Effect of the 2014 Atrial Fibrillation Guideline Revisions on the Proportion of Patients Recommended for Oral Anticoagulation

In 2014, the American Heart Association, American College of Cardiology, and Heