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ORIGINAL RESEARCH

Race and Ethnic and Sex Differences in Rhythm Control Treatment of Incident Atrial Fibrillation

Larry R Jackson II[1], Daniel J Friedman[1], Diane M Francis[2], Sonia Maccioni[2], Vincent C Thomas[3], Paul Coplan[4], Rahul Khanna[4], Charlene Wong[4], Neloufar Rahai[4], Jonathan P Piccini[1]

[1]Division of Cardiology, Duke University Medical Center & Duke Clinical Research Institute, Durham, NC, USA; [2]Health Economics and Market Access, Johnson & Johnson Medical Devices, Irvine, CA, USA; [3]Medical Safety, Biosense Webster, Irvine, CA, USA; [4]Medical Device Epidemiology and Real-World Data Sciences, Johnson & Johnson, New Brunswick, NJ, USA

Correspondence: Larry R Jackson II, Duke Clinical Research Institute, 300 W. Morgan Street, Durham, NC, 27701, USA, Tel +1 919-684-9940, Email larry.jackson@duke.edu

Background: Atrial fibrillation (AF) is associated with considerable morbidity and mortality. Timely management and treatment is critical in alleviating AF disease burden. Variation in treatment by race and ethnic and sex could lead to inequities in health outcomes.
Objective: To identify racial and ethnic and sex differences in rhythm treatment for patients with incident AF.
Methods: Using 2010–2019 Optum Clinformatics database, an administrative claims data for commercially insured patients in the United States (US), incident AF patients ≥20 years old who were continuously enrolled 12-months pre- and post-index diagnosis were identified. Rhythm control treatment (ablation, antiarrhythmic drugs [AAD], and cardioversion) for AF were compared by patient race and ethnicity (Asian, Hispanic, Black vs White) and sex (female vs male). Multivariable regression analysis was used to examine the relationship of race and ethnicity and sex with rhythm control AF treatment.
Results: A total of 77,932 patients were identified with incident AF. Black and Hispanic female patients had the highest CHA_2DS_2VASc scores (4.3 ± 1.8) and Elixhauser scores (4.1 ± 2.8 and 4.0 ± 6.7), respectively. Black males were less likely to receive AAD treatment (adjusted odds ratio [aOR] 0.87; 95% confidence interval [CI], 0.79–0.96) or ablation (aOR, 0.72; 95% CI, 0.58–0.90). Compared to White males, all groups had lower likelihood of receiving cardioversion with Asian females having the lowest [aOR, 0.48; 95% CI, (0.37–0.63)].
Conclusion: Black patients were less likely to receive pharmacologic and procedural rhythm control therapies. Further research is needed to understand the drivers of undertreatment among racial and ethnic groups and females with AF.
Keywords: race, sex, atrial fibrillation, catheter ablation

Introduction

Atrial fibrillation (AF) is the most common abnormal heart rhythm disorder in the United States (US).[1] Approximately 6 million individuals have AF in the US, with the prevalence of AF expected to increase to 16 million by 2050.[2–4] Antiarrhythmic drug (AAD) therapy and catheter ablation are rhythm control strategies implemented to prevent recurrent AF and maintain sinus rhythm. Results from a multi-center trial, the Early Treatment of Atrial Fibrillation for Stroke Prevention Trial (EAST-AFNET 4), demonstrated benefits of early rhythm control including improved cardiovascular outcomes in AF patients.[5] Guidelines from the 2017 American College of Cardiology, the American Heart Association, and the Heart Rhythm Society recommend catheter ablation as the first-line therapy for patients with recurrent symptomatic paroxysmal and persistent AF prior to trial of Class I or III AAD.[6]

Prior studies have observed racial and ethnic and sex differences in the treatment of AF. For example, White patients with AF are more likely to undergo catheter ablation than Black, Hispanic, Asian, or other racial and ethnic groups.[7–15] Differences in treatment among males and females have also been noted, with female patients less likely to undergo catheter ablation for rhythm control of AF.[6–14] A recent study by Eberly et al examined the relationship of race and ethnicity and socioeconomic status with use of a rhythm control strategy among patients with AF and demonstrated

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a significantly (P<0.001) lower likelihood of use of a rhythm control strategy in Black patients (versus White patients) and lower utilization of catheter ablation in patients of Latinx ethnicity (versus White patients) (P=0.002).[15]

With few exceptions, most of the extant literature on racial, ethnic, and sex differences in AF management is dated and does not provide current assessments of whether these differences have resolved, persist, or have been accentuated over time. As the treatment options have expanded, including technological advances in catheter ablation techniques which have led to improved effectiveness, there is an urgent need to re-evaluate racial and ethnic and sex differences in AF treatment using contemporary data. Though Eberly et al examined variation in AF treatment using a more contemporary data (2015–2019 period),[16] they examined the topic from an individual prism of race and ethnicity or sex, but not as a collective function (ie, intersection of race and ethnicity and sex). As such, the objective of this study was to examine the intersection of racial and ethnic (White, Black, Asian, Hispanic, others) and sex (male, female) variation in the proportion of patients with incident (ie, newly diagnosed) AF receiving rhythm control, including AAD therapy, catheter ablation and cardioversion.

Methods

Data Source and Study Sample

We used the deidentified Optum Clinformatics Data Mart, Extended – Socioeconomic Status (Optum) from January 1, 2010 to December 31, 2019, to investigate the study objectives; years of data used included baseline and follow-up periods. The Optum database comprises health insurance claims data for a combination of US private insurance and Medicare Advantage beneficiaries from geographically diverse regions across the country. This database contains deidentified data derived from health plan members' enrollment data and facility, physician, and pharmacy claims for approximately 13 million covered lives annually. In the Optum database, about 4% of the observations were missing information on race, and 0.02% were missing information on sex.

Patients who met all of the following criteria were included in the study: 1) had at least two medical service visits (within 3 months) between January 1, 2011 and December 31, 2018, with a primary diagnosis of AF (The International Classification of Diseases, Ninth Revision, Clinical Modification [ICD-9] code 427.31 and 10 Revision [ICD-10] codes I48.0, I48.1, I48.2, I48.91); one or more codes were required for the diagnosis of AF with the first such occurrence classified as index AF diagnosis; 2) had continuous enrollment 12-months pre- and post-index diagnosis; and 3) were ≥20 years of age at the time of index diagnosis. Patients who met any of the following were excluded from the study: 1) had AF diagnosis (primary or secondary) in the 12-month pre-index diagnosis period; 2) filled an AAD prescription in the 12-month pre-index diagnosis period; 3) had a history of congenital heart disease; and 4) had missing data for race or sex.

Study Variables

The primary independent variables of interest included patient race and ethnicity and sex. Covariates, selected based on prior AF research and theoretical plausibility, included age, insurance type, education, and clinical characteristics, including obstructive sleep apnea, Elixhauser comorbidity score, CHA_2DS_2-VASc score, and provider region as described in Table 1. Elixhauser comorbidity score was determined based on ICD-9 and ICD-10 diagnostic codes for 31 comorbid categories.[17] Stroke risk was assessed using CHA_2DS_2-VASc scores, categorized as follows: score of 0, score of 1–3, and score of ≥4.[18]

The following healthcare and treatment utilization outcomes were assessed in the 1 year following the diagnosis of incident (newly diagnosed) AF: 1) use of one or more of the following AADs: Amiodarone, Dofetilide, Flecainide, Propafenone, Ibutilide, Sotalol, Dronedarone, Quinidine, and Disopyramide according to the National Drug Code directory; 2) receipt of catheter ablation treatment for AF, determined based on ICD-9, ICD-10, and Current Procedural Terminology (CPT) code (per previous studies,[19,20] one or more codes were required for identification of treatment with catheter ablation, as shown in eTable 1); 3) receipt of cardioversion that was determined based on ICD-9 and ICD-10 (one or more codes were required for identification of treatment with cardioversion, as shown in eTable 1).

Table 1 Baseline Demographics of Patients with Incident Atrial Fibrillation

Variable	Asian Female n=763	Asian Male n=869	Black Female n=3073	Black Male n=2612	Hispanic Female n=2685	Hispanic Male n=2809	White Female n=30,085	White Male n=35,036	*P* value
Patient (%), (N=77,932)	(1.0)	(1.1)	(3.9)	(3.4)	(3.6)	(3.6)	(38.6)	(45.0)	
Age (years), mean (SD)	73.4 (12.1)	70.2 (12.9)	72.1 (12.2)	67.2 (13.4)	73.9 (11.4)	68.4 (14.3)	74.7 (10.3)	69.5 (12.6)	<0.001
Education, n (%)									<0.001
Bachelor's or higher	184 (24.1)	241 (27.7)	183 (6.0%)	162 (6.2)	264 (9.8)	313 (11.1)	5021 (16.7)	6797 (19.4)	
HS or less	139 (18.2)	158 (18.2)	1465 (47.7)	1113 (42.6)	1204 (44.8)	1201 (42.8)	6805 (22.6)	7319 (20.9)	
Less than Bachelor's	435 (57.0)	468 (53.9)	1418 (46.1)	1331 (51.0)	1212 (45.1)	1289 (45.9)	18,185 (60.5)	20,816 (59.4)	
Unknown	5 (0.7)	2 (0.2)	7 (0.2)	6 (0.2)	5 (0.2)	6 (0.2)	74 (0.3)	104 (0.3)	
Insurance, n (%)									<0.001
HMO/EPO	391 (51.3)	389 (44.8)	1167 (38.0%)	795 (30.4)	1584 (59.0)	1388 (49.4)	10,796 (35.9)	10,521 (30.0)	
IND/OTH	234 (30.7)	259 (29.8)	1270 (41.3)	888 (34.0)	637 (23.7)	633 (22.5)	13,120 (43.6)	12,381 (35.3)	
POS	114 (14.9)	198 (22.8)	447 (14.6)	732 (28.0)	320 (11.9)	641 (22.8)	4069 (13.5)	9523 (27.2)	
PPO	22 (2.9)	22 (2.5)	186 (6.1)	184 (7.0)	139 (5.2)	144 (5.1)	2040 (6.8)	2461 (7.0)	
Unknown	2 (0.3)	1 (0.1)	3 (0.1)	13 (0.5)	5 (0.2)	3 (0.1)	60 (0.2)	150 (0.4)	
Sleep Apnea	29 (3.8)	63 (7.3)	297 (9.7)	320 (12.3)	196 (7.3)	293 (10.4)	2206 (7.3)	4488 (12.8)	<0.001
CHA_2DS_2-VASc score, mean (SD)	3.9 (1.7)	2.9 (1.8)	4.3 (1.8)	2.7 (1.8)	4.3 (1.8)	2.8 (1.9)	4.0 (1.7)	2.6 (1.8)	<0.001
Elixhauser Score, mean (SD)	3.3 (2.5)	3.0 (2.4)	4.1 (2.8)	3.4 (2.7)	4.0 (6.7)	3.3 (2.7)	3.4 (2.5)	2.9 (2.4)	<0.001
Provider Region									<0.001
North Central	92 (12.1)	107 (12.3)	660 (21.5%)	530 (20.3)	208 (7.8)	229 (8.2)	9323 (31.0)	11,056 (31.6)	
Northeast	120 (15.7)	166 (19.1)	292 (9.5)	223 (8.5)	364 (13.6)	361 (12.9)	3896 (13.0)	4357 (12.4)	
South	139 (18.2)	175 (20.1)	1836 (59.8)	1650 (63.2)	955 (35.6)	1118 (39.9)	9068 (30.1)	11,274 (32.2)	
West	407 (53.3)	419 (48.2)	280 (9.1)	203 (7.8)	1134 (42.3)	1092 (38.9)	7663 (25.5)	8248 (23.5)	
Unknown	5 (0.7)	2 (0.2)	5 (0.2)	6 (0.2)	24 (0.9)	9 (0.3)	135 (0.5)	101 (0.3)	

Notes: Data is n (%), unless otherwise noted. CHA_2DS_2-VASc, stroke risk score where "C" represents congestive heart failure history, "H" represents hypertension history, "A" represents age greater than 75 years, "D" represents diabetes history, "S" represents stroke/transient ischemic attack, thromboembolism history, "V" represents vascular disease history, "A" represents age 65–74 years, "S" represents sex category.

Abbreviations: CPD, chronic pulmonary disease; EPO, exclusive provider organization; HMO, health maintenance organization; HS, high school; IND/OTH, indemnity/other; POS, point-of-service; PPO, preferred provider organization; SD, standard deviation.

Data Analyses

Baseline characteristics are summarized using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Chi-square tests were used to compare the proportion of patients, by race and ethnicity and sex, receiving AADs, ablation procedure, or cardioversion for AF treatment.

