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ORIGINAL RESEARCH

Impact of Race and Ethnicity on Use and Outcomes of Septal Reduction Therapies for Obstructive Hypertrophic Cardiomyopathy

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BACKGROUND: Information on impact of race and ethnicity on use and early outcomes of septal reduction therapies (SRTs) for obstructive hypertrophic obstructive cardiomyopathy are limited.

METHODS AND RESULTS: Using the National Inpatient Sample from January 2012 through December 2019, we identified all adult admissions with a primary diagnosis of obstructive hypertrophic cardiomyopathy and those undergoing SRT. Predictors of receiving SRT and outcomes including in-hospital mortality, complications, and resource use were evaluated in racial and ethnic groups. Among a total of 18 895 adult admissions with obstructive hypertrophic cardiomyopathy, SRT was performed in 7255 (38.4%) admissions. Septal myectomy was performed in 4930 (26.1%), while alcohol septal ablation was performed in 2325 (12.3%). In adjusted analysis, Black patient (versus White patient adjusted odds ratio, 0.65 [95% CI, 0.57–0.73]; $P<0.001$) and Hispanic patient admissions (versus White adjusted odds ratio, 0.78 [95% CI, 0.66–0.92]; $P=0.003$) were less likely to receive SRT. Among admissions undergoing SRT, in-hospital mortality was significantly higher for Hispanic (adjusted odds ratio, 3.38 [95% CI, 1.81–6.30], $P<0.001$) and other racial and ethnic groups (adjusted odds ratio 2.02 [95% CI, 1.00–4.11]; $P=0.05$) compared with White patient admissions, whereas Black patient admissions had comparable mortality. Black, Hispanic, and other ethnic group patients had higher rates of SRT complications and more frequent dismissals to acute care facilities.

CONCLUSIONS: Among obstructive hypertrophic cardiomyopathy hospitalizations, minoritized racial groups were less likely to receive SRT. Importantly, hospitalizations of Hispanic and other ethnic patients undergoing SRT had significantly higher in-hospital mortality and complication rates. Further studies with granular echocardiographic information to assess indications for SRT are needed to better understand these differences.

Key Words: disparities ■ ethnicity ■ hypertrophic cardiomyopathy ■ race ■ septal reduction

Hypertrophic obstructive cardiomyopathy (HCM) limits functional capacity because of symptoms including dyspnea, chest pain, and syncope and can result in sudden cardiac death.[1] While medical therapy improves functional capacity and provides symptomatic relief in some patients, septal reduction therapy (SRT) is necessary for many patients whose symptoms do not respond to conservative management or have limiting side effects of medications. SRT to relieve left ventricular outflow tract obstruction can be achieved by surgical septal myectomy or alcohol septal ablation.[2–4] Septal myectomy is preferred in many comprehensive HCM centers, but the procedure is not performed at all institutions, and limited experience has been associated with increased operative risk.[5,6] Alcohol septal ablation is another technique for septal reduction, and early outcomes

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CLINICAL PERSPECTIVE

What Is New?

- Minoritized racial and ethnic groups were less likely to undergo septal reduction therapy when hospitalized for obstructive hypertrophic cardiomyopathy.
- Higher in-hospital mortality and frequent complications were identified in hospitalizations of Hispanic and other ethnic patients undergoing septal reduction in comparison with other race groups.

What Are the Clinical Implications?

- A greater emphasis on providing equitable care and improving access to care is necessary to mitigate disparities in use of septal reduction therapies.
- Further investigations are required to understand whether differences in outcomes after septal reduction procedures are related to phenotypic/pathophysiologic characteristics or patterns of care.

Nonstandard Abbreviations and Acronyms

HCM	hypertrophic cardiomyopathy
HCUP	Healthcare Cost and Utilization Project
NIS	National (Nationwide) Inpatient Sample
PCS	Procedure Coding System
SRT	septal reduction therapy

are considered comparable with surgical myectomy.[4,7,8] Despite the potential greater need for reintervention and inferior results with late outflow tract gradient relief, septal ablation may be preferred in those at high risk for surgery.[4,8]

It is unclear, however, whether access to SRT and associated benefits is equitable across all racial and ethnic groups in the United States. Previous studies from single centers suggest that Black patients with HCM may be underdiagnosed and underreferred for septal myectomy.[9,10] Women with HCM also tend to present late for SRT with more symptoms and have poorer survival compared with men.[11,12] Additionally, marginalized races more often belong to low-income groups, which, in addition to difficult social conditions, may limit access to recommended care or to comprehensive HCM centers where both SRT procedures are available. Therefore, using a contemporary nationally representative database, we investigated possible racial and ethnic disparities in use and outcomes associated with SRT.

