Antithrombotic Therapy Use at Discharge and 1 Year in Patients With Atrial Fibrillation and Acute Stroke
Results From the AVAIL Registry

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Background and Purpose—Current American Heart Association/American Stroke Association guidelines identify warfarin use as a class IA indication in patients with atrial fibrillation (AF) and ischemic stroke (IS) or transient ischemic attack (TIA). However, few studies have examined factors associated with long-term antithrombotic therapy use in IS/TIA patients with AF.

Methods—We utilized the Get With The Guidelines–Stroke national quality improvement registry and the Adherence eValuation After Ischemic Stroke Longitudinal (AVAIL) Registry to examine patterns of antithrombotic use at discharge and at 12 months in IS/TIA patients with AF. A multivariate logistic regression model was developed to identify predictors of warfarin use in this patient population at 12 months.

Results—Of the 2460 IS/TIA patients, 291 (11.8%) had AF, of which 5.5% of patients were discharged on aspirin alone, 49.1% on warfarin alone, 1.4% on clopidogrel alone, 34.7% on warfarin plus aspirin, 2.1% on aspirin plus clopidogrel, and 1.0% on aspirin plus clopidogrel plus warfarin. Paradoxically, there was a decrease in the rate of warfarin use in patients with a CHADS2 score >3. The only factor associated with warfarin use at 12-month follow-up was male gender (adjusted odds ratio, 2.27; confidence interval, 1.22–4.35; \(P=0.01\)).

Conclusions—Overall, the use of warfarin therapy is high at discharge in IS/TIA patients with AF; however, there was a decrease in the rate of warfarin use in patients with a CHADS2 score >3. Compared to women, men were more likely to be on warfarin at 1 year after the index stroke event. Therefore, opportunities exist to improve antithrombotic use in all IS/TIA patients with AF. (Stroke. 2011;42:3477-3483.)

Key Words: antithrombotic therapy ■ atrial fibrillation ■ stroke

Atrial fibrillation (AF) is the most common cardiac arrhythmia encountered in clinical practice and is responsible for one-third of all cardiac rhythm disturbance admissions. AF is associated with an increased risk of heart failure and cognitive dysfunction, as well as a 5-fold increase of stroke and a 2-fold increase risk of mortality.\(^1,2\) Approximately 15% of acute ischemic strokes (IS) occur in people with AF. Furthermore, AF serves as an independent predictor of morbidity and mortality in IS.\(^3–8\) Current American Heart Association/American Stroke Association guidelines advocate anticoagulation use as a class IA recommendation in patients with AF and IS or transient ischemic attack (TIA).\(^9\)

However, few studies have examined antithrombotic/anticoagulation use at 1 year and longitudinal predictors of antithrombotic therapy use in IS/TIA patients with AF. Using a longitudinal cohort from the Adherence eValuation After Ischemic Stroke Longitudinal (AVAIL) Registry, we examined patient characteristics associated with AF and IS/TIA, antithrombotic use at discharge, antithrombotic use at 12-month follow-up, and predictors of warfarin use after hospital discharge.

Materials and Methods

The AVAIL Registry includes data from a prospective, nonrandomized, observational follow-up study (AVAIL) that was designed to better-understand medication use behavior of patients discharged after IS/TIA, and its methodology has been previously described.\(^10\) Briefly, the AVAIL Registry expanded on the ongoing hospital-based quality improvement program called Get With The Guidelines (GWTG)–Stroke. Outcome Sciences serves as the data collection and coordination center for GWTG–Stroke. The Duke Clinical Research Institute serves as the data analysis center and has an agreement to analyze the aggregate deidentified data for research purposes. Using this existing in-hospital data collection effort, the AVAIL Registry collected longitudinal medication data of patients who consented to provide information at 3 and 12 months after discharge.\(^10\) The primary objectives of the AVAIL...
Registry were to assess patient persistence with medications in the year after hospital discharge for TIA or stroke, and to identify specific patient, provider, and system factors associated with persistence.

The AVAIL Registry was implemented in collaboration with the American Heart Association/American Stroke Association GWTG–Stroke Program. In July 2006, all 676 hospitals participating in GWTG–Stroke were invited to participate in AVAIL; of those hospitals, 106 completed Institutional Review Board approval (IRB) to enroll patients into the AVAIL Registry. To be eligible, a patient had to meet the following criteria: age 18 years or older; hospitalization with a primary diagnosis of acute IS or TIA; direct admission based on physician evaluation or arrival through the emergency department, including emergency department transfers to the recruiting site emergency department; and ability of patient or legally authorized representative to provide informed consent. Subjects with a diagnosis of subarachnoid hemorrhage, a diagnosis of intracerebral hemorrhage, or those who were expected to survive ≤6 months were excluded. All sites were required to obtain local Institutional Review Board approval of the protocol before study initiation.1 The study closed to enrollment in July 2008; 12-month follow-up was completed in September 2009.

The GWTG–Stroke data collection form served as the primary source of baseline data. These data were abstracted from inpatient medical records by trained site personnel and entered into an online patient management tool. In-hospital variables included: demographics; medical history; National Institutes of Health Stroke Scale (NIHSS) score on admission; presentation information; stroke symptoms, evaluation, and diagnoses; acute therapies, including thrombolytics and deep vein thrombosis prophylaxis; discharge medications/interventions for recurrent stroke risk reduction; treating physician specialty; and discharge status and destination. After discharge, patients were contacted at 3 and 12 months by telephone. The follow-up questionnaires included validated scales to assess current medication use, functional status, and clinical outcomes.

Medication use was collected at 3 time points. First, the discharge hospital faxed a copy of the patient’s medication list to the coordinating center. Second, medication use at follow-up was collected 3 months after discharge through a series of questions targeting current prescriptions compared to the discharge list medication lists. Third, the same questions were asked 12 months after discharge. If a medication had been discontinued, then the patient was asked whether the health care provider or patient stopped the medication. If the patient had opted to stop the medication, then the interviewer asked if the patient stopped because of cost, side effects, perception of medication ineffectiveness, or another reason.

Among the 2804 patients enrolled in the AVAIL Registry, 2460 from 98 hospitals met the inclusion criteria for this analysis. Patients were excluded if they did not have matched GWTG–Stroke infor-

Table 1. Baseline Characteristics of Study Population*

<table>
<thead>
<tr>
<th></th>
<th>All Patients (n = 2460)</th>
<th>AF (n = 291)</th>
<th>No AF (n = 2169)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, median y (25th, 75th)</td>
<td>66 (56, 76)</td>
<td>76 (67, 81)</td>
<td>65 (55, 74)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Female (%)</td>
<td>46.5</td>
<td>51.6</td>
<td>45.9</td>
<td>0.07</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>White</td>
<td>82.7</td>
<td>92.8</td>
<td>81.3</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>11.1</td>
<td>3.4</td>
<td>12.1</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6.2</td>
<td>3.8</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>Medical history (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>79.8</td>
<td>78.4</td>
<td>80.0</td>
<td>0.54</td>
</tr>
<tr>
<td>Diabetes</td>
<td>29.4</td>
<td>24.0</td>
<td>30.2</td>
<td>0.03</td>
</tr>
<tr>
<td>Stroke/TIA</td>
<td>25.6</td>
<td>23.7</td>
<td>25.9</td>
<td>0.43</td>
</tr>
<tr>
<td>CAD/MI</td>
<td>25.4</td>
<td>37.3</td>
<td>23.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Smoker</td>
<td>26.0</td>
<td>11.2</td>
<td>28.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Prosthetic heart valve</td>
<td>1.4</td>
<td>3.5</td>
<td>1.1</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>48.4</td>
<td>46.3</td>
<td>48.7</td>
<td>0.46</td>
</tr>
<tr>
<td>Stroke characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIA</td>
<td>20.7</td>
<td>16.4</td>
<td>21.3</td>
<td>0.08</td>
</tr>
<tr>
<td>Ischemic stroke</td>
<td>79.3</td>
<td>83.2</td>
<td>78.8</td>
<td></td>
</tr>
<tr>
<td>NIHSS score median (Q1, Q3)</td>
<td>3 (1, 6)</td>
<td>3 (1.7)</td>
<td>2 (1.6)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>NIHSS score ≥15</td>
<td>5.2</td>
<td>8.9</td>
<td>4.8</td>
<td>0.01</td>
</tr>
<tr>
<td>Modified Rankin score ≥3</td>
<td>29.1</td>
<td>38.5</td>
<td>27.9</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

AF indicates atrial fibrillation; CAD, coronary artery disease; MI, myocardial infarction; NIHSS, National Institutes of Health Stroke Scale; TIA, transient ischemic attack.

*All values presented as percentages except when noted.

Wilcoxon rank-sum test was used for continuous variables, and a $ \chi^2 $ test was used for categorical variables.

Use of antithrombotic combinations in IS/TIA patients was investigated among patients with AF. McNemar test was used to test for agreement between medication use at baseline and at 12-month follow-up. Multivariate logistic regression models were performed to identify factors associated with warfarin use at 12 months among patients with IS/TIA and AF. The statistical models were built using variables that have been previously shown to be clinically associated with warfarin use in patients with IS/TIA and AF. All data analyses were performed using SAS version 9.2 (SAS Institute), and $ P=0.05 $ was used to declare statistical significance.

Results

The prevalence of AF at hospitalization was 11.8% (n=291). Baseline characteristics among IS/TIA patients with and without AF are shown in Table 1. Patients with IS/TIA and AF were older and more likely to have other comorbidities (eg, previous myocardial infarction/coronary artery disease or prosthetic heart valves) when compared to those without AF. Patients with AF were less likely to have diabetes than...
patients without AF (24.0% versus 30.1%). Stroke severity, as assessed by the NIHSS, was also greater in patients with AF (median, 3; 25th–75th percentile, 1–7) when compared to those patients without AF (median, 2; 25th–75th percentile, 1–6).

**Antithrombotic Use**

The use of antithrombotic agents at discharge and at 12 months after discharge in IS/TIA patients with AF are shown in Table 2. Among eligible subjects, 253 (86.9%) were discharged on warfarin, 126 (43.3%) on aspirin, and 19 (6.5%) on clopidogrel. At discharge, warfarin alone was prescribed in 143 patients (49.1%), aspirin alone in 16 patients (5.5%), and clopidogrel alone in 4 patients (1.4%). Combination antithrombotic therapy at discharge included warfarin plus aspirin in 101 patients (34.7%), aspirin plus clopidogrel in 6 patients (2.1%), and aspirin plus clopidogrel plus warfarin in 3 patients (1.0%). Among patients with NIHSS score >8, the use of warfarin at discharge was 90.9%, whereas in those patients with NIHSS score ≤8 it was 88.0% (P=0.59).

At 12 months after hospital discharge, 226 of the 291 AF patients (77.7%) were using warfarin. Of those who received warfarin at discharge (n=253), 45 (17.8%) patients were taken off warfarin. Of those who did not receive warfarin at discharge (n=38), 18 patients (47.4%) were started on warfarin. The persistence rate of any warfarin use at 1 year was 82.2% (208 of the 253 patients who were discharged and remained on warfarin at 1 year). Of the 38 AF patients who did not receive warfarin at discharge, 18 (47.4%) started on warfarin within 1 year and 20 (52.6%) never started warfarin during this 1-year period.

IS/TIA patients with AF were more likely to receive thrombolytic therapy with intravenous tissue-type plasminogen activator when compared to those IS/TIA patients without AF (11.5% versus 5.8%, respectively). According to the stroke risk assessed by the CHADS2 (Congestive heart failure, Hypertension, Age older than 75, Diabetes, previous Stroke or TIA) score,11 the use of warfarin at discharge is shown in the Figure. There was a decrease in the rate of warfarin use in patients with a CHADS2 score >3. Similar results were observed when age was excluded from the CHADS2 score (data not shown). Among the components of CHADS2, diabetes was associated with lower rates of warfarin use at discharge (81.2%) and hypertension was associated with the higher rates (86.2%).

**Predictors of Warfarin Use at 1 Year**

In patients with IS/TIA and AF, the only independent factor associated with warfarin use at 12 months was male gender (adjusted odds ratio [OR], 2.27; confidence interval [CI], 1.22–4.35; P=0.01; Table 3). There was a trend toward increased likelihood of warfarin use at 12 months with decreasing age (adjusted OR per 10-year decrease, 1.30; CI, 0.94–1.82; P=0.1).

**Discussion**

Among a large cohort of patients with IS/TIA, we found that AF was present in 11.8%. Moreover, patients with AF were...

