	OR (95%CI)	**OR (95%CI)**	**OR (95%CI)**	**OR (95%CI)**	**OR (95%CI)**
Race/Ethnicity					
Black vs. White/Asian	0.75 (0.41, 1.37)	0.80 (0.43, 1.50)	0.72 (0.39, 1.32)	0.91 (0.48, 1.73)	1.01 (0.51, 2.00)
Hispanic vs. White/Asian	0.51 (0.28, 0.94)	0.53 (0.28, 1.00)	0.45 (0.24, 0.84)	0.54 (0.29, 1.03)	0.55 (0.28, 1.10)
Hispanic vs. Black	0.68 (0.32, 1.43)	0.66 (0.31, 1.40)	0.62 (0.29, 1.33)	0.60 (0.27, 1.31)	0.55 (0.24, 1.23)
Age ≥ 65	-	2.03 (1.25, 3.31)	-	-	2.87 (1.62, 5.09)
Men	-	1.05 (0.64, 1.74)	-	-	1.30 (0.75, 2.25)
Medicaid vs. Other/No health insurance type	-	1.37 (0.72, 2.63)	-	-	1.45 (0.71, 2.93)
Paid caregiver prior to admit or Post discharge vs. none	-	-	2.11 (1.28, 3.49)	-	2.00 (1.14, 3.51)
Ischemic heart failure	-	-	-	1.39 (0.79, 2.43)	1.25 (0.70, 2.24)
Hypertension	-	-	-	1.05 (0.61, 1.78)	0.88 (0.50, 1.54)
Diabetes	-	-	-	1.16 (0.67, 2.02)	1.09 (0.61, 1.94)
Renal failure/Dialysis	-	-	-	0.86 (0.50, 1.48)	0.72 (0.41, 1.27)
Peripheral vascular disease	-	-	-	1.41 (0.68, 2.91)	1.41 (0.66, 2.98)
Inotrope	-	-	-	1.43 (0.82, 2.51)	1.67 (0.94, 3.00)
Statin	-	-	-	0.76 (0.44, 1.33)	0.62 (0.35, 1.11)
Ace/ARB	-	-	-	0.41 (0.24, 0.69)	0.42 (0.24, 0.73)
Beta blocker	-	-	-	0.48 (0.27, 0.85)	0.43 (0.24, 0.78)
Calcium channel blocker	-	-	-	0.42 (0.18, 0.97)	0.33 (0.14, 0.79)
Diuretic	-	-	-	1.30 (0.68, 2.45)	1.44 (0.74, 2.81)

Table 4b: Multivariate adjusted association between race/ethnic group and death at 1-year post discharge.

The paradoxical observation that Hispanic HF patients have higher readmission rates and lower mortality rates versus non-Hispanics has been shown in prior research conducted in large national, and state wide studies [3,14]. The higher overall 30-day readmission rate for Hispanic patients in our study was over two-times that for white/Asian patients (20% versus 7%). This is somewhat larger than differences shown in other studies, and in part may reflect a substantially lower readmission rate among whites/Asians in our study. For example, in a study of Medicare enrolled patients with HF discharged between 2006 and 2008, 30-day readmission rates among Hispanics was 27.9% compared with 25.9% among whites [3]. In another study of Medicare patients discharged for HF between 2005-2011 Hispanics had the highest 30-day readmission rates of any race/ethnic group (26.3%), but the difference compared to non-Hispanic whites (23.0%) was smaller than what was observed in our study [5]. Other studies have documented higher readmission rates among black versus non-Hispanic white HF patients [4,6,15,16]. This was not observed in our study where black patients had the lowest overall 30-day readmission rate.

Reasons for higher readmission rates among Hispanic HF patients versus others may include patient and environmental-level factors. Hispanic patients in our study, as in other studies, had higher frequency of comorbidities such as diabetes and hypertension [8,17,18]. Past research has shown Hispanic patients may be less likely than whites to seek regular care from a private doctor's office or to have access to preventative services [19,20]. Hispanic ethnicity has also been show to predict more emergency department visits for an acute HF exacerbation [21] and non-white race has been linked to use of the emergency department for HF care [22]. Language barriers, lower acculturation, and lower overall health literacy have also been cited as key factors that may adversely influence health behaviors and clinical outcomes among Hispanics versus others [23-25]. Our observation that higher 30-day readmission was experienced by Hispanic HF patients ≥ 65 years old, and not among those <65 years old suggests

that conditions linked to both age and ethnicity contribute to the disparity.

Our study documented lower odds of mortality at 1-year among Hispanic patients versus non-Hispanic whites/Asians. The association was observed among patients ≥ 65 years of age and not among HF patients <65 years old. The data showing lower mortality among Hispanic HF patients ≥ 65 years old is consistent with contemporary national data among Medicare-enrollees [5]. Our data are unique compared with many current studies of race and HF outcomes, because they also include patients under 65 years old. This is especially important given Hispanics with HF tend to be younger than other HF patients [17,18], and older Hispanic HF patients may have overcome competing mortality risks, or differ from younger Hispanic patients in tangible ways that may impact outcomes such as acculturation level [25-28], severity of comorbidity [8,17,18], and medical adherence self-efficacy [7,24,29,30]. Moreover, due in part to the age range in our study and unlike many other studies, our patient population is not limited to Medicare participants. Enrolment in Medicare may in itself influence access to healthcare and the outcomes studied [21,31].

There are limitations to this study. We did not have measures to adjust for specific clinical parameters such as metabolic syndrome, cardiovascular function, cardiac resynchronization therapy, or physical activity level [32-35]; or for select socio-economic conditions such as household or neighbourhood-level income, or other factors that may contribute to observed racial/ethnic disparities in HF outcomes including education level, health literacy, or acculturation [5,23-25,36-39]. However, we were able to adjust for Medicaid enrolment as a measure of socio-economic status. It may be important to study other factors such as miRNAs, or the role of β-adrenergic receptors, not addressed in this cohort study, to assess the independent association between race/ethnicity and outcomes [40,41]. We cannot exclude the possibility that rate of readmissions to other hospitals, or reporting of death via Social Security Death Index, was differential by race/ethnicity. But, our results were similar when outcomes were supplemented by survey data regarding outside hospitalizations at 1-year. Finally, this was a single-site study, which limited our ability to evaluate the impact of hospital-level factors (e.g. hospital quality) on outcomes [3,4,42].

In conclusion, this study documented significantly higher odds of 30-day readmission among Hispanic HF patients which was not fully explained by factors measured in this study. Lower 1-year mortality rates among Hispanic HF patients versus whites/Asians, were explained, in part, by younger age and future studies should examine additional clinical factors that could confound the associations we observed between race and ethnicity in clinical outcomes among patients with HF.

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