Multivariable logistic regression was used to determine associations between race and ethnicity and sex and rhythm treatment (AAD use, AF ablation, and cardioversion) while adjusting for covariates described above and as depicted in Table 1. Two sets of models were run, one with race and ethnicity and sex as main independent variables adjusting for study covariates, and the other with race and ethnicity and sex pair as the main independent variables adjusting for study covariates. As part of sensitivity analysis, we conducted regression analysis wherein the interaction term for race and ethnicity and sex was added as the main independent variable after controlling for study covariates. Further, we also ran analyses to examine changes in atrial fibrillation treatment across study years.

In all analyses, a two-sided $P<0.05$ was considered statistically significant. All analyses were conducted using R for Windows; version 4.0.2. The use of Optum was reviewed by the New England Institutional Review Board (IRB) and was determined to be exempt from broad IRB approval, as this research project did not involve active human subject participation.

Results

Baseline patient characteristics (Figure 1) depicts study attrition. Overall, the final cohort included 77,932 patients with incident AF. Baseline demographics of patients classified by race and ethnicity and sex are shown in Table 1. Mean age differed significantly across groups ($P<0.001$), where male patients were younger than female patients within each

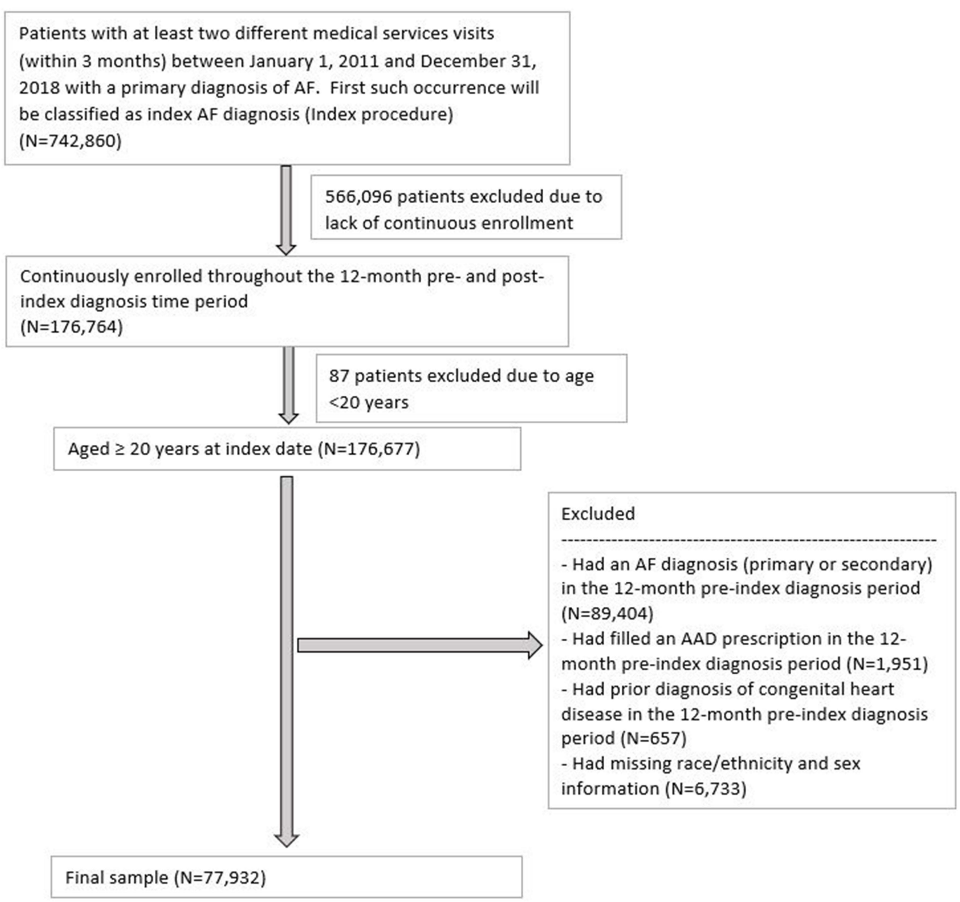

Figure 1 Sample attrition based on study inclusion and exclusion criteria.

race group. The level of education also differed significantly across groups (*P*<0.001). Asian female (24.1%) and male patients (27.7%) had the highest rates of higher education (Bachelor's or higher) among all races and ethnicities. A higher proportion of Black and Hispanic patients had 'high school or less' education, with Black female (47.7%) and Hispanic female patients (44.8%) having the highest rate among all groups. Risk factor and comorbidity burden also differed significantly across groups as evidenced by CHA_2DS_2VASc (*P*<0.001) and Elixhauser scores (*P*<0.001). Black and Hispanic female patients had the highest CHA_2DS_2VASc scores (4.3 ± 1.8) and Elixhauser scores (4.1 ± 2.8 and 4.0 ± 6.7, respectively) among all groups.

