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# Geriatric Elements and Oral Anticoagulant Prescribing in Older Atrial Fibrillation Patients: SAGE-AF

**Jane S. Saczynski, PhD**[*], **Saket R. Sanghai, MD**[†], **Catarina I. Kiefe, MD, PhD**[‡], **Darleen Lessard, MS**[†,‡], **Francesca Marino, BS**[†], **Molly E. Waring, PhD**[§], **David Parish, MD**[¶], **Robert Helm, MD**[‖], **Felix Sogade, MD**[**], **Robert Goldberg, PhD**[†], **Jerry Gurwitz, MD**[††], **Weijia Wang, MD**[†], **Tanya Mailhot, RN, PhD**[*,‡‡], **Benita Bamgbade, PharmD, PhD**[*], **Bruce Barton, PhD**[†], **David D. McManus, MD, ScM**[†,‡]

[*]Department of Pharmacy and Health System Sciences, Northeastern University, Boston, Massachusetts

[†]Cardiology Division, Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

[‡]Department of Population and Quantitative Health Sciences, University of Massachusetts Medical School, Worcester, Massachusetts

[§]Department of Allied Health Sciences, University of Connecticut, Storrs, Connecticut

[¶]Department of Community Medicine/Internal Medicine, Mercer University School of Medicine, Macon, Georgia

[‖]Department of Medicine, Boston University Medical Center, Boston, Massachusetts

[**]Department of Medicine, Mercer University School of Medicine, Mercer, Georgia

[††]Geriatric Medicine Division, Department of Medicine, University of Massachusetts Medical School, Worcester, Massachusetts

[‡‡]Montreal Heart Institute Research Center, Montreal, Quebec, Canada

## Abstract

**OBJECTIVES:** Oral anticoagulants are the cornerstone of stroke prevention in high-risk patients with atrial fibrillation (AF). Geriatric elements, such as cognitive impairment and frailty, commonly occur in these patients and are often cited as reasons for not prescribing oral anticoagulants. We sought to systematically assess geriatric impairments in patients with AF and determine whether they were associated with oral anticoagulant prescribing.

Address correspondence to Jane S. Saczynski, PhD, Department of Pharmacy and Health System Sciences, Northeastern University, 360 Huntington Avenue, Boston, MA 02115. j.saczynski@northeastern.edu.

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**Conflict of Interest:** The remaining authors have declared no conflicts of interest for this article.

**DESIGN:** Cross-sectional analysis of baseline data from the ongoing Systematic Assessment of Geriatric Elements in Atrial Fibrillation (SAGE-AF) prospective cohort study.

**SETTING:** Multicenter study with site locations in Massachusetts and Georgia that recruited participants from cardiology, electrophysiology, and primary care clinics from 2016 to 2018.

**PARTICIPANTS:** Participants with AF age 65 years or older, $CHA_2DS_2$-VASc (congestive heart failure; hypertension; aged ≥75 y [doubled]; diabetes mellitus; prior stroke, transient ischemic attack, or thromboembolism [doubled]; vascular disease; age 65–74; female sex) score of 2 or higher, and no oral anticoagulant contraindications (n = 1244).

**MEASUREMENTS:** A six-component geriatric assessment included validated measures of frailty, cognitive function, social support, depressive symptoms, vision, and hearing. Oral anticoagulant use was abstracted from the medical record.

**RESULTS:** A total of 1244 participants (mean age = 76 y; 49% female; 85% white) were enrolled; 42% were cognitively impaired, 14% frail, 53% pre-frail, 12% socially isolated, and 29% had depressive symptoms. Oral anticoagulants were prescribed to 86% of the cohort. Oral anticoagulant prescribing did not vary according to any of the geriatric elements (adjusted odds ratios [ORs] for oral anticoagulant prescribing and cognitive impairment: OR = .75; 95% confidence interval [CI] = .51–1.09; frail OR = .69; 95% CI = .35–1.36; social isolation OR = .90; 95% CI = .52–1.54; depression OR = .79; 95% CI = .49–1.27; visual impairment OR = .98; 95% CI = .65–1.48; and hearing impairment OR = 1.05; 95% CI = .71–1.54).

**CONCLUSION:** Geriatric impairments, particularly cognitive impairment and frailty, were common in our cohort, but treatment with oral anticoagulants did not differ by impairment status. These geriatric impairments are commonly cited as reasons for not prescribing oral anticoagulants, suggesting that prescribers may either be unaware or deliberately ignoring the presence of these factors in clinical settings.

## Keywords

atrial fibrillation; cognitive impairment; frailty; oral anticoagulants

Atrial fibrillation (AF) afflicts 5.2 million Americans today, a number expected to rise to more than 12 million in 2050.[1] The prevalence of AF doubles with each decade of life after age 40, reaching almost 20% in those 85 years or older. Stroke prevention is central to AF treatment. Based on over 20 trials including more than 60 000 patients showing that oral anticoagulants (OACs) dramatically reduce stroke risk,[2–4] AF treatment guidelines recommend assessing thromboembolic risk using scoring schemes such as the $CHA_2DS_2$-VASc (congestive heart failure; hypertension; aged ≥75 y [doubled]; diabetes mellitus; prior stroke, transient ischemic attack, or thromboembolism [doubled]; vascular disease; age 65–74; female sex) to guide AF prescriptions.[5,6] The overwhelming majority (approximately 75%) of patients with AF 65 years and older meet guideline criteria for OAC treatment ($CHA_2DS_2$-VASc score ≥2). Although OAC use has been increasing in recent years among those 65 years or older, up to 40% of patients eligible for anticoagulation are untreated.[7,8]

Several patient characteristics are associated with lower rates of OAC prescribing including older age, female sex, antiplatelet use, and comorbid conditions.[9–11] Beyond these clinical

factors, providers frequently cite actual or perceived fall risk and age-related impairments as reasons for AC withholding.[12,13] Studies have shown that physician perceptions of stroke and bleeding risk in patients with AF do not consistently relate to validated risk score estimations. Severity of AF symptoms, not living independently, and history of anemia may be more likely to influence physician perception of stroke risk than risk captured by stroke or bleeding risk scores.[7] Although not routinely assessed in clinical visits, geriatric impairments, such as frailty and cognitive impairment, are associated with OAC success and outcomes. For example, cognitive impairment, lack of social support, and frailty are associated with poor adherence to OAC and lower time in therapeutic range (TTR), whereas depression is associated with low TTR and more frequent dose adjustments for patients taking warfarin.[14–17]

Data from registries and hospitalized patient cohorts showed that cognitive impairment and frailty are associated with lower rates of OAC prescribing.[18–20] However, because these studies often use medical record data to assess geriatric impairments, they may underestimate the presence and magnitude of these conditions and reflect only severely impaired patients. The prevalence of systematically assessed geriatric conditions in older patients with AF has not been reported; nor have OAC prescribing patterns been examined in relation to these conditions.

Using data from the ongoing Systematic Assessment of Geriatric Elements in Atrial Fibrillation (SAGE-AF) cohort, we describe the prevalence of a set of geriatric impairments (cognitive impairment, social isolation, sensory impairments, frailty, and depression) among older patients with AF who are eligible for OAC and examine whether prescribing of OAC varies according to these geriatric impairments. We hypothesize that, after adjusting for other geriatric impairments and important clinical factors, patients who are cognitively impaired, frail, or depressed will be less likely to be prescribed OAC than their nonimpaired counterparts.

## METHODS

### Study Sample

The SAGE-AF study is an ongoing prospective study of AF, OAC treatment, and relationships between components of a geriatric examination and clinical outcomes. Consenting participants complete a comprehensive baseline geriatric assessment, a structured interview (including validated instruments to assess mood, AF-related quality of life [QoL], OAC treatment satisfaction, medication adherence), and a comprehensive baseline medical record review. Participants are reassessed at 1 and 2 years after baseline, but this cross-sectional analysis reports on baseline findings only.

To be eligible for SAGE-AF, participants must (1) be scheduled for an ambulatory care visit at one of four central Massachusetts practices (UMass Memorial Health Care [UMMHC] internal medicine, UMMHC cardiology, UMMHC electrophysiology, or Heart Rhythm Associates of Central Massachusetts), one practice in eastern MA (Boston University cardiology), or one of two practices in central Georgia (Family Health Center and Georgia Arrhythmia Consultants); (2) have AF (participants were considered to have AF if the

arrhythmia was present on an electrocardiogram or Holter monitor or if AF was noted in any clinic note or hospital record); (3) be age 65 years or older; and (4) have a $CHA_2DS_2$-VASc risk score of 2 or higher.

Participants are not eligible for enrollment if they have documentation of an absolute contraindication to OAC, if they have an indication for OAC other than AF (ie, mechanical heart valve, deep venous thrombosis, or pulmonary embolism), if they do not demonstrate capacity to provide informed consent as assessed by a capacity instrument that combines direct questions about their understanding of study participation with interviewer observations of the patient,[21] if they do not speak English, if they have a planned invasive procedure with high risk for uncontrollable bleeding, if they are prisoners, or if they were unwilling or unable to participate in planned 1- and 2-year follow-up visits at their study sites.

All participants received an invitation to participate 1 week before their scheduled clinic visit. All SAGE-AF participants provided informed written consent, and all protocols were approved by the University of Massachusetts Medical School, Boston University, and Mercer University review boards.

## SAGE-AF Examination

All SAGE-AF study participants had a medical history obtained and a physical examination performed in the context of their routine care, typically on the day of study enrollment. All participants underwent a 60-minute interviewer-administered computer-assisted interview with standardized measures including assessments of mood, frailty, cognition, social support, as well as other key patient-reported measures. Baseline data are from 2016 to 2018.

## Comprehensive Geriatric Assessment

All SAGE-AF participants complete a six-component geriatric assessment using validated measures of frailty, cognitive function, social support, depressive symptoms, vision, and hearing. Frailty is assessed using the Cardiovascular Health Survey frailty scale[22] that includes five components: weight loss/shrinking, exhaustion, low physical activity, slow gait speed, and weakness. Each component receives a point, and the scale ranges from 0 to 5. A participant is frail if three or more criteria are present, 1 or 2 for pre-frail (have some impairment but do not meet full criteria for frailty), and 0 for robust. Cognitive function is assessed by the Montreal Cognitive Assessment Battery,[23] a 30-item screening tool validated to detect mild cognitive impairment with 23 used as the cutpoint for impairment.[24] We use a five-item modified version of the Social Support Scale and the six-item Social Network Scale (range = 0–30) to assess breadth and depth of social support available to participants[25] with a score of 12 used to indicate social isolation. Patient Health Questionnaire-9 (range = 0–27) was used to assess for depressive symptoms[26] with 5 used as a cutpoint for high depressive symptoms. Patients' self-report vision and hearing status are based on standardized questionnaires.

### Oral Anticoagulation Use

Prescription of OACs (including vitamin K antagonists and direct oral anticoagulants) was abstracted from the electronic medical record and confirmed by patient self-report during the in-person interview.

### Other Study Measures

Demographic, clinical, treatment, and laboratory characteristics of SAGE-AF participants were abstracted from the medical record by study staff after rigorous training with regular quality control checks. Information abstracted from the health record included participants' age, sex, race, insurance type, comorbidities relevant to stroke, bleeding risk (eg, diabetes, hypertension, heart failure, anemia, chronic kidney disease), and cardiovascular treatments (ie, use of antithrombotics). Information about key laboratory tests including levels of serum creatinine, hemoglobin, and international normalized ratio values (over the past 4 wk) were also abstracted from the health record. $CHA_2DS_2VAS$-C and HAS-BLED (hypertension, abnormal renal and liver function, stroke, bleeding, labile international normalized ratio, elderly, drugs or alcohol) risk scores were calculated based on relevant clinical data in the electronic health record using validated methods.[27] Disease-specific QoL was measured using the Atrial Fibrillation Effect on Quality-of-Life (AFEQT) questionnaire, a validated instrument for AF patients that includes subscales for symptom severity, global well-being, AF burden, and impact on healthcare utilization.[28] AFEQT scores range from 0 to 100 with higher scores representing higher self-reported health-reported QoL. Education and marital status were self-reported by the participant.

### Statistical Analysis

Characteristics of the cohort were compared according to OAC status using $\chi^2$, analysis of variance, and *t* tests for discrete and continuous variables, respectively. We used multiple logistic regression analysis to examine independent factors associated with OAC prescribing and included all variables that differed by OAC prescribing at the $P < .05$ level, as well as the geriatric elements, because they were our main variables of interest. We did not individually adjust for variables that were components of the $CHA_2DS_2$-VASc and HAS-BLED scores. All analyses were performed using SAS software, v.9.4 (SAS Institute, Cary, NC).

