



Racial/ethnic differences in atrial fibrillation symptoms, treatment patterns, and outcomes: Insights from Outcomes Registry for Better Informed Treatment for Atrial Fibrillation Registry

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Background Significant racial/ethnic differences exist in the incidence of atrial fibrillation (AF). However, less is known about racial/ethnic differences in quality of life (QoL), treatment, and outcomes associated with AF.

Methods Using data from the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation, we compared clinical characteristics, QoL, management strategies, and long-term outcomes associated with AF among various racial/ethnic groups.

Results We analyzed 9,542 participants with AF (mean age 74 ± 11 years, 43% women, 91% white, 5% black, 4% Hispanic) from 174 centers. Compared with AF patients identified as white race, patients identified as Hispanic ethnicity and those identified as black race were younger, were more often women, and had more cardiac and noncardiac comorbidities. Black patients were more symptomatic with worse QoL and were less likely to be treated with a rhythm control strategy than other racial/ethnic groups. There were no significant racial/ethnic differences in CHA₂DS₂-VASc stroke or ATRIA bleeding risk scores and rates of oral anticoagulation use were similar. However, racial and ethnic minority populations treated with warfarin spent a lower median time in therapeutic range of international normalized ratio (59% blacks vs 68% whites vs 62% Hispanics, $P < .0001$). There was no difference in long-term outcomes associated with AF between the 3 groups at a median follow-up of 2.1 years.

Conclusion Relative to white and Hispanic patients, black patients with AF had more symptoms, were less likely to receive rhythm control interventions, and had lower quality of warfarin management. Despite these differences, clinical events at 2 years were similar by race and ethnicity. (*Am Heart J* 2016;174:29-36.)

Approximately 5.2 million people in United States are affected with atrial fibrillation (AF), and the number is expected to rise in next 30 years.¹⁻³ Atrial fibrillation is a

major cause of stroke, systemic embolism, heart failure (HF), and long-term mortality.⁴⁻⁶ Recent studies have demonstrated differences in risk factor burden and management of AF classified by race/ethnicity.⁷⁻¹¹ However, there remains a paucity of data on symptom prevalence, AF-related quality of life (QoL), management strategies, and quality of anticoagulation in various racial and ethnic groups. Moreover, long-term outcomes including all-cause mortality, all-cause hospitalizations, and new-onset HF among patients with AF in diverse groups are not entirely known. Given the rapidly changing racial and ethnic demographics in the United States,¹² it is important to understand the natural history, contemporary outpatient management strategies, and longitudinal outcomes of AF among distinct patient groups. The objectives of this study were to evaluate

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whether patients identified as black race or Hispanic ethnicity with AF have differential symptom prevalence, AF-related QoL, treatment patterns, and longitudinal outcomes as compared to individuals classified as white race.

Methods

The Outcomes Registry for Better Informed Treatment for Atrial Fibrillation (ORBIT-AF) project is a multicenter, prospective, outpatient registry of patients with incident or prevalent AF that analyzes characteristics, treatment patterns, and outcomes in patients with AF in the United States.¹³ The registry enrolled patients managed by a variety of providers that included primary care providers, cardiologists, and electrophysiologists. Sites abstract data on demographics, comorbidities, medical history, treatment strategy, and provider characteristics and enter information into an interactive, Web-based data collection form. Race and ethnicity data are collected as distinct data fields as self-reported by the patient. Information on vital status, hospitalizations, bleeding events, disease progression, medical therapies/procedures, and QoL is collected at approximately 6-month intervals for up to 3 years after initial enrollment. Atrial Fibrillation Effect on Quality of Life (AFEQT) scores assessed QoL¹⁴ whereas, in terms of risk assessment, the CHA₂DS₂-VASc stroke risk score and ATRIA bleeding scores were used.^{15,16} ORBIT-AF used an adaptive design that allowed for modifications to the registry after its initiation. This adaptive design also ensured geographic and provider heterogeneity. The Duke Clinical Research Institute performed site selection and management. Site investigators enrolled consecutive patients with AF who were 18 years or older, with electrocardiographic evidence of AF. Patients with AF due to a reversible cause (eg, in setting of cardiac surgery or hyperthyroidism) or life expectancy <6 months were excluded. In addition, patients with atrial flutter were also excluded from the study. A Web-based case report form was used to gather data, and primary sources were the patient's medical record and treating physician. Among primary outcome events, stroke was verified by source documentations, whereas other outcomes were recorded from the case report form by the individual investigators.

Statistical analysis

Baseline clinical characteristics including demographics, medical history, type of AF, procedures, and medical therapies were compared among 3 groups: non-Hispanic white race, non-Hispanic black race, and Hispanic ethnicity. Categorical variables are presented as frequencies and percentages, and differences between the groups were assessed by χ^2 test. Continuous variables are presented as median (25th, 75th interquar-

tile range [IQR]), and differences between the groups were assessed by Kruskal-Wallis test. To assess association of race/ethnicity and oral anticoagulation at baseline, hierarchical logistic regression (random-effects model) to account for variability between sites was used because racial/ethnic patient representation across sites is highly skewed. Previously developed model for anticoagulation was used for adjustment.¹⁷ To determine the association of race/ethnicity and long-term outcomes, Cox frailty regression modeling (which takes into account variability in outcomes between sites by adding a random effect for site) was used. Briefly, backward selection with a stay criterion of $P < .05$ was used to identify predictors of each outcome. For all models, continuous variables were evaluated for nonlinearity with the outcome and when nonlinear fit with linear splines. Missing data were handled with multiple imputation, and imputed values were obtained by Markov chain Monte Carlo or regression methods. All candidate variables had <2% missing except for level of education (4%), estimated glomerular filtration rate (8%), and hematocrit (10%), left ventricular ejection fraction (11%), and left atrial diameter (14%). SEs and results reflect the combined analysis over 5 imputed data. Adjusted outcomes were displayed as hazard ratios (HRs) (95% CIs). To determine quality of anticoagulation, percent time in therapeutic range (TTR) on warfarin was calculated. A modified Rosendaal method of linear interpolation was used between each pair of measured international normalized ratio (INR) values. Daily INR values were imputed between the first and last measured INR for each patient. No extrapolation was performed between the baseline visit at the time of registry enrollment or after the end of follow-up. The TTR was calculated as the proportion of days with INR values between 2.0 and 3.0.

All analyses were performed using SAS software (version 9.3; SAS Institute, Cary, NC). All P values were based on 2-sided tests, and $\alpha = .05$ was used to establish the significance of the tests. The Duke Institutional Review Board approves the ORBIT-AF registry, and all participating sites obtained institutional review board approval as per local requirements. All subjects provided written informed consent. The authors are solely responsible for the design and conduct of this study, all study analyses, the drafting and editing of the manuscript, and its final contents.

Results

The overall ORBIT-AF cohort included 10,132 patients who were enrolled at 176 sites from June 2010 to August 2011. After excluding patients with missing race/ethnicity data ($n = 17$); race/ethnicity other than white, black, or Hispanic ($n = 143$); and patients without at least 1 follow-up visit ($n = 430$), 9,542 patients enrolled at 174

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