Association Between Race and Ethnicity and Sex and Rhythm Control Treatment for AF

Bivariate analysis showed significant differences in treatment rates by race and ethnicity and sex (Table 2). For AAD usage, White males (25.0%) were observed to have the highest rate, and Asian females (19.9%) had the lowest rate of AAD use within 1 year of incident AF diagnosis. For cardioversion, the rates were highest among White males (19.9%) and lowest among Asian females (8.1%). As per catheter ablation, White males (5.0%) had the highest rate with Hispanic females (2.3%) having the lowest rate. The rate of AF treatment was also observed to vary across study years (eTables 2–4). When examining the use of AADs (eTable 2), a significant decline in usage was observed for White males (26.82% in 2011 to 23.05% in 2019), White females (25.34% in 2011 to 19.03% in 2019), and Asian males (34.38% in 2011 to 22.08% in 2019) during the study period. In contrast, the rate of ablation (eTable 3) and cardioversion (eTable 4) seem to have improved during the study period. For example, for White males, the rate of ablation procedure increased from 3.43% in 2011 to 8.46% in 2019 (p<0.0001). Significant improvements in the rate of ablation procedure use was also observed for White females (1.64% in 2011 to 4.11% in 2019; p<0.0001), Black females (1.75% in 2011 to 4.72% in 2019; p=0.001), Asian males (6.25% in 2011 to 10.39% in 2019; p=0.005), Hispanic males (0.55% in 2011 to 5.67% in 2019; p=0.001), and Hispanic females (0.26% in 2011 to 5.41% in 2019; p=0.001) (eTable 3). As per cardioversion, significant improvements in use were seen for White males (16.17% in 2011 to 22.54% in 2019; p<0.0001) and White females (9.65% in 2011 to 15.63% in 2019; p<0.0001) during the study period, with no significant change observed for other race and ethnic and sex categories (eTable 4).

Results from logistic regression analyses for receipt of each treatment by race and ethnicity (relative to White patients), sex (relative to males), and race and ethnicity-sex groups (relative to White males) are shown in Table 3. As stated earlier, we ran two models, with one model having race and ethnicity and sex as separate key independent variables of interest and the other having the merged variable as the key independent variable. Compared with White male patients, Black male patients (Odds ratio [OR] 0.72; 95% CI, 0.58–0.90) had significantly lower likelihood of receiving catheter ablation for AF within 1-year of incident AF diagnosis. Black male patients (OR 0.87; 95% CI, 0.79–0.96) were also less likely to initiate AAD, while Hispanic female patients (OR 1.17; 95% CI, 1.06–1.28) were more likely to initiate AAD, compared to White male patients. All groups were significantly less likely to undergo

Table 2 Bivariate Analysis Comparing Rhythm Control Treatment for Atrial Fibrillation by Race and Ethnicity and Sex

Outcome	AF-Related Treatment		
	Anti-Arrhythmic Drugs* N (%)	**Cardioversion* N (%)**	**AF Ablation* N (%)**
White Male (n=35,036)	8771 (25.0)	6972 (19.9)	1749 (5.0)
White Female (n=30,085)	6658 (22.1)	3807 (12.7)	809 (2.7)
Black Male (n=2612)	623 (23.9)	418 (16.0)	94 (3.6)
Black Female (n=3073)	701 (22.8)	301 (9.8)	76 (2.5)
Asian Male (n=869)	206 (23.7)	103 (11.9)	36 (4.1)
Asian Female (n=763)	152 (19.9)	62 (8.1)	23 (3.0)
Hispanic Male (n=2809)	679 (24.2)	357 (12.7)	108 (3.8)
Hispanic Female (n=2685)	647 (24.1)	233 (8.7)	62 (2.3)

Note: *p-value <0.0001 (from chi-square analysis).