## RESULTS

Between June 2016 and June 2018, a total of 1244 study participants were enrolled and completed their baseline examination (Figure 1). Participants were an average of 75.5 years of age (standard deviation [SD] = 7.1), 49% were female, and 85% were white (Table 1). Participants were at a high stroke and bleeding risk (mean $CHA_2DS_2$-VASc score = 4.4 [SD = 1.6], and mean HAS-BLED score = 3.2 [SD = 1.0]). Geriatric elements were common in SAGE-AF participants with half (53%) of the cohort falling into the pre-frail category and 14% categorized as frail. More than 2 in every 5 patients (42%) were cognitively impaired, and approximately one-third reported vision (36%) or hearing (36%) impairment. More than one-quarter (29%) of the study cohort reported high depressive symptoms, and 13% were socially isolated.

Of the 1244 participants enrolled in SAGE-AF, all were eligible for treatment with OAC, and 1064 (85.5%) were treated with an OAC (Table 2). Of the 1064 participants treated with an OAC, 598 (56%) were treated with a vitamin K antagonist, and the remaining 466 patients were treated with target-specific OACs (direct OACs [DOACs]). Compared with untreated participants, those treated with an OAC were approximately 2 years older on average, at higher risk for stroke ($CHA_2DS_2$-VASc score: 4.5 vs 4.0), more frequently had heart failure, and reported significantly lower health-related QoL (AFEQT score = 79 vs 83) (all $P < .05$; Table 2). Participants treated with an OAC were less likely to have paroxysmal AF (56% vs 78%) and more likely to have persistent (28% vs 7%) or long-standing persistent AF (7% vs 2%). Treatment with OAC did not significantly differ according to any of the geriatric conditions examined (cognitive function, frailty, social isolation, sensory impairment, and depression) (Table 2).

Although all geriatric impairments were associated with a reduced odds of being prescribed an anticoagulant, none were statistically significant in unadjusted or adjusted logistic regression models (Table 3; adjusted ORs for OAC prescribing: cognitive impairment OR = .75; 95% CI = .51–1.09; frail OR = .69; 95% CI = .35–1.36; social isolation OR = .90; 95% CI = .52–1.54; depression OR = .79; 95% CI = .49–1.27; visual impairment OR = .98; 95% CI = .65–1.48; hearing impairment OR = 1.05; 95% CI = .71–1.54).

We also conducted analyses stratified by region (Massachusetts and Georgia) to examine whether there were regional differences in the association of geriatric elements and OAC prescribing. Results of these region-specific analyses did not differ from the overall analysis: OAC prescribing did not differ by any of the geriatric elements (data not shown).

## DISCUSSION

In a contemporary and well-characterized cohort of older participants with AF that represents current OAC prescribing patterns, including a balance of patients treated with warfarin and direct oral anticoagulants, cognitive impairment was present in 42%, frailty or pre-frailty in 67%, and social isolation in 13%. More than 85% of the cohort was treated with an OAC, but treatment did not differ by cognitive, frailty, or social support status. Our findings suggest that although frail status or cognitive impairment is often cited as a reason to withhold OAC,[12,13] prescribers do not formally assess for these elements or are not taking them into account when making OAC prescribing decisions. Rather, our findings suggest that prescribers are more likely to use stroke risk scores, such as $CHA_2DS_2$-VASc, that include medical comorbidities and disease-specific severity measures, but no formal assessment of frailty or cognition, when making OAC prescribing decisions.

Rates of cognitive impairment were higher in our cohort than in those reported in previous studies of older patients with AF.[18,29,30] Many of these studies used cognitive status from the medical record[30,31] that often underestimates the frequency and severity of impairment and may only reflect more severe impairment or dementia.[18,32] For instance, in the ORBIT-AF registry, only 3% of patients were identified as cognitively impaired, compared with 42% of participants in our cohort. ORBIT-AF used medical record documentation of cognitive impairment and did not perform cognitive testing on participants. Because we

conducted in-person interviews with participants, we were able to use the Montreal Cognitive Assessment, an objective cognitive test recommended for use in patients with cardiovascular disease that captures mild and moderate and severe cognitive impairment.[33] Participants with less severe cognitive impairment are especially important to identify and follow because they are less likely than a patient with a dementia diagnosis to receive assistance with medication management and may require closer monitoring and surveillance.

Frailty was present in 14% of our cohort, but more than half of SAGE-AF participants were pre-frail. Our rate of frailty is higher than some previously published studies[18] but lower than others.[19,20,34–36] Our measure of frailty is based on objective measures from a physical examination with the patient, whereas many of the frailty measures used in other studies are based on medical records and represent a cumulative deficits approach (ie, the more comorbidities a person has the more frail they are) and thus may identify a different subset of patients than our measure.[37]

The OAC prescribing rate in our cohort was high. This rate reflects increasing attention in current guidelines[38] to treating older patients and those who may have comorbidities and psychosocial or cognitive impairments that would have previously impeded prescribing. Geriatric conditions were not associated with lower odds of OAC treatment after adjustment. Although several previous studies reported no association between OAC prescribing and cognitive impairment or frailty,[29,34] others found lower prescribing rates in patients with cognitive impairment and in those who are frail.[18–20,35,36] Differences between our findings and those of previous studies could relate to differences in the approach to cognitive and physical function assessment or because our data represent a more recent cohort of patients and that prescribing patterns in older patients are changing. We hypothesize that the high rate of anticoagulation in our cohort may explain differences from previous findings because rates of AC use in our cohort is higher than that reported in all prior cohorts.[18–20,35,36] Follow-up data, which we are currently collecting, on outcomes of OAC therapy will allow us to examine whether cognitive impairment and frailty are associated with more bleeding complications or less TTR for warfarin vs DOACs-treated patients.

## Strengths and Limitations

Our study has several strengths. It represents a contemporary cohort of older patients with AF who are well characterized with respect to clinical and patient-reported factors. All geriatric elements were objectively measured using standardized validated tools available freely in the public domain, enhancing applicability and reproducibility of our findings. Importantly, our cohort reflects current OAC prescribing patterns that are well balanced between vitamin K antagonists and DOACs, so our results are broadly generalizable to contemporary US AF patients. Our study also has several limitations. Our cohort is mostly composed of white participants, and most were enrolled through cardiology clinics, so the results should be replicated in a more diverse sample. We also excluded patients with dementia due to the burden our questionnaires may have put on these participants; therefore, results on cognitive impairment represent mild/moderate impairment and cannot be extended to patients with dementia.

In conclusion, in a contemporary cohort of more than 1200 older participants with AF, cognitive impairment and frailty were highly prevalent but were not associated with OAC prescribing. These impairments are commonly cited by patients and providers as part of the decision-making process for OAC prescribing. However, cognitive impairment and frailty may not be systematically assessed as part of the clinical visit. Whether consideration of geriatric elements *should* enter the decision-making process for OAC prescribing remains to be elucidated by studying outcomes. In the meantime, assessing these factors using standardized tools may identify a high-risk subgroup who may need additional training and surveillance for medication adherence and management to optimize the outcomes of this vulnerable group of patients.

