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Use of Evidence-Based Primary and Secondary Cardiac Prevention Therapy Among Outpatients with Atrial Fibrillation

Paul L. Hess, MD[1], **Sunghee Kim, PhD**[1], **Jonathan P Piccini, MD, MHS**[1], **Larry A. Allen, MD, MHS**[2], **Jack E. Ansell, MD**[3], **Paul Chang, MD**[4], **James V. Freeman, MD, MPH**[5], **Bernard J. Gersh, MB, ChB, Dphil**[6], **Peter R. Kowey, MD**[7], **Kenneth W. Mahaffey, MD**[1], **Laine Thomas, PhD**[1], **Eric D. Peterson, MD, MPH**[1], and **Gregg C. Fonarow, MD**[8]

[1]Duke Clinical Research Institute, Durham, NC

[2]University of Colorado, Denver, CO

[3]Lenox Hill Hospital, New York, NY

[4]Janssen Pharmaceuticals, Raritan, NJ

[5]Stanford University School of Medicine, Palo Alto, CA

[6]Mayo Clinic, Rochester, MN

[7]Jefferson Medical College, Wynnewood, PA

[8]Ahmanson-UCLA Cardiomyopathy Center, Los Angeles, CA

Abstract

Corresponding Author: Paul L. Hess, M.D., Duke Clinical Research Institute, PO Box 17969, Durham, NC 27715; fax: 919-668-7058; telephone: 919-668-7835; p.hess@duke.edu.

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Paul L. Hess, MD- None
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Background—Patients with atrial fibrillation often have cardiovascular risk factors or known comorbid disease, yet the use of evidence-based primary and secondary prevention cardiac therapy among atrial fibrillation outpatients is unknown.

Methods—Using baseline data collected between June 2010 and August 2011 from 174 sites participating in ORBIT-AF, a US national registry of patients with atrial fibrillation coordinated from Durham, NC, USA, we examined professional guideline -recommended evidence-based therapy use for cardiovascular comorbid conditions and risk factors. Multivariable logistic regression was used to identify factors associated with receipt of all indicated evidence-based therapy.

Results—Among 10096 enrolled patients, 93.5% were eligible for one or more evidence-based therapy. Among those eligible, 46.6% received all indicated therapies: 62.3% received an antiplatelet agent, 72.3% received a β-blocker, 59.5% received an angiotensin converting enzyme or angiotensin receptor blocker, 15.3% received an aldosterone antagonist, 65.7% received a statin, and 58.8% received implantable cardioverter-defibrillator. A minority of patients with coronary artery disease, diabetes mellitus, heart failure, and peripheral vascular disease received all indicated therapies (25.1%, 43.2%, 42.5%, and 43.4%, respectively). A total of 52.4% of patients had controlled hypertension and 74.6% of patients with hyperlipidemia received a statin. Factors associated with non-receipt of all indicated therapies included frailty, comorbid illness, geographic region, and antiarrhythmic drug therapy.

Conclusions—The majority of eligible atrial fibrillation outpatients did not receive all guideline-recommended therapies for cardiovascular comorbid conditions and risk factors. This represents a potential opportunity to improve atrial fibrillation patients' quality of care and outcomes.

Keywords

atrial fibrillation; evidence-based medicine; registry

Introduction

Atrial fibrillation is a growing public health concern.[1,2] The lifetime risk of developing atrial fibrillation is approximately 1 in 4 among US individuals ≥ 40 years of age.[3] Approximately 2.66 million US adults have been diagnosed with atrial fibrillation.[4] By the year 2050, the number of patients with diagnosed atrial fibrillation will exceed 5.6 million.[5] Outcomes related to atrial fibrillation, including stroke[6] and death,[7] may likewise increase over time.

Cardiovascular comorbidities and risk factors are common among atrial fibrillation patients and elevate the risk of atrial fibrillation-related morbidity such as stroke.[8,9] In fact, coexisting conditions and risk factors account for a substantial portion[10] if not the entirety[11] of atrial fibrillation-related mortality. Thus, modification of cardiovascular risk in atrial fibrillation patients and treatment of comorbid conditions via the use of proven primary and secondary prevention therapeutic interventions is highly desired. However, rates of evidence-based primary and secondary cardiac prevention therapy use among atrial fibrillation outpatients are unknown. Data regarding contemporary care of these patients may provide important insights into their clinical characteristics and associated treatment

patterns and thus inform future quality improvement initiatives. Using baseline data from the Outcomes Registry for Better Informed Treatment Atrial Fibrillation (ORBIT-AF), the goals of this analysis were (1) to quantify the proportion of eligible atrial fibrillation outpatients receiving guideline-directed evidence-based therapy for coronary artery disease, diabetes mellitus, heart failure, hyperlipidemia, hypertension, and peripheral vascular disease; and (2) to identify factors associated with receipt of all indicated evidence-based therapy.

Methods

Data Source

ORBIT-AF is a national, observational, community-based, ongoing registry of outpatients with atrial fibrillation. The ORBIT-AF program has been described previously.[12] Baseline data collected between June 2010 and August 2011 from 174 sites were the primary dataset for this analysis. Trained personnel at participating outpatient practices, including internal medicine, cardiology, and electrophysiology clinics, abstracted data on consecutive eligible atrial fibrillation patients and submitted them to the ORBIT-AF registry via Web-enabled case report forms.

Using standard definitions, data include demographic and clinical characteristics, medical history and prior treatments, type of atrial fibrillation, pharmacologic treatment strategy, and antithrombotic therapy and monitoring. The specialties of the enrolling physician and co-treating physicians (internal medicine, neurology, cardiology, electrophysiology) in the patient's atrial fibrillation-related care were also captured.

Study Population

Patients ≥ 18 years of age with electrocardiographically documented atrial fibrillation were enrolled. For the current analysis, 2 records with incomplete information about the use of evidence-based therapy and 653 records of patients not eligible for at least one evidence-based therapy were excluded.

Outcome Measures

The principal outcome measure was the use of evidence-based therapy among eligible patients. Eligibility for evidence-based therapy was defined according to current professional guidelines endorsed by the American College of Cardiology Foundation/American Heart Association,[13–15] the American Diabetes Association,[16] the National Cholesterol Education Program,[17] and the National High Blood Pressure Program.[18] Specifically, patients with coronary artery disease were eligible for antiplatelet therapy, a β-blocker, an angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) in the presence of diabetes mellitus or a left ventricular ejection fraction ≤ 40%, a statin, and antihypertensive therapy in the presence of previously-diagnosed hypertension or elevated blood pressure during their baseline visit (blood pressure ≥ 140/90 mm Hg or blood pressure ≥ 130/80 mm Hg among patients with diabetes mellitus or chronic kidney disease). Patients with diabetes mellitus were eligible for an ACEI/ARB if indicated, a statin, and antihypertensive therapy if indicated. Heart failure patients were eligible for a β-blocker, an ACEI/ARB if indicated, an aldosterone antagonist in the presence of New York Heart

Association Class III-IV symptoms and creatinine ≤ 2.5 mg/dL among men or ≤ 2.0 mg/dL among women, antihypertensive therapy if indicated, and implantable cardioverter-defibrillator therapy in the presence of a left ventricular ejection fraction ≤ 35% and New York Heart Association Class II-III symptoms. Patients with hyperlipidemia were eligible for statin therapy in the presence of coronary artery disease, diabetes mellitus, and/or peripheral vascular disease. Hypertension treatment was defined by receipt of an antihypertensive medication, while hypertension control was defined by blood pressure < 140/90 mm Hg in the absence of diabetes mellitus or chronic kidney disease or blood pressure < 130/80 mm Hg in the presence of one or both of these comorbidities. Patients with peripheral vascular disease were eligible for antiplatelet therapy and a statin. Eligibility criteria for evidence-based therapy according to cardiovascular risk factors and comorbidities are further detailed in Supplementary Table 1.

Statistical Analysis

We compared the baseline characteristics of patients who received all evidence-based therapy to those of patients who did not receive all evidence-based therapy using χ^2 tests for categorical variables and Kruskal-Wallis tests for continuous variables. We report percentages for categorical variables and medians and interquartile ranges (IQR) for continuous variables. The proportion of patients with each cardiovascular comorbidity and risk factor and corresponding use of evidence-based therapy was determined.

To identify factors associated with receipt of all indicated evidence-based therapy, we constructed a multivariable logistic regression model after stratification by the 64 combinations of 6 comorbidities (coronary artery disease, heart failure, hypertension, hyperlipidemia, peripheral vascular disease, and diabetes mellitus). Covariate associations were therefore determined within strata representing subjects with equivalent sets of comorbidities and treatment eligibilities. Strata without representation of both receipt and non-receipt of evidence-based therapy (0.8% of patients) and the stratum without comorbidities were excluded. Candidate variables were selected on the basis of prior literature and clinical experience. The initial model included variables for age, sex, race, insurance status, educational status, body mass index, heart rate, thyroid disease, obstructive sleep apnea, cognitive impairment, liver disease, alcohol abuse, cancer, osteoporosis, hip fracture, history of gastrointestinal bleeding, dialysis-dependence, anemia, frailty (a clinical syndrome in which 3 or more of the following are present: unintentional weight loss of ≥ 10 pounds, self-reported exhaustion, poor grip strength, slow walking speed, and low physical activity), chronic obstructive pulmonary disease, drug abuse (history of current, recent, or remote abuse of any controlled substance), current smoking, family history of atrial fibrillation, sinus node dysfunction or sick sinus syndrome, creatinine clearance, hemoglobin, current antiarrhythmic drug use, catheter ablation of atrial fibrillation, prior stroke or transient ischemic attack, renal insufficiency, past warfarin use, current warfarin use, contraindications to oral anticoagulant therapy, functional status, and provider specialty. Continuous variables were tested for linearity, and non-linear variables were transformed using spline functions or truncated. Using backward selection, factors for which P was ≥ 0.05 were excluded from the model. Missing covariate data (< 11%) were handled by multiple imputation using Markov Chain Monte Carlo and propensity methods. Final

estimates and associated standard errors reflect the combined analysis over five imputed data sets.

P values of <0.05 were considered statistically significant, and all tests were 2-sided. Analyses were performed using SAS software version 9.3 (SAS Institute, Cary, NC). The institutional review board of the Duke University Health System and each enrolling center approved this study. The authors had full access to the data and have read and agree to the manuscript as written.

Results

Among 10096 enrolled patients, 9443 (93.5%) were eligible for one or more evidence-based therapy.Table 1 shows the baseline characteristics of the evidence-based therapy-eligible atrial fibrillation cohort. The median age was 75 (IQR 67–82) years, 57.4% were male, and 89.0% were white. A total of 4398 patients (46.6%) received all evidence-based therapy indicated for their cardiovascular comorbidities and risk factors. In comparison to patients who received all indicated evidence-based therapies, patients who did not were older (76 [IQR 69–83] years vs. 74 [IQR 66–81] years), more often male (59.0% vs. 55.5%), less frequently had private insurance (25.0% vs. 31.4%), and more frequently had Medicare or Medicaid (74.2% vs. 67.5%). They had a higher prevalence of most cardiovascular comorbidities and risk factors: 50.2% vs. 15.9% had coronary artery disease, 42.4% vs. 18.8% had diabetes mellitus, 46.0% vs. 21.7% had heart failure, and 20.8% vs. 6.8% had peripheral vascular disease. They also had a higher prevalence of most non-cardiovascular comorbidities, including anemia, cancer, cognitive impairment/dementia, chronic obstructive pulmonary disease, dialysis-dependence, frailty, history of gastrointestinal bleeding, history of hip fracture, history of stroke or transient ischemic attack, liver disease, obstructive sleep apnea, and sinus node dysfunction/sick sinus syndrome. They were more likely to have been treated with or to currently take warfarin. Further, the practices where they received their medical care were more likely to be located in the South and West.

The proportion of eligible atrial fibrillation patients receiving evidence-based therapy are shown in Figure 1: 62.3% received an antiplatelet agent, 72.3% received a β-blocker, 59.5% received an ACEI/ARB, 15.3% received an aldosterone antagonist, 65.7% received a statin, 52.4% with hypertension had it controlled, 58.8% received an implantable cardioverter-defibrillator, and 46.6% received all indicated evidence-based therapies. Table 2 shows receipt of evidence-based therapy according to cardiovascular comorbidity or risk factor. A minority of patients with coronary artery disease, diabetes mellitus, heart failure, and peripheral vascular disease received all corresponding indicated evidence-based therapies (25.1%, 43.2%, 42.5%, and 43.4%, respectively). A total of 74.6% of patients with hyperlipidemia received a statin. Table 3 shows factors independently associated with receipt or lack of receipt of all evidence-based therapy in the total atrial fibrillation cohort: frailty, geographic region, prior stroke or transient ischemic attack, chronic obstructive pulmonary disease, current antiarrhythmic drug therapy, renal function, osteoporosis, and thyroid disease.

Discussion

We examined the quality of care for atrial fibrillation-related cardiovascular comorbidities and risk factors in a national atrial fibrillation registry. There were three main findings from our study. First, the vast majority of atrial fibrillation outpatients were eligible for evidence-based therapy. Second, evidence-based therapies were significantly underused in eligible atrial fibrillation patients. Third, several important factors were independently associated with evidence-based therapy under use, including frailty, comorbid illness, geographic region, and antiarrhythmic drug therapy.

Mortality in atrial fibrillation patients is high, and anticoagulation may only partially reduce its occurrence.[19] Emerging evidence suggests that many therapies traditionally reserved for non-atrial fibrillation conditions prevent the development of atrial fibrillation[20–22] or reduce its recurrence.[23–26] Treating cardiovascular comorbidities and risk factors as a means to potentially reduce atrial fibrillation-related morbidity and mortality, however, represents an often-overlooked therapeutic paradigm.[27] This approach is attractive because the proportion of atrial fibrillation-related mortality attributable to coexisting conditions and risk factors is high[10,11] and receipt of evidence-based therapy has been shown to reduce mortality.[28,29] Despite clear professional guideline recommendations, however, one out of every two eligible patients in the current analysis did not receive one or more indicated evidence-based therapy. These gaps in care represent potential opportunities to improve atrial fibrillation patient outcomes.

Prior studies have demonstrated evidence-based therapy under use among outpatients with each of the studied cardiovascular comorbidities and risk factors.[30–35] A novelty of the current analysis lies in its assessment of outpatient evidence-based therapy use in the context of atrial fibrillation. Baseline data from the Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting (IMPROVE HF), provides a recent, US-based reference dataset.[32] Evidence-based therapy use was suboptimal among IMPROVE HF enrollees. In comparison, however, ORBIT-AF enrollees with heart failure were even less likely to receive most evidence-based therapy (74.9% v. 87.6% received a β-blocker, 61.7% v. 79.5% received an ACEI/ARB, 15.3% v. 33.3% received an aldosterone antagonist, 97.8%, and 58.8% v. 49.1% received implantable cardioverter-defibrillator therapy). Though not accounting for case-mix or inter-practice variation, these direct comparisons nonetheless suggest that those with atrial fibrillation are even less likely to receive evidence-based therapy than their heart failure counterparts. The degree to which the presence of atrial fibrillation influences receipt of evidence-based therapy among patients with heart failure and other cardiovascular comorbidities and risk factors in the current era requires further study.

The current analysis underscores the importance of frailty in the receipt of evidence-based therapy. A geriatric syndrome of heightened vulnerability to stressors,[36] frailty is associated with death and disability in patients with heart disease.[37] Although the benefits of evidence-based therapy should be high in the setting of corresponding high risk, data are limited. The American Heart Association therefore has called for further study of frailty and its relation to treatment outcomes.[38,39]

Our finding that antiarrhythmic drug therapy may pose as a barrier to receipt of evidence-based therapy for cardiac comorbid conditions or risk factors is novel. Amiodarone receipt may preclude the use of a traditional β-blocker by virtue of its intrinsic β-blocking properties. However, clinical trial data suggest that discontinuation of a β-blocker in favor of amiodarone increases the likelihood of all-cause mortality, particularly in the post-myocardial infarction[40] and heart failure[41] settings. In contrast to evidence-based therapy, antiarrhythmic medications have not been shown to reduce mortality. Choosing to either initiate or continue a β-blocker rather than using antiarrhythmic medication alone is therefore preferred except in instances of evidence-based therapy intolerance or advanced symptoms necessitating antiarrhythmic use. As many patients on antiarrhythmic therapy are otherwise healthy, under appreciation of patient risk on the part of physicians prescribing antiarrhythmic agents may also play a role.

Regional variation in receipt of all indicated evidence-based therapy also offers unique insight not observed in prior United States-based, outpatient atrial fibrillation registries.[42,43] Evidence-based therapy use was greatest in the Northeast, whereas treatment rates were lower in the South and West. After adjustment for demographic and clinical factors, these relationships persisted. The South and West therefore will merit close attention in future quality improvement initiatives.

Some factors associated with low evidence-based therapy use may reflect sound physician judgment. For example, the risk-benefit ratio for patients with a prior a prior hemorrhagic stroke or who are currently taking warfarin may be in favor of not using an antiplatelet agent. Patients receiving evidence-based therapy may be more likely to undergo screening for osteoporosis, leading to a surveillance bias.

Limitations

The study population was derived from practices participating in a voluntary registry and may not be fully representative of atrial fibrillation patients in the US. Data were acquired via chart review, and their accuracy is therefore dependent on completeness of initial documentation and thoroughness of subsequent abstraction. Reasons for not providing therapy in the absence of clear contraindications or other potentially important variables such as rural v. urban residence were not collected and thus could not be factored into these analyses. Low density lipoprotein levels were not available and thus eligibility for statin therapy was based on the presence of comorbidities alone. As with any observational analysis, residual unmeasured confounders may exist and impact the validity of our results.

Conclusions

In the ORBIT-AF registry, the vast majority of atrial fibrillation outpatients were eligible for primary or secondary prevention intervention. Cardiovascular comorbidities and risk factors in atrial fibrillation outpatients were often inadequately treated with guideline-recommended evidence-based therapy, underscoring opportunities to improve atrial fibrillation patients' quality of medical care and outcomes. Further, a number of important patient and practice factors were independently associated with incomplete use of evidence-based therapy, including frailty, geographic region, prior stroke or transient ischemic attack, chronic

obstructive disease, and antiarrhythmic drug use. These findings should be investigated in other atrial fibrillation populations, as they may play important roles in the careful construction of future atrial fibrillation quality improvement initiatives.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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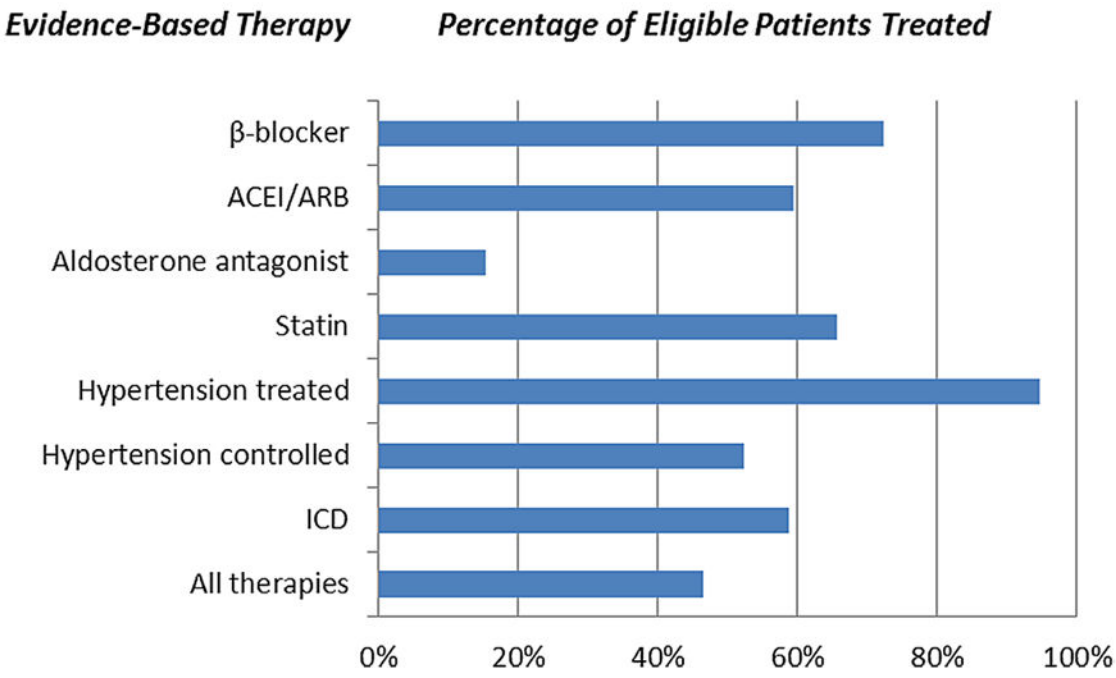