Table 3 Logistic Regression Model Results for Treatment of Incident Atrial Fibrillation by Race and Ethnicity, Sex, and Race and Ethnicity–Sex

Outcome	AF-Related Treatment		
	Anti-Arrhythmic Drugs OR* (95% CI)	**Cardioversion OR* (95% CI)**	**AF Ablation OR* (95% CI)**
Race and Ethnicity[a]			
White (n=65,121)	Reference		
Black (n=5685)	0.92 (0.86–0.99)	0.80 (0.73–0.87)	0.80 (0.68–0.94)
Asian (n=1632)	0.94 (0.83–1.06)	0.65 (0.55–0.76)	0.96 (0.74–1.26)
Hispanic (n=5494)	1.03 (0.96–1.10)	0.74 (0.68–0.81)	0.89 (0.76–1.04)
Sex[a]			
Male (n=41,326)	Reference		
Female (n=36,606)	1.07 (1.03–1.11)	0.71 (0.68–0.75)	1.01 (0.93–1.11)
Race and Ethnicity–Sex[b]			
White Male (n=35,036)	Reference		
White Female (n=30,085)	1.04 (1.01–1.09)	0.71 (0.68–0.74)	0.98 (0.90–1.08)
Black Male (n=2612)	0.87 (0.79–0.96)	0.81 (0.72–0.90)	0.72 (0.58–0.90)
Black Female (n=3073)	1.02 (0.93–1.12)	0.56 (0.50–0.77)	0.91 (0.72–1.16)
Asian Male (n=869)	1.00 (0.85–1.18)	0.63 (0.51–0.77)	0.91 (0.64–1.28)
Asian Female (n=763)	0.90 (0.75–1.08)	0.48 (0.37–0.63)	1.06 (0.69–1.62)
Hispanic Male (n=2809)	0.96 (0.88–1.05)	0.71 (0.68–0.74)	0.84 (0.69–1.04)
Hispanic Female (n=2685)	1.17 (1.06–1.28)	0.57 (0.50–0.63)	0.95 (0.73–1.24)

Notes: [a]Regression model wherein race and ethnicity and sex were the main independent variables of interest adjusting for study covariates. [b]Regression model wherein a variable combining race and ethnicity and sex was used as the main independent variable of interest adjusting for study covariates. *Risk models adjusted for: age, education, insurance, Elixhauser comorbidity score, CHA_2DS_2-VASc score, sleep apnea, and provider region.
Abbreviations: AF, atrial fibrillation; OR, odds ratio; CI, confidence interval.

cardioversion compared to White males, with Asian female patients (OR 0.48; 95% CI, 0.37–0.63) having the lowest ORs. Results from sensitivity analysis with interaction term between race and ethnicity and sex showed similar results to the main analysis (eTables 5–7). For example, Black males were observed to have significantly lower likelihood of having an ablation as compared to White males (OR 0.72, 95% CI 0.58–0.89), similar to result from the main analysis.

Discussion

In our analysis of nationwide outcomes data in more than 77,000 patients, we found several notable differences in management of AF by race, ethnicity, and sex. Compared with White male patients, Black male patients were less likely to undergo ablation and AAD treatment; and all other groups had significantly lower likelihood of undergoing cardioversion after AF diagnosis. The results suggest a lower utilization of rhythm control therapies, including the use of one or more AADs, catheter ablation, or cardioversion, in Black patients with AF. Notably, the underutilization was more prominent for ablation treatment compared to AAD or cardioversion treatment. Black males had 13% lower likelihood of receiving AAD treatment, 19% lower likelihood of receiving cardioversion, and 28% lower likelihood of receiving ablation treatment as compared to White males.

Prior research has demonstrated racial and sex differences in healthcare utilization for patients with AF.[16,21–24] Several studies have also investigated the underlying differences among patients with AF.[6–14,25–33] Naderi et al found that, compared to White male patients, Black male patients and other male patients from underrepresented racial and ethnic groups (UREGs) had 20–30% lower odds of catheter ablation; odds of catheter ablation were even lower among female patients regardless of race and ethnicity when compared to White male patients.[10] In a study by Bhave et al, Black patients had lower likelihood of rhythm and rate control compared to White patients, and Hispanic patients had lower likelihood of catheter ablation.[30] Our results align with those from these prior studies and build on those by integrating race and ethnicity and sex. As with prior research, we also observed Black patients to have lower likelihood of receiving AAD and catheter ablation treatment as compared to White patients (across both main analysis and sensitivity analysis). However, these differences primarily stemmed from the underutilization of these treatments among Black male patients. Though not approaching statistical significance, Black female patients were observed to have the lowest likelihood of receiving catheter ablation treatment among female patients, compared to White male patients, a trend that has been indicated in prior reports.[10] Further, Hispanic females were observed to have higher utilization of AADs as compared to White male patients. These results suggest that there is considerable variation in rhythm control treatment among UREG patients, which necessitate assessment of AF management at the intersection of race and ethnicity and sex, rather than as separate components. To the best of our knowledge, this is the first study to examine the variation in AF treatment by intersection of race and ethnicity and sex.