METHODS

All data used for this study are publicly available and can be accessed through the Healthcare Cost and Utilization Project (HCUP)-National (Nationwide) Inpatient Sample (NIS) database (https://www.hcup-us.ahrq.gov/).[13] The NIS is an all-payer administrative database of hospital inpatient stays and represents a 20% stratified sample of US inpatient hospitalizations across the country.[13] Databases from the HCUP use *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*), and *Tenth Revision*, *Clinical Modification* (*ICD-10-CM*) diagnosis and procedure codes, with up to 40 diagnosis codes for each admission. Institutional Review Board approval was not required because of the publicly available nature of this deidentified database.

Adult admissions (aged ≥18 years) with a primary diagnosis of obstructive HCM based on *ICD-9-CM* 425.11 and *ICD-10-CM* I42.1 and with information on race and ethnicity were identified using the HCUP-NIS data from January 2012 through December 2019. All admissions with a diagnosis of aortic stenosis were excluded to differentiate obstructive HCM and left ventricular hypertrophy secondary to aortic valve disease. Surgical septal myectomy was identified using a concomitant procedure code *ICD-9-CM* Procedure Coding System (PCS) code 37.33 and *ICD-10-CM* PCS codes 02BM0ZZ, 02BL0ZZ, 025L0ZZ, 025M0ZZ. Alcohol septal ablation was identified using *ICD-9* PCS 37.34 and *ICD-10* PCS 025L3ZZ, 025M3ZZ, 02BL3ZZ, 02BM3ZZ codes. Deyo's modification of the Charlson comorbidity index was used to estimate the burden of comorbid diseases.[14] Concomitant cardiac operations were identified using *ICD* PCS codes for all major cardiac operations. Race and ethnicity were classified as White, Black, Hispanic, and Others (Asian or Pacific Islander, Native American, Others). Coding for "Race" in NIS combines "race" and "ethnicity" provided by the data source into 1 data element (RACE). If both "race" and "ethnicity" were available, ethnicity was preferred over race in setting the HCUP value for "RACE."[13] The HCUP-NIS classifies hospitals on the basis of size (small, medium, and large), location and teaching status (rural, urban nonteaching, urban teaching), and region (Northeast, Midwest, South, West) (Table S1).[13]

The primary outcomes of interest were disparities based on race and ethnicity in the use and outcomes of SRT. The secondary outcomes included differences in hospitalization costs, hospital length of stay, discharge disposition, and other clinical events. We also evaluated possible disparities in SRT subgroups of septal myectomy and alcohol septal ablation.

Statistical Analysis

Discharge weights provided with the HCUP-NIS database were used to generate national estimates as

recommended by HCUP-NIS.[15] The inherent restrictions of the HCUP-NIS database related to research design, data interpretation, and data analysis were reviewed and addressed.[15] Categorical variables are expressed as percentages and compared with the Pearson chi-square test or Fisher exact test. Continuous variables are reported as mean±SD or median (interquartile range) and were compared using ANOVA. The association of race and ethnicity with the use of SRT and in-hospital mortality after SRT was analyzed using a multivariable hierarchical logistic regression analysis adjusting for age, sex, primary payer status, median household income quartile, hospital characteristics, comorbidity index score, concomitant cardiac procedures, ventricular arrhythmias, and year of admission. The associated risk for each variable of interest was expressed as odds ratio (OR) with a corresponding 95% CI. All *P* values were based on 2-sided tests and were considered statistically significant at $P<0.05$. Analyses were performed using SPSS v25.0 (IBM Corp, Armonk, NY).

RESULTS

Over the 8-year study period, there were a total of 18 895 adult admissions with obstructive HCM. Among these, SRT was performed in 7255 (38.4%) admissions. Septal myectomy was performed in 4930 (26.1%) while alcohol septal ablation was performed in 2325 (12.3%). Admissions that underwent SRT had lower mean comorbidity index scores (2.6±1.8 versus 2.8±2.1; $P<0.001$) and more often received care at large and teaching hospitals compared with admissions not receiving SRT (Table S2).

Baseline characteristics of admissions with obstructive HCM are stratified by racial and ethnic groups and shown in Table 1. Compared with admission of White patients, patients belonging to Hispanic and other ethnicities or races were younger, more often belonged to lower-income quartiles, had lower comorbidity index scores, and less often underwent a concomitant major cardiac operation.

Use of SRTs

When the use of SRT was compared among racial and ethnic groups, a lower proportion of admissions belonging to Black (20.9%), Hispanic (28.7%), and other race patients (32.6%) underwent SRT when compared with White patient (43.1%) obstructive HCM admissions, respectively (Figure [A]). After adjustment for differences in demographics, hospital characteristics, comorbidities, and elective status, Black patient (versus White patient, adjusted OR, 0.65 [95% CI, 0.57–0.73]; $P<0.001$) and Hispanic patient admissions (versus White patient, adjusted OR, 0.78 [95% CI, 0.66–0.92]; $P=0.003$) were less likely to receive SRT (Figure [B]). Female sex, large-sized hospitals, teaching hospitals, elective admission, and receipt of a concomitant major cardiac operation were associated with higher odds of receiving a SRT (Table S3).

In subgroup analyses, similar to the primary findings, use of septal myectomy was lower in Black (adjusted OR, 0.62 [95% CI, 0.54–0.72]; $P<0.001$), Hispanic (adjusted OR, 0.80 [95% CI, 0.68–0.95]; $P=0.01$), and other racial and ethnic patients (adjusted OR, 0.76 [95% CI, 0.63–0.91]; $P=0.003$) obstructive HCM admissions when compared with White patient admissions. However, there were no racial and ethnic differences observed in the use of alcohol septal ablation in adjusted analysis.

Differences in Outcomes After Septal Reduction Among Racial and Ethnic Groups

Characteristics of patient admissions undergoing SRT are shown in Table S4 stratified by race and ethnicity. In unadjusted analysis (Table 2), Black patient admissions had lower in-hospital mortality for SRT compared with White patient admissions (0.9% versus 1.4%), whereas Hispanic and other ethnic and racial patient admissions had higher in-hospital mortality (4.2% and 2.8% versus 1.4%; $P<0.001$). In the adjusted analysis, however, Hispanic (adjusted OR, 3.38 [95% CI, 1.81–6.30]; $P<0.001$) and other racial and ethnic group patients (adjusted OR, 2.02 [95% CI, 1.00–4.11]; $P=0.05$) had higher adjusted in-hospital mortality compared with White patient admissions undergoing SRT, whereas Black patient admissions had comparable in-hospital mortality (Table 3).

Black, Hispanic, and other racial and ethnic group patients had higher rates of new implantable cardioverter-defibrillator device implantation, acute kidney injury, and greater need for prolonged mechanical ventilation and blood transfusions in comparison with White patient admissions after SRT (Table 2). Higher rates of pacemaker implantation were seen in White and other race hospitalizations. Black and Hispanic patient admissions undergoing SRT had longer lengths of hospital stay, and all non-White patient admissions had higher hospitalization charges compared with White patient admissions. Among hospital survivors, Black patients and other marginalized races had more frequent dismissals to acute nursing care facilities compared with White patient admissions (Table 2).

DISCUSSION

In this large nationally representative study, we identified significant differences in the use and outcomes of SRT for obstructive hypertrophic cardiomyopathy. Septal reduction procedures were performed less

Table 1. Baseline Characteristics of Obstructive HCM Hospitalizations in the United States Stratified by Race and Ethnicity

Characteristic	White (N=13 885)	Black (N=2685)	Hispanic (N=1235)	Others* (N=1090)	*P* value
Age, y	59.8±15.2	55.2±15.8	53.2±18.0	57.8±17.5	<0.001
Female sex	58.4	64.6	56.7	55.0	<0.001
Primary payer					<0.001
Medicare	43.5	36.9	26.9	37.3	
Medicaid	8.4	20.9	29.0	16.1	
Private	43.0	29.6	29.4	38.2	
Others†	5.1	12.7	14.7	8.3	
Median household income quartile					<0.001
0–25th	22.0	46.2	30.8	16.5	
26th–50th	25.3	21.0	26.3	22.0	
51st–75th	26.2	18.1	26.3	24.3	
75th–100th	26.5	14.7	16.6	37.2	
Hospital bed size					<0.001
Small or medium	26.6	28.7	33.6	24.8	
Large	73.4	71.3	66.4	75.2	
Teaching hospital	86.6	87.7	87.9	84.9	0.07
Hospital region					<0.001
Northeast	22.2	21.8	23.9	35.3	
Midwest	30.6	23.8	10.5	13.8	
South	31.4	44.9	33.2	24.8	
West	15.7	9.5	32.4	26.1	
Comorbidities					
Hypertension	69.6	77.8	68.4	61.9	<0.001
Prior myocardial infarction	7.6	12.5	7.3	6.9	<0.001
Diabetes, uncomplicated	6.4	8.6	8.1	9.2	<0.001
Congestive heart failure	32.0	38.5	29.1	26.1	<0.001
Chronic lung disease	22.8	24.2	19.0	16.1	<0.001
Renal disease	10.9	18.4	10.1	7.8	<0.001
Peripheral vascular disease	3.5	4.5	2.8	2.3	0.003
Charlson comorbidity index score	2.8±1.9	2.8±2.2	2.3±2.1	2.5±2.1	<0.001
Elective admission	58.4	28.1	39.4	40.6	<0.001
Septal reduction therapy					<0.001
Septal myectomy	29.6	14.0	19.0	19.3	
Alcohol septal ablation	13.5	6.9	9.7	13.3	
Concomitant cardiac procedure	21.5	9.5	16.2	19.3	<0.001