Figure 1.
Receipt of Evidence-Based Medicine Among Eligible Patients in the Total Atrial Fibrillation Cohort

Table 1

Patient Characteristics*

Characteristic	Total (n=9443)	All EBT (n=4398)	Not all EBT (n=5045)	*P* Value
Age, median (IQR), y	75 (67–82)	74 (66–81)	76 (69–83)	<0.001
Male, %	57.4	55.5	59.0	<0.001
White, %	89.0	89.0	89.0	0.923
Insurance, %				<0.001
Private	28.0	31.4	25.0	
Medicare or Medicaid	71.1	67.5	74.2	
Systolic blood pressure, median (IQR), mm Hg	126 (117–138)	128 (118–138)	126 (115–138)	<0.001
Diastolic blood pressure, median (IQR), mm Hg	72 (66–80)	74 (68–80)	71 (64–80)	<0.001
Heart rate, median (IQR), bpm	70 (63–80)	70 (62–80)	70 (64–80)	0.002
Body mass index, median (IQR)†	29.3 (25.4–34.3)	29.6 (25.8–34.4)	29.0 (25.1–34.2)	<0.001
Cardiovascular comorbidities and risk factors, %				
Coronary artery disease	34.2	15.9	50.2	<0.001
Diabetes mellitus	31.4	18.8	42.4	<0.001
Heart failure	34.7	21.7	46.0	<0.001
Hyperlipidemia	74.0	73.7	74.2	0.541
Hypertension	98.5	99.5	97.6	<0.001
Peripheral vascular disease	14.2	6.8	20.8	<0.001
Other medical history, %				
Anemia	19.0	15.3	22.2	<0.001
Cancer	24.1	22.8	25.2	0.005
Cognitive impairment/dementia	3.2	2.4	3.9	<0.001
COPD	17.0	12.8	20.7	<0.001
Dialysis	1.3	0.8	1.7	<0.001
Frailty	6.0	3.9	7.8	<0.001
GI bleed	9.4	7.8	10.8	<0.001
Hip fracture	2.6	2.0	3.2	<0.001
History stroke or transient ischemic attack	16.1	10.4	21.1	<0.001
Liver disease	1.9	1.5	2.3	0.003

Characteristic	Total (n=9443)	All EBT (n=4398)	Not all EBT (n=5045)	*P* Value
Obstructive sleep apnea	18.5	17.2	19.7	0.002
Osteoporosis	13.4	13.7	13.1	0.373
Severe renal disease (eGFR < 30 or dialysis)	11.1	10.3	11.8	0.021
Sinus node dysfunction/sick sinus syndrome	18.0	15.6	20.0	<0.001
Thyroid disease	22.7	21.3	23.9	0.003
Functional status				<0.001
Living independently	90.1	93.0	87.5	
Living with assistance	7.5	5.1	9.6	
Residing in assisted living facility	1.4	1.1	1.7	
Residing in skilled nursing home	0.4	0.1	0.6	
Laboratory Data, median (IQR)				
eGFR, mL/min/1.73 m^2	68.6 (49.2–95.4)	73.2 (53.0–101.1)	64.2 (46.4–90.1)	<0.001
Hemoglobin	13.5 (12.2–14.6)	13.7 (12.5–14.8)	13.2 (12.0–14.4)	<0.001
Left ventricular ejection fraction, %				<0.001
Normal (≥ 50%)	69.3	75.2	64.2	
Mild dysfunction (>40%, <50%)	6.4	5.6	7.1	
Moderate dysfunction (≥30% to 40%)	9.5	6.1	12.5	
Severe dysfunction (<30%)	4.5	2.3	6.4	
Current antiarrhythmic drug therapy	28.3	28.2	28.4	0.791
Warfarin				
History of treatment	82.8	81.1	84.4	<0.001
Current treatment	72.7	71.3	73.9	0.005
Region				<0.001
Midwest	25.6	26.7	24.7	
Northeast	25.8	27.8	24.1	
South	34.8	32.8	36.5	
West	13.8	12.7	14.8	
Provider specialty				0.289
Cardiology	65.6	65.5	65.7	
Electrophysiology	14.8	15.3	14.3	
Family Practice/Internal Medicine	19.6	19.2	20.0	

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Abbreviations: EBT, evidence-based therapy; IQR, interquartile range; eGFR, estimated glomerular filtration rate.

*Data are based on patients with available data for each characteristic.

†Body mass index is calculated as weight in kilograms divided by height in meters squared.

Table 2

Receipt of Evidence-Based Therapy by Cardiovascular Comorbidity or Risk Factor

Evidence-Based Therapy	Coronary Artery Disease (n=3,232)	Diabetes Mellitus (n=2,968)	Heart Failure (n=3,275)	Hyperlipidemia (n=4,829)	Hypertension (n=8,731)	Peripheral Vascular Disease (n=1,345)
Antiplatelet agent	66.0	-	-	-	-	58.6
β-blocker	73.3	-	74.9	-	-	-
ACEI/ARB	58.1	61.4	61.7	-	-	-
Aldosterone antagonist	-	-	15.3	-	-	-
Statin	72.9	66.3	-	74.6	-	68.3
Hypertension						
Treated	96.6	95.9	97.8	-	-	-
Controlled	55.4	44.3	57.7	-	52.4	-
Implantable cardioverter-defibrillator	-	-	58.8	-	-	-
All therapies	25.1	43.2	42.5	74.6	52.4	43.4

*Data are presented as percentages of each cardiovascular comorbidity or risk factor. Analysis was confined to eligible patients according to current professional guidelines.

Table 3

Factors Associated With Receipt of Evidence-Based Therapy Among Patients With Atrial Fibrillation*

Factor	OR (95% CI)	*P* Value
White	0.85 (0.72, 1.00)	0.045
Location		<0.001
West v. Northeast	0.63 (0.53, 0.75)	<0.001
South v. Northeast	0.72 (0.63, 0.82)	<0.001
Midwest v. Northeast	0.95 (0.82, 1.09)	0.450
Heart rate < 66, per 10-bpm increase	0.89 (0.84, 0.95)	0.003
Functional status		0.018
Living with assistance v. Living independently	0.74 (0.60, 0.92)	0.005
Residing in assisted living facility v. Living independently	0.70 (0.46, 1.09)	0.114
Residing in skilled nursing home v. Living independently	0.68 (0.25, 1.84)	0.451
Body mass index, per 2.5 kg/m^2 increase	1.02 (1.00, 1.04)	0.022
Frailty	0.75 (0.59, 0.95)	0.016
Chronic obstructive pulmonary disease	0.84 (0.73, 0.97)	0.015
Osteoporosis	1.19 (1.02, 1.39)	0.031
Prior stroke or transient ischemic attack	0.40 (0.34, 0.46)	<0.001
Thyroid disease	0.87 (0.77, 0.98)	0.023
eGFR, per 10 mL/min/1.73 m^2 decrease	0.94 (0.92, 0.97)	<0.001
Current antiarrhythmic drug therapy	0.78 (0.70, 0.88)	<0.001

Abbreviations: OR, odds ratio; CI, confidence interval

*Listed variables were significant factors in the final logistic regression model that influenced receipt of all indicated evidence-based therapy. Variables in the initial model included age, sex, race, insurance status, educational status, body mass index, heart rate, thyroid disease, obstructive sleep apnea, cognitive impairment, liver disease, alcohol abuse, cancer, osteoporosis, hip fracture, GI bleed, dialysis-dependence, anemia, frailty, COPD, drug abuse, family history of atrial fibrillation, sinus node dysfunction or sick sinus syndrome, estimated glomerular filtration rate, current antiarrhythmic drug use, current smoking, catheter ablation of atrial fibrillation, prior stroke or transient ischemic attack, renal insufficiency, past warfarin use, current warfarin use, contraindications to oral anticoagulant therapy, functional status, and provider specialty.