Our analysis showed that Black and Hispanic female patients generally have the highest proportion of comorbid conditions associated with AF. These findings mirror previous analyses which demonstrated that both Black and Hispanic patients with AF had more traditional cardiovascular risk factors compared to White patients.[33] Black and Hispanic female patients had the highest CHA_2DS_2VASc and Elixhauser scores, which increases the likelihood of stroke, heart failure, and/or death.[28]

In a sub-study from the Catheter Ablation and Antiarrhythmic Drug Therapy for Atrial Fibrillation (CABANA) trial, Thomas et al reported that catheter ablation was associated with significant reductions in primary endpoint of interest (a composite of all-cause mortality, disabling stroke, serious bleeding, or cardiac arrest; adjusted Hazard Ratio [aHR] 0.32; 95% CI 0.13–0.78) and AF recurrence (aHR 0.45; 95% CI 0.23–0.89) among racial and ethnic minorities.[34] The reasons why racial and ethnic minority patients in the CABANA trial fared better with catheter ablation are complex and not fully understood. Irrespectively, the lower use of ablation among Black patients observed in our study remains concerning given the potential benefits of catheter ablation among UREGs with AF.

The underlying factors associated with underutilization of rhythm control strategies among UREGs are complex and warrant further investigation. These factors potentially include clinical appropriateness, barriers to healthcare access, lack of proper training and resources among physicians, patient preferences in treatment and healthcare use, conscious or unconscious bias among physicians, and low health literacy among patients which impedes informed decision-making. Low health literacy could preclude patients from fully understanding the disease burden presented by AF or the risk and benefits of procedural therapy. Though all patients in our study had healthcare insurance, there could be variation in geographic and economic access to health services, which could have contributed to lower treatment among UREGs with AF. Physician training and access to resources in treating UREG patients presenting with AF symptoms could influence treatment. In their study of medical evaluation and management of Medicare beneficiaries, Bach et al found that primary care physicians treating Black patients versus White patients were less likely to be board certified and more likely to report access barriers in terms of providing quality care to their patients.[35] Patient preferences are a critical component of treatment uptake. Several studies have suggested higher rates of refusal for cardiovascular procedures among Black and female patients.[36–39] Future research should be aimed at understanding the drivers of patient preference as well as impact of social determinants of health in UREGs with AF and how these determinants may affect uptake of rhythm control therapies. Additionally, qualitative inquiry, specifically mixed method approaches, are needed to better understand barriers and facilitators to the uptake of rhythm control strategies for treatment of AF.

Limitations

Given that this analysis is retrospective in nature, we cannot exclude the possibility of residual confounding. Several factors that affect treatment decisions such as prognostic indicators or disease severity were not available (eg, left atrial volume index, AF burden). Other factors such as patient preference, patient income,[15] physician specialty, and physician experience could potentially have influenced treatment for AF, were also not included in the study. Coding errors during claims processing can affect identification of services and subsequently the results of this analysis. However, there is no reason to expect variation in coding errors by race or sex. Given the differential use of medical services for treatment of AF by race, ethnicity, and sex, we cannot exclude the potential for diagnostic bias for the detection of AF between races and sexes. There was a disproportionate representation of patients with AF by race, ethnicity, and sex in our study. Further, the patients in Optum database, used in this study, are enrollees of United Healthcare commercial and Medicare Advantage insurance plans. As such, our results may not be generalizable to patients with non-commercial insurance including self-pay, Medicaid, and Medicare fee-for-service insurance.

Conclusions

Using data from a large private health insurance dataset, this study identified differences in the treatment of AF by race, ethnicity, and sex. Rhythm control strategies were used less in Black patients, particularly in Black male patients. Further research is warranted for a better understanding of the causes of racial, ethnic, and sex differences in the rhythm treatment of AF.

Abbreviations

AAD, antiarrhythmic drug; AF, atrial fibrillation; ICD-9, International Classification of Diseases, Ninth Revision; ICD-10, International Classification of Diseases, Tenth Revision; UREG, underrepresented racial and ethnic group.

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