Represented as percentage or mean±standard deviation.HCM indicates hypertrophic cardiomyopathy.
*Asian or Pacific Islander, Native American, Others.
†Self-Pay, No Charge, Others.

frequently in minoritized race groups, and the differences were driven by lower use of septal myectomy in Black, Hispanic, and other racial and ethnic groups. In addition to underuse, differences in mortality and other in-hospital outcomes after SRT were also identified. A higher adjusted in-hospital mortality was seen among admissions belonging to Hispanic and other races and ethnicities compared with White patient admissions.

In a study evaluating the clinical profile of patients referred for HCM, Wells et al[9] speculated that Black patients were often underreported and underreferred for surgical myectomy potentially because of differences in access to specialty care. More recently, evaluation of HCM registry data identified that Black patients with HCM were diagnosed at a younger age and had worse symptoms with a greater prevalence of New York

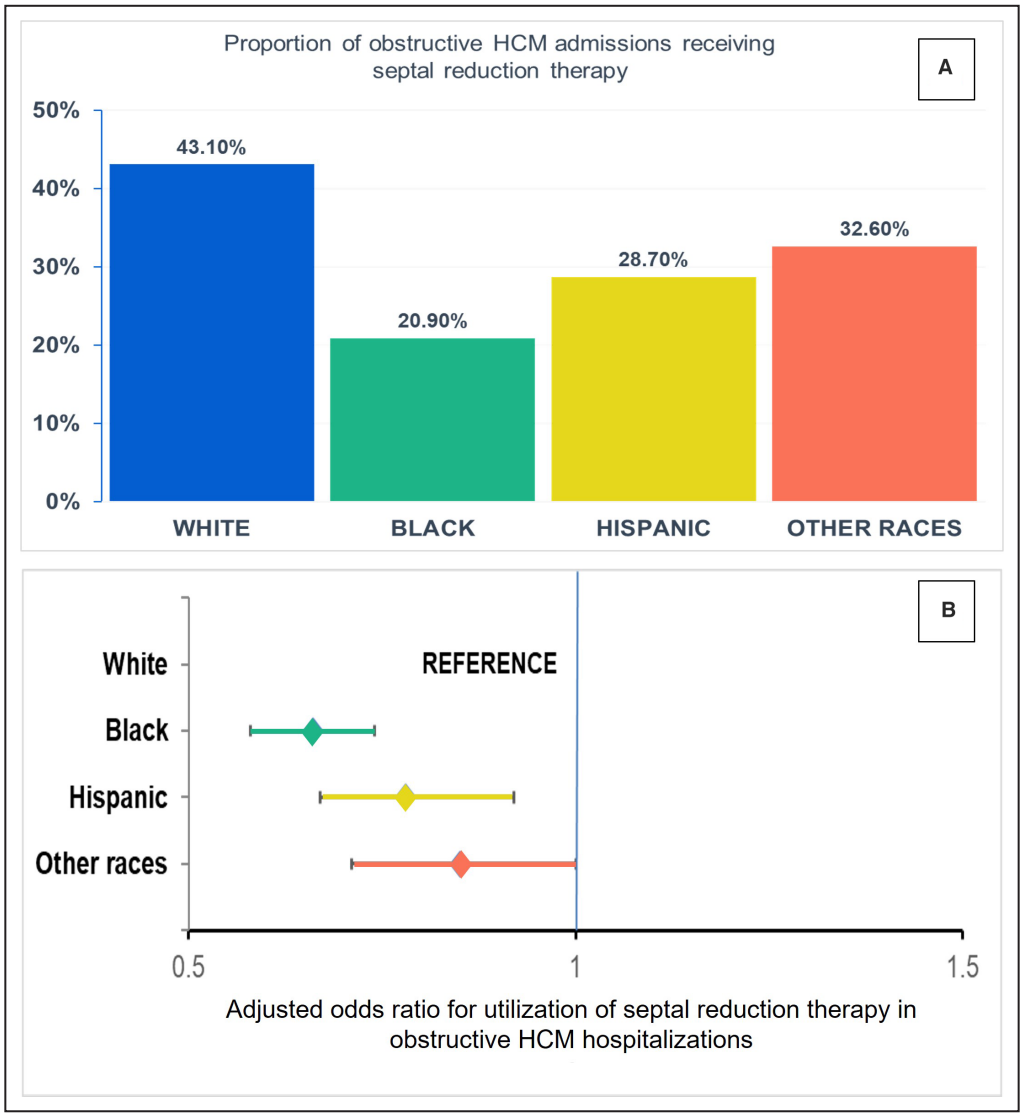

Figure. Racial and ethnic differences in the use of SRTs in the United States.
A, Use of SRT among racial and ethnic groups. **B**, Adjusted odds ratios of racial and ethnic groups for use of SRT in obstructive HCM hospitalizations. Other races includes Asian or Pacific Islander, Native American, Others. HCM indicates hypertrophic cardiomyopathy; and SRT, septal reduction therapy.

Heart Association class III and IV heart failure.[16] On the contrary, another study has reported that outflow tract obstruction and severe heart failure symptoms are less frequent in Black patients with HCM, and Black patients exhibited fewer risk factors for sudden cardiac death than White patients.[9] Another report concluded that Black patients had a different phenotypic expression of HCM with a higher rate of apical and concentric hypertrophy, which may confound the diagnosis of HCM,[17] and thereby potential referral to surgical myectomy or alcohol septal ablation. Thus, while underuse could possibly be attributable to differences in clinical presentation, there may also be an important impact of socioeconomic factors and provider bias on the use of SRT. Indeed, the significantly lower number of elective admissions among non-White races when compared with White patients suggests the possibility of issues pertaining to access to care for these marginalized groups. The underuse of SRT in Hispanics and other ethnic groups emphasizes the need to address the clinical profiles and risk stratification of obstructive HCM patients belonging to these minority populations in addition to Black patients.

Importantly, the previously cited reports have shown that there were no differences in clinical outcomes of White and Black HCM patients.[9,17] Indeed, the adjusted in-hospital mortality and complications between White patient and Black patient admissions were comparable in our study. An unexpected finding was the significantly worse in-hospital mortality in Hispanic and other racial groups. These admissions were more likely to receive care at small hospitals compared with White

Table 2. In-Hospital Outcomes of Obstructive HCM Admissions Undergoing SRT

Characteristic	White (N=5990)	Black (N=560)	Hispanic (N=355)	Others† (N=355)	*P* value
In-hospital mortality	1.4	0.9	4.2	2.8	<0.001
Length of stay, d	6.3±6.1	8.2±9.0	8.1±13.8	6.1±4.1	<0.001
Pacemaker implantation	8.4	6.3	7.0	14.1	<0.001
ICD implantation	6.3	7.1	8.5	9.9	0.03
Stroke	0.8	0.9	1.4	0.0	0.22
Acute kidney injury	7.6	8.0	9.9	12.7	0.004
Prolonged mechanical ventilation*	2.3	3.6	1.4	2.8	0.13
Blood transfusion	12.9	15.2	23.9	15.5	<0.001
Hospitalization costs (×1000 USD)	98.6 (67.7–146.7)	111.1 (73.7–165.2)	113.5 (76.8–225.8)	109.6 (63.3–178.1)	<0.001
Discharge disposition					<0.001
Home	67.8	57.7	67.6	68.1	
Skilled nursing facility	5.9	10.8	4.4	8.7	
Home with HHC	26.0	31.5	27.9	23.2	

Represented as percentage or median (interquartile range); HCM indicates hypertrophic cardiomyopathy; HHC, home health care; ICD, implantable cardioverter-defibrillator; SRT, septal reduction therapy; and USD, US dollars.

*Defined as continuous invasive mechanical ventilation for 96 consecutive hours or more.