![Figure. Warfarin use at discharge according to CHADS2 score in patients with ischemic stroke/transient ischemic attack and atrial fibrillation. The figure illustrates the rates of warfarin use at discharge according to CHADS2 score in patients with ischemic stroke/transient ischemic attack and atrial fibrillation. There is a decrease in the rate of warfarin use in patients with a CHADS2 score >3.](http://stroke.ahajournals.org/)

<table>
<thead>
<tr>
<th>CHADS2 Score</th>
<th>% Receiving Warfarin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>90%</td>
</tr>
<tr>
<td>3</td>
<td>91%</td>
</tr>
<tr>
<td>4</td>
<td>85%</td>
</tr>
<tr>
<td>5</td>
<td>78%</td>
</tr>
<tr>
<td>6</td>
<td>50%</td>
</tr>
</tbody>
</table>
why warfarin was not prescribed. Even though our study leaves 13% of AF patients who were not prescribed warfarin alone at the end of the hospitalization period. This at discharge and enrolled in the AVAIL Registry were prescribed warfarin therapy at the follow-up appointment. Neverthe-
at discharge, or at least should have been considered for anticoagulation should have received warfarin at
result, all 291 patients with no documented contraindications to anticoagulation were prescribed warfarin at
included in this study had a CHADS2 score
had IS/TIA; therefore, all patients with AF who were included in this study had a CHADS2 score 
2 receive warfarin at discharge.15

In non-AF patients with acute stroke, aspirin monotherapy, aspirin and extended-release dipyriramole combined, or clopidogrel monotherapy are generally acceptable options for initial therapy. However, when AF is present, the benefit of oral anticoagulation over oral antiplatelet agents is far greater and, therefore, should be the first option utilized (unless there is a contraindication).16 In our study, a minority of patients were discharged on aspirin alone, clopidogrel alone, or the combination of these 2 antiplatelet drugs. For AF patients with contraindications to oral anticoagulation, aspirin plus clopidogrel might be an option for stroke prevention; however, the combination is associated with a significant increase in both fatal and nonfatal bleeding.17 In our study, aspirin plus clopidogrel was prescribed in a minority of patients (2.1%).

The addition of an antiplatelet agent to warfarin therapy does not provide additional protection against future ischemic events and (unless another indication exists) is associated with an increased risk for bleeding.9 In our study, aspirin was prescribed at discharge in 43.3% of patients overall. The

Table 3. Predictors of Warfarin Use at 12-Month Follow-Up in Patients With Ischemic Stroke/Transient Ischemic Attack and Atrial Fibrillation

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>Lower (95% CI)</th>
<th>Upper (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male vs female</td>
<td>2.27</td>
<td>1.22</td>
<td>4.35</td>
<td>0.01</td>
</tr>
<tr>
<td>Age (per 10-y decrease)</td>
<td>1.30</td>
<td>0.94</td>
<td>1.82</td>
<td>0.10</td>
</tr>
<tr>
<td>Married vs other</td>
<td>1.67</td>
<td>0.74</td>
<td>3.85</td>
<td>NS</td>
</tr>
<tr>
<td>Region: Midwest vs Northeast</td>
<td>1.32</td>
<td>0.65</td>
<td>2.68</td>
<td>NS</td>
</tr>
<tr>
<td>Region: South vs Northeast</td>
<td>1.12</td>
<td>0.48</td>
<td>2.61</td>
<td>NS</td>
</tr>
<tr>
<td>Region: West vs Northeast</td>
<td>0.81</td>
<td>0.33</td>
<td>2.01</td>
<td>NS</td>
</tr>
<tr>
<td>Hospital type (other vs academic)</td>
<td>1.32</td>
<td>0.62</td>
<td>2.78</td>
<td>NS</td>
</tr>
<tr>
<td>Inadequate income</td>
<td>1.19</td>
<td>0.54</td>
<td>2.63</td>
<td>NS</td>
</tr>
<tr>
<td>Education level (high school or college vs lower)</td>
<td>1.11</td>
<td>0.60</td>
<td>2.05</td>
<td>NS</td>
</tr>
<tr>
<td>Living status (with someone or institution vs alone)</td>
<td>1.16</td>
<td>0.48</td>
<td>2.79</td>
<td>NS</td>
</tr>
<tr>
<td>Did not have medical instructions</td>
<td>1.11</td>
<td>0.55</td>
<td>2.27</td>
<td>NS</td>
</tr>
<tr>
<td>Work status (home vs working)</td>
<td>1.05</td>
<td>0.55</td>
<td>2.44</td>
<td>NS</td>
</tr>
<tr>
<td>Race (white vs black)</td>
<td>1.02</td>
<td>0.29</td>
<td>3.56</td>
<td>NS</td>
</tr>
</tbody>
</table>

Cl indicates confidence interval; NS, not significant; OR, odds ratio.

more likely to have a history of myocardial infarction/coronary artery disease and/or prosthetic valves, and had more severe strokes than IS/TIA patients without AF. As recommended by American Heart Association/American Stroke Association guidelines, warfarin use was high among IS/TIA patients with AF but, nonetheless, significantly underutilized. Of the 38 patients who did not receive warfarin at discharge but were eligible for its use, 18 (47.4%) initiated warfarin up to 1 year after the index stroke event and 20 (52.6%) did not. Of the 253 patients discharged on warfarin, 208 (82.2%) were still using warfarin at 12 months. Importantly, male gender was the only independent predictor of warfarin use at 12 months.

Current American Heart Association/American Stroke Association guidelines recommend warfarin use as a class IA recommendation in IS/TIA patients with AF.9 Warfarin reduces the risk of stroke by \( \approx62\% \) in IS/TIA patients with AF.12 All of the patients included in the AVAIL Registry had IS/TIA; therefore, all patients with AF who were included in this study had a CHADS2 score \( \geq2 \). As a result, all 291 patients with no documented contraindications to anticoagulation should have received warfarin at discharge, or at least should have been considered for warfarin therapy at the follow-up appointment. Nevertheless, our results indicated that 86.9% of the AF patients enrolled in the AVAIL Registry were prescribed warfarin at discharge and \( \approx50\% \) of the patients were prescribed warfarin alone at the end of the hospitalization period. This leaves 13% of AF patients who were not prescribed warfarin at all. We did not query the practitioners to assess why warfarin was not prescribed. Even though our study (in which all patients had a stroke or TIA) demonstrates higher warfarin use than previous studies (which included patients without acute stroke), we found that among survivors at 12 months, 17.8% of the patients who were using warfarin at discharge were taken off warfarin for unknown reasons and only 47.4% of those patients who were not using warfarin at discharge were started on warfarin. The persistence rate of patients who were discharged on warfarin and remained on warfarin at 12 months was \( \approx80\% \) in our study.

There are several possible explanations for the finding that more than half of warfarin-eligible patients who were not discharged on warfarin (\( n=20; 52.6\% \)) were also not started on warfarin therapy within 12 months of hospital discharge. First and foremost, no data currently exist that has established optimal timing of warfarin therapy initiation in IS/TIA patients with AF. However, the American Heart Association/American Stroke Association stroke secondary prevention guidelines recommend warfarin initiation within 2 weeks of the stroke event.9 Second, in the transition of care from hospital admission to discharge, clinical inertia, risks, or exclusions for anticoagulation may be identified, such as difficulty with international normalized ratio monitoring, high probability for bleeding complications, or identification of traumatic injury risk (such as falls) once the patient is discharged from the hospital. Third, patient preferences may influence the decision to prescribe warfarin because of the need for frequent monitoring of therapeutic levels, which may include the willingness to risk future strokes because of the refusal to use warfarin for fear of bleeding. The AVAIL Registry did not capture data to explore this possibility. Fourth, other studies have demonstrated an "anticoagulation paradox" in which patients at the highest risk for AF-related thromboembolic events are the least likely to receive warfarin therapy, similar to the findings of our study.13,14 Finally, other clinical scenarios have been shown to influence warfarin use in patients with AF. For example, \(<40\% \) of patients who have new-onset AF during hospitalization for a myocardial infarction and have a CHADS2 score \( \geq2 \) receive warfarin at discharge.15
combination of aspirin and warfarin was used at discharge in more than one-third of the patients (34.7%), which may indicate the presence of other risk factors for stroke or the coexistence of previous myocardial infarction/coronary artery disease. These rates of warfarin and aspirin use are higher than previous studies, but similar to those performed more recently. Our results confirm and extend the findings of previous studies that have demonstrated IS/TIA patients with AF are typically sicker and experience more severe stroke symptoms than those IS/TIA patients without AF. In a large cohort of 2594 IS/TIA patients, Bateman et al showed that AF and heart failure were independent predictors of in-hospital mortality. Interestingly, this study demonstrated that the increased risk of death in patients with AF and heart failure were similar, regardless of thrombolytic therapy use for the index stroke. These findings suggest that clinical risk factors should not be considered contraindications for thrombolysis in stroke patients. In our study, IS/TIA patients with AF were more likely to receive acute thrombolytic therapy when compared to IS/TIA patients without AF. Patients with more severe strokes, defined by NIHSS score >8, were discharged on warfarin similarly to those patients with a NIHSS score ≤8 (90.9% and 88.0%, respectively), which suggests that stroke severity does not seem to play an important role in the decision to prescribe warfarin at discharge.

Other studies have demonstrated warfarin therapy use in eligible patients is low, especially because of warfarin management barriers. As a result, identifying predictors of warfarin use, particularly long-term use, is critical in improving patient outcomes. As mentioned previously, we found that male gender was the only independent predictor of AF patients using warfarin therapy at 12 months after hospital discharge. Women were at 56% lower odds of being on warfarin at 1 year when compared to men. Our data also show that women with stroke/TIA were more likely to have AF than men, which has been shown in previous studies. Some of these studies have also shown that women with IS/TIA have worse in-hospital and postdischarge outcomes than men and receive less disease-specific diagnostic and treatment procedures. In addition, after adjusting for age and other confounders, women generally are less likely to be treated with intravenous tissue-type plasminogen activators, to be entered in a clinical trial, and to experience an excellent outcome. Compared to men, women are more likely to have a cardioembolic etiology of ischemic stroke, which is likely attributable to the higher prevalence of AF. Reeves et al demonstrated that quality of care in women is lower than men in almost 400,000 patients with IS/TIA. In our study, women with AF were less likely to receive warfarin at discharge than men with AF. Our study expands these results and identifies female gender as an independent factor associated with lower 1-year warfarin use. Our findings create a critical opportunity to improve care of all patients with IS/TIA and AF, particularly among women.

Finally, new antithrombotic agents are being developed and will likely change clinical practice for stroke prophylaxis and recurrence in patients with AF. New P2Y inhibitors, such as prasugrel and ticagrelor, newer antiplatelet agents, such as PAR-1 inhibitors, direct thrombin inhibitors, such as dabigatran, and other oral factor Xa inhibitors, such as rivaroxaban or apixaban, will be available soon and will complicate the decision on different combinations of antithrombotic therapies for patients who require >1 antithrombotic agent. In general, warfarin (and its combination with aspirin and/or clopidogrel) will continue to be used worldwide and the different combinations of newer drugs will need to be evaluated in prospective randomized studies.

Limitations
Our study has several limitations. First, this is an observational study of patients who were admitted to hospitals that participated in GWTG–Stroke between 2006 and 2008. Data from these patients may not be generalizable to a broader population and unmeasured confounders and causal relationships cannot be completely established. For example, other factors that may not have been captured in our data collection process may assist in predicting patient persistence to warfarin therapy. Second, our study cohort has some imbalances: (1) more women in the AF group could have influenced the results; however, several previous studies have shown that women are more likely to have AF, so our results are consistent with those findings; (2) some missing data were present in a significant number of patients, although the lost-to-follow-up rates were lower than those in previous studies; (3) patients with diabetes and smokers were less likely to have AF; and (4) patients with AF were more likely to receive thrombolytic therapy than patients without AF, probably related to larger stroke size in patients with AF and not to warfarin initiation at discharge. Third, we did not collect information on international normalized ratio controls in patients who received warfarin therapy (international normalized ratio controls are known to play a role in outcomes). Fourth, our relative small sample size may not be sufficient to capture or identify predictors that would be significant in a larger sample (eg, heart failure). Fifth, we could not include stroke severity, assessed by NIHSS score, in our multivariable model because >30% was missing. Finally, we were unable to determine the exact timing, duration, and type (eg, persistent, permanent, or paroxysmal) of AF, despite the fact that both persistent and paroxysmal AF are associated with worse outcomes in patients with acute stroke.

Conclusions
Ischemic stroke/TIA patients with AF are sicker and typically exhibit more severe strokes than IS/TIA patients without AF. Warfarin use after AS/TIA in those patients with AF is high; however, among eligible IS/TIA patients with AF and particularly in those at greatest risk for stroke who were not discharged on warfarin, <50% were started on warfarin therapy within 12 months after hospital discharge and more than half of patients not discharged on warfarin were never started on warfarin within this period. Female gender was the only independent predictor of no warfarin use at 1 year after AS/TIA.
the index stroke event, exhibiting 56% lower odds of being on warfarin at 1 year. Our findings encourage future studies to develop novel processes that will improve use of warfarin at discharge and long-term in high-risk eligible IS/TIA patients with AF.

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