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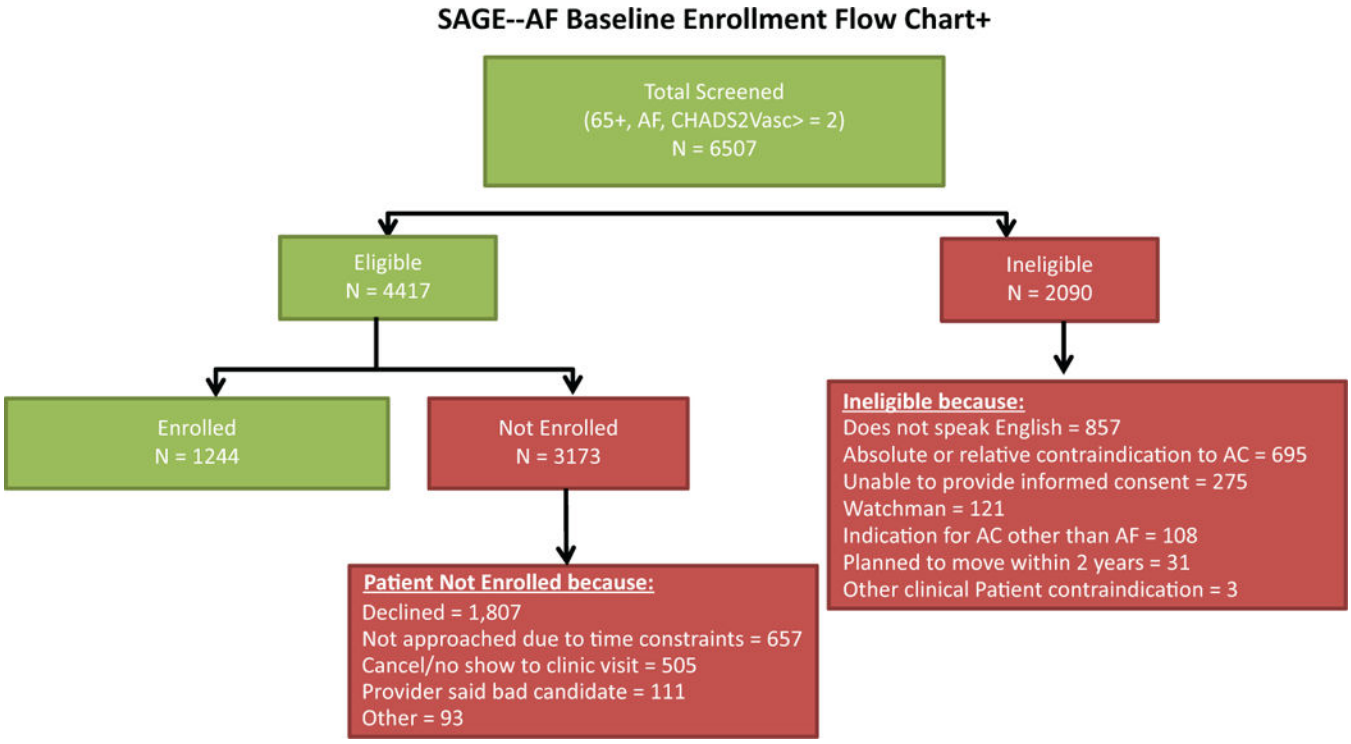


**Figure 1.**
Baseline enrollment flowchart: the SAGE-AF Study, 2016–2018.

**Table 1.**

Cohort Characteristics at Baseline (N = 1244): the SAGE-AF Study, 2016–2018[a]

| Characteristic | N (%) |
|---|---|
| Age, y | 75.5 (7.1) |
| Female | 607 (48.8) |
| White | 1056 (85.4) |
| Married or living as married | 694 (55.8) |
| Education, college or higher | 527 (42.3) |
| Insurance type | |
| Commercial | 225 (18.1) |
| Medicare | 898 (72.2) |
| **Clinical characteristics** | |
| AF type | |
| Paroxysmal | 741 (59.6) |
| Persistent | 309 (24.8) |
| Long-standing persistent | 73 (5.9) |
| New onset | 121 (9.7) |
| $CHA_2DS_2$-VASc score, median (IQR) | 4.0 (3.0–6.0) |
| HAS-BLED score, median (IQR) | 3.0 (2.0–4.0) |
| Health-related QoL, AFEQT, median (SD) | 80.0 (17.9) |
| **Medical history** | |
| Heart failure | 462 (38.4) |
| Myocardial infarction | 242 (19.5) |
| Hypertension | 1121 (90.1) |
| Diabetes | 346 (27.8) |
| Major bleeding | 244 (19.6) |
| Stroke | 122 (9.8) |
| Chronic kidney disease | 356 (28.6) |
| **Treatment characteristics** | |
| Oral anticoagulation | 1064 (85.5) |
| Aspirin use | 442 (35.5) |
| Other antiplatelet use | 79 (6.4) |
| Provider type | |
| Cardiologist | 587 (47.2) |
| Electrophysiologist | 627 (50.4) |
| Internist | 30 (2.4) |
| Geriatric elements Frailty category[b] | |
| Robust | 413 (33.2) |
| Pre-frail | 659 (53.0) |
| Frail | 172 (13.8) |
| Cognitive impairment[c] | 525 (42.2) |

| Characteristic | N (%) |
|---|---|
| Social isolation[d] | 156 (12.5) |
| Visual impairment | 427 (34.3) |
| Hearing impairment | 451 (36.3) |
| Depression[e] | 354 (28.5) |

Abbreviations: AF, atrial fibrillation; AFEQT, Atrial Fibrillation Effect on Quality-of-Life; $CHA_2DS_2$-VASc, congestive heart failure; hypertension; aged ≥75 y (doubled); diabetes mellitus; prior stroke, transient ischemic attack, or thromboembolism (doubled); vascular disease; age 65–74; female sex; HAS-BLED, Hypertension, Abnormal renal and liver function, stroke, bleeding, Labile international normalized ratio, Elderly, Drugs or alcohol; IQR, interquartile range; SAGE-AF, Systematic Assessment of Geriatric Elements in Atrial Fibrillation; SD, standard deviation.

[a]Continuous variables are presented as mean ± SD; categorical variables are presented as n (%).

[b]Based on Cardiovascular Health Survey frailty scale.

[c]Defined as Montreal Cognitive Assessment Score ≤23.

[d]Based on Medical Outcomes Study <12.

[e]Based on Patient Health Questionnaire-9 ≥5.

**Table 2.**

Cohort Characteristics According to Oral Anticoagulation Status: The SAGE-AF Study, 2016–2018

| Characteristic | OAC treated (n = 1064) | Not on OAC (n = 180) | *P* value |
|---|---|---|---|
| Age, y | 75.7 (7.1) | 74.4 (7.1) | <.05 |
| Female | 525 (49.3) | 82 (45.6) | .35 |
| White | 902 (84.8) | 154(85.6) | .13 |
| Married or living as married | 593 (55.7) | 101 (56.1) | .99 |
| Education, college graduate or higher | 438 (41.2) | 89 (49.4) | .11 |
| Insurance type | | | |
| Commercial | 184 (17.3) | 41 (22.8) | .20 |
| Medicare | 772 (72.6) | 126 (70.0) | |
| **Clinical characteristics** | | | |
| AF type | 600 (56.4) | 141 (78.3) | |
| Paroxysmal | | | |
| Persistent | 297 (27.9) | 12 (6.7) | |
| Long-standing persistent | 69 (6.5) | 4 (2.2) | |
| New onset | 98 (9.2) | 23 (12.8) | <.001 |
| $CHA_2DS_2$-VASc score, median (IQR) | 4.0 (3.0–6.0) | 4.0 (3.0–5.0) | <.001 |
| HAS-BLED score, median (IQR) | 3.0 (3.0–4.0) | 3.0 (2.0–4.0) | .14 |
| Health-related QoL, AFEQT score | 79.5 (17.8) | 83.2 (18.2) | <.05 |
| **Medical history** | | | |
| Heart failure | 409 (38.4) | 53 (29.4) | <.05 |
| Myocardial infarction | 212 (19.9) | 30 (16.7) | .30 |
| Hypertension | 966 (90.8) | 155 (86.1) | .06 |
| Diabetes | 306 (28.8) | 40 (21) | .07 |
| Major bleeding | 209 (19.6) | 35 (19.4) | .95 |
| Stroke | 108 (10.2) | 14 (7.8) | .31 |
| Chronic kidney disease | 310 (29.1) | 46 (25.6) | .32 |
| **Treatment characteristics** | | | |
| Aspirin use | 308 (29.0) | 134 (74.4) | <.001 |
| Provider type | | | |

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| Characteristic | OAC treated (n = 1064) | Not on OAC (n = 180) | *P* value |
|---|---|---|---|
| Cardiologist | 488 (45.9) | 99 (55.0) | |
| Electrophysiologist | 552 (51.9) | 75 (41.7) | |
| Internist | 24 (2.3) | 6 (3.3) | <.05 |
| Other antiplatelet use | 57 (5.4) | 22 (12.2) | <.01 |
| **Geriatric elements** | | | |
| Frailty category[a] | | | |
| Robust | 348 (32.7) | 65 (36.1) | |
| Pre-frail | 567 (53.3) | 92 (51.1) | |
| Frail | 149 (14.0) | 23 (12.8) | .66 |
| Cognitive impairment [b] | 447 (42.0) | 78 (43.3) | .74 |
| Social isolation [c] | 133 (12.5) | 23 (12.8) | .92 |
| Visual impairment | 369 (34.7) | 58 (32.2) | .52 |
| Hearing impairment | 386 (36.3) | 65 (36.1) | .97 |
| Depression[d] | 304 (28.6) | 50 (27.8) | .83 |

Abbreviations: AF, atrial fibrillation; AFEQT, Atrial Fibrillation Effect on Quality-of-Life; $CHA_2DS_2$-VASc, congestive heart failure; hypertension; aged ≥75 y (doubled); diabetes mellitus; prior stroke, transient ischemic attack, or thromboembolism (doubled); vascular disease; age 65–74; female sex; HAS-BLED, hypertension, abnormal renal and liver function, stroke, bleeding, labile international normalized ratio, elderly, drugs or alcohol; IQR, interquartile range; OAC, oral anticoagulant; QoL, quality of life; SAGE-AF, Systematic Assessment of Geriatric Elements in Atrial Fibrillation.

Note: Continuous variables are presented as mean ± standard deviation and categorical variables are presented as n (%).

[a]Based on Cardiovascular Health Survey frailty scale.

[b]Defined as Montreal Cognitive Assessment Score ≤23.

[c]Based on Medical Outcomes Study <12.

[d]Based on Patient Health Questionnaire-9 ≥5.

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**Table 3.**

Odds Ratios (95% Confidence Intervals) for Prescribing of Oral Anticoagulation on Geriatric Elements: The SAGE-AF Study, 2016–2018

| | OAC use, N (%) | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|---|
| **Geriatric impairments** | | | |
| Frailty | | | |
| Robust | 348 (84.3) | 1.0 | 1.0 |
| Pre-frail | 567 (86.0) | 1.15 (.82–1.63) | 1.01 (.66–1.55) |
| Frail | 149 (86.6) | 1.21 (.73–2.02) | .69 (.35–1.36) |
| Cognitive impairment | 449 (85.2) | .95 (.69–1.30) | .75 (.51–1.09) |
| Social Isolation | 135 (84.9) | .98 (.61–1.57) | .90 (.52–1.54) |
| Visual impairment | 370 (86.5) | 1.12 (.80–1.57) | .98 (.65–1.48) |
| Hearing impairment | 386 (85.6) | 1.01 (.73–1.40) | 1.05 (.71–1.54) |
| Depression | 303 (85.8) | 1.04 (.73–1.48) | .79 (.49–1.27) |
| **Demographic and clinical factors** | | | |
| $CHA_2DS_2$-VASc score | | 1.24 (1.12–1.38) | 1.42 (1.24–1.63) |
| HAS-BLED Score | | 1.13 (.97–1.32) | 1.04 (.86–1.26) |
| AF type | | | |
| Paroxysmal | | 1.0 | 1.0 |
| Persistent | | 5.82 (3.17–10.66) | 5.71 (3.02–10.82) |
| Long-standing persistent | | 4.05 (1.16–11.29) | 4.72 (1.58–14.24) |
| New onset | | 1.00 (.61–1.63) | 1.26 (.72–2.20) |
| Health-related QoL, AFEQT score | | .99 (.98–1.00) | .98 (.97–1.00) |
| **Treatment characteristics** | | | |
| Aspirin use | | .14 (.10-.20) | .12 (.08-.18) |
| Other antiplatelet use | | .41 (.24-.68) | .21 (.11-.40) |
| Provider, electrophysiologist | | 1.51 (1.10–2.08) | 1.35 (.92–1.99) |

Abbreviations: AF, atrial fibrillation; AFEQT, Atrial Fibrillation Effect on Quality-of-Life; $CHA_2DS_2$-VASc, congestive heart failure; hypertension; aged ≥75 y (doubled); diabetes mellitus; prior stroke, transient ischemic attack, or thromboembolism (doubled); vascular disease; age 65–74; female sex; CI, confidence interval; HAS-BLED, hypertension, abnormal renal and liver function, stroke, bleeding, labile international normalized ratio, elderly, drugs or alcohol; OAC, oral anticoagulant; OR, odds ratio; QoL, quality of life; SAGE-AF, Systematic Assessment of Geriatric Elements in Atrial Fibrillation.