†Asian or Pacific Islander, Native American, Others.

patient admissions. Although our analysis adjusted for these differences, it is possible that unmeasured confounders such as clinician and surgeon experience at these hospitals, clinical presentation, and disease severity may have influenced the results. These findings regarding the impact of ethnicity on use and outcomes of SRT deserve special attention in the future because of the changing demographics in the United States in which Hispanics constitute 19% of the total population. Other race hospitalizations had a significantly higher rate of pacemaker implantations after septal reduction. A possible explanation could be that these patients more often had alcohol septal ablation compared with other race groups. It is also possible that patients in this subgroup are smaller, and poorer surgical exposure may have predisposed to a higher rate of conduction injury during myectomy.

Table 3. Adjusted Odds Ratios and 95% CIs for In-Hospital Mortality of Obstructive HCM Admissions Undergoing SRT

Predictor	Odds ratio (95% CI)	*P* value
Race and ethnicity		
White	Reference	
Black	0.49 (0.19–1.25)	0.13
Hispanic	3.38 (1.81–6.30)	<0.001
Other races*	2.02 (1.00–4.11)	0.05
Age, per year	0.98 (0.96–1.00)	0.05
Sex		
Men	Reference	
Women	1.75 (1.11–2.74)	0.01
Household income quartile		
Higher quartiles	Reference	
Lower quartiles	0.41 (0.15–1.10)	0.07
Charlson comorbidity index score	1.48 (1.31–1.67)	<0.001
Teaching hospital	0.33 (0.18–0.63)	0.001
Concomitant cardiac procedure	3.03 (1.95–4.69)	<0.001
Year of admission, per year increase	1.18 (1.07–1.30)	0.001
Ventricular arrhythmia	1.92 (1.13–3.24)	0.01

Effect estimates are shown as adjusted odds ratios and 95% CIs. HCM indicates hypertrophic cardiomyopathy; and SRT, septal reduction therapy.

*Asian or Pacific Islander, Native American, Others.

It is well established that outcomes of septal myectomy have a significant correlation with procedural volume and surgeon experience.[6,18] A similar volume-outcome relationship has also been demonstrated with alcohol septal ablation for obstructive HCM.[6,8] While the overall in-hospital mortality observed in this study is higher than most contemporary reports from specialized centers, more than one-third of SRTs were performed along with other cardiac procedures. Indeed, the overall risk for isolated SRT was 1.0% compared with 2.5% for combined procedures. Recent evidence has also shown that patients receiving myectomy at centers with less experience are nearly 2.5 times more likely to receive a concomitant procedure, and this is associated with poorer in-hospital outcomes.[19,20] Additionally, we found that SRT performed at teaching hospitals had nearly 70% lower risk of in-hospital mortality, further supporting the importance of receiving SRT at experienced centers with comprehensive HCM programs.

It is conceivable that individuals belonging to the lowest-income quartiles are likely to experience

significant financial and systemic barriers that limit access to high-quality health care. These may not only influence treatment options but also affect disease identification and prognosis because of limited or absent health care follow-up in this group. The finding that a higher proportion of non-White races belonged to lower-income quartiles together with the identified disparities in the management of obstructive HCM should increase awareness of medical and surgical providers regarding equity in treatment pathways.

Limitations

This study has the inherent limitations of administrative data, and although HCUP-NIS uses several quality measures to limit errors, the observed results may have been affected because of potential errors related to coding of diagnosis, comorbidities, and procedures causing misclassification of patients. However, prior studies have demonstrated a positive predictive value of 90% for identifying HCM using these codes, and these have been extensively used in previously published reports. Race is self-reported, which may lead to ascertainment bias in certain marginalized groups. Important information such as echocardiographic and other imaging data, laboratory parameters, and other procedural characteristics that estimate disease severity and influence outcomes are not available in the NIS database. It is not possible to discern repeat SRT because of the inherent limitations of the database. Further, despite extensive covariate adjustment, the observed results may be attributable to residual confounding.

CONCLUSIONS

There are important disparities in the use of SRT, specifically septal myectomy, related to race and ethnicity. Black, Hispanic, and other ethnic group patient hospitalizations for obstructive HCM were associated with lower use of SRT when compared with White patient admissions. In-hospital outcomes were comparable among White and Black admissions but significantly worse in other ethnic groups; this difference was independent of demographics, socioeconomic status, comorbidity burden, and hospital characteristics. The lower use rates and poor early outcomes in racial and ethnic minoritized groups may be a reflection of delay in access or underlying bias in health care delivery in these populations.

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Disclosures

None.

Supplemental Material

Tables S1–S4

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SUPPLEMENTAL MATERIAL

Table S1. Classification of hospitals by bedsize by the Healthcare Cost and Utilization Project.

Location and teaching status		Hospital bedsize		
		Small	**Medium**	**Large**
Northeast	**Rural**	1-49	50-99	100+
	Urban non-teaching	1-124	125-199	200+
	Urban teaching	1-249	250-424	425+
Midwest	**Rural**	1-29	30-49	50+
	Urban non-teaching	1-74	75-174	175+
	Urban teaching	1-249	250-374	375+
South	**Rural**	1-39	40-74	75+
	Urban non-teaching	1-99	100-199	200+
	Urban teaching	1-249	250-449	450+
West	**Rural**	1-24	25-44	45+
	Urban non-teaching	1-99	100-174	175+
	Urban teaching	1-199	200-324	325+

The HCUP-NIS obtains "hospital region" from the AHA Annual Survey of Hospitals and this census region is defined by the U.S. Census Bureau. The HCUP-NIS classifies this into four regions-Northeast, Midwest, South, and West.[13]

For classification as rural or urban, the HCUP uses the Core Based Statistical Area (CBSA). Hospitals residing in counties with a CBSA type of metropolitan were considered urban, while hospitals with a CBSA type of micropolitan or non-core were classified as rural.[13]

Per the HCUP-NIS, a hospital was categorized as a teaching hospital if it has one or more Accreditation Council for Graduate Medical Education (ACGME) approved residency programs, is a member of the Council of Teaching Hospitals (COTH) or has a ratio of full-time equivalent interns and residents to beds of .25 or higher.[13]

Table S2. Baseline characteristics of hospitalizations for obstructive HCM in the United States.

Characteristic	Septal reduction therapy		*P*
	YES (N= 7,255)	**NO (N=11,640)**	
Age (years)	58.8 ± 13.9	58.5 ± 16.8	0.27
Female sex	58.1%	59.5%	0.06
Race/Ethnicity			<0.001
White	67.9%	82.5%	
Black	18.3%	7.7%	
Hispanic	7.6%	4.9%	
Other races†	6.3%	4.9%	
Primary Payer			<0.001
Medicare	38.7%	42.6%	
Medicaid	7.8%	14.6%	
Private	47.7%	35.1%	
Others^	5.8%	7.7%	
Median household income quartile			<0.001
0-25th	22.6%	27.6%	
26th-50th	24.6%	24.6%	
51st-75th	26.2%	24.2%	
75th-100th	26.7%	23.7%	
Hospital bed-size			<0.001

Small or medium	20.4%	31.6%	
Large	79.6%	68.4%	
Teaching hospital	95.6%	81.2%	<0.001
Hospital region			<0.001
Northeast	20.2%	24.8%	
Midwest	32.9%	23.9%	
South	32.2%	33.6%	
West	14.8%	17.6%	
Comorbidities			
Hypertension	71.6%	69.4%	<0.001
Prior myocardial infarction	5.9%	9.7%	<0.001
Diabetes, uncomplicated	6.1%	7.6%	<0.001
Chronic lung disease	21.0%	23.2%	<0.001
Renal disease	10.1%	12.8%	<0.001
Peripheral vascular disease	3.2%	3.7%	0.04
Charlson comorbidity index score	2.6 ± 1.8	2.8 ± 2.1	<0.001
Concomitant cardiac procedure	38.0%	7.6%	<0.001

Represented as percentages or mean ± standard deviation; †Asian or Pacific Islander, Native American, Others; ^Self-Pay, No Charge, Others

Table S3. Predictors of receiving SRT in obstructive HCM hospitalizations.

Characteristic	Odds ratio (95% CI)	*P*
Race/Ethnicity		
White	Reference	
Black	0.65 (0.57-0.73)	<0.001
Hispanic	0.78 (0.66-0.92)	0.003
Other races†	0.86 (0.72-1.02)	0.08
Age (years)	1.00 (1.00-1.01)	0.02
Female sex	1.14 (1.05-1.23)	0.002
Primary Payer		
Medicare	Reference	
Medicaid	0.88 (0.76-1.03)	0.11
Private	1.28 (1.16-1.42)	<0.001
Others^	1.22 (1.02-1.46)	0.02
Median household income quartile		
0-25th	Reference	
26th-50th	1.03 (0.92-1.15)	0.61
51st-75th	1.12 (1.00-1.24)	0.05
75th-100th	1.09 (0.97-1.22)	0.14
Hospital bed-size		
Small or medium	Reference	
Large	1.24 (1.14-1.36)	<0.001
Teaching hospital	3.51 (3.02-4.07)	<0.001

Hospital region		
Northeast	Reference	
Midwest	1.47 (1.32-1.64)	<0.001
South	1.19 (1.07-1.32)	0.002
West	1.10 (0.97-1.25)	0.13
Comorbidities		
Hypertension	1.24 (1.13-1.35)	<0.001
Prior myocardial infarction	0.98 (0.85-1.14)	0.80
Diabetes, uncomplicated	1.24 (1.06-1.44)	0.01
Chronic lung disease	1.00 (0.91-1.10)	0.98
Renal disease	1.05 (0.93-1.19)	0.43
Peripheral vascular disease	0.88 (0.71-1.08)	0.21
Cerebrovascular disease	0.82 (0.65-1.03)	0.08
Mild liver disease	1.22 (0.97-1.54)	0.08
Moderate/Severe liver disease	2.04 (1.12-3.73)	0.02
Dementia	0.24 (0.09-0.66)	0.01
Rheumatic disease	1.10 (0.87-1.38)	0.42
Peptic ulcer disease	1.50 (0.77-2.92)	0.23
Metastatic solid tumor	0.20 (0.06-0.61)	0.005
Other malignancy	0.76 (0.55-1.06)	0.11
Hemiplegia or paraplegia	2.07 (1.26-3.41)	0.004
Concomitant cardiac procedure	4.55 (4.13-5.02)	<0.001
Elective admission	9.9 (9.11-10.8)	<0.001

Calendar year of admission, per year increase	0.84 (0.83-0.86)	<0.001

Effect estimates are shown as adjusted odds ratios and 95% confidence intervals.

†Asian or Pacific Islander, Native American, Others; ^Self-Pay, No Charge, Others

Table S4. Baseline characteristics of obstructive HCM hospitalizations undergoing SRT stratified by race/ethnicity.

Characteristic	White (N= 13,885)	Black (N= 2,685)	Hispanic (N= 1,235)	Others† (N= 1,090)	*P*
Age (years)	59.2 ± 13.8	56.3 ± 14.1	55.4 ± 14.4	58.6 ± 15.1	<0.001
Female sex	57.0%	68.8%	56.3%	62.0%	<0.001
Primary Payer					<0.001
Medicare	39.3%	41.1%	25.4%	38.6%	
Medicaid	6.8%	13.4%	18.3%	5.7%	
Private	48.8%	37.5%	43.7%	48.6%	
Others^	5.1%	8.0%	12.7%	7.1%	
Median household income quartile					<0.001
0-25th	21.2%	41.1%	23.9%	15.5%	
26th-50th	25.5%	18.8%	23.9%	18.3%	
51st-75th	26.2%	22.3%	26.8%	31.0%	
75th-100th	27.0%	17.9%	25.4%	35.2%	
Hospital bed-size					<0.001
Small or medium	20.2%	22.3%	28.2%	12.7%	
Large	79.8%	77.7%	71.8%	87.3%	
Teaching hospital	95.4%	100.0%	91.5%	95.8%	<0.001
Hospital region					<0.001
Northeast	19.7%	22.3%	19.7%	25.4%	

Midwest	35.8%	25.0%	11.3%	16.9%	
South	30.6%	42.9%	36.6%	38.0%	
West	13.9%	9.8%	32.4%	19.7%	
Comorbidities					
Hypertension	71.3%	79.5%	67.6%	69.0%	<0.001
Prior myocardial infarction	5.7%	10.7%	2.8%	5.6%	<0.001
Diabetes, uncomplicated	5.5%	8.0%	8.5%	9.9%	<0.001
Congestive heart failure	32.6%	50.0%	35.2%	38.0%	<0.001
Chronic lung disease	20.5%	27.7%	19.7%	19.7%	<0.001
Renal disease	9.3%	24.1%	5.6%	5.6%	<0.001
Peripheral vascular disease	3.3%	0.0%	2.8%	5.6%	0.003
Charlson comorbidity index score	2.6 ± 1.8	3.0 ± 2.1	2.3 ± 1.8	2.5 ± 1.8	<0.001
Concomitant cardiac procedure	37.6%	35.7%	39.4%	47.9%	<0.001

Represented as percentages or mean ± standard deviation; †Asian or Pacific Islander, Native American, Others; ^Self-Pay, No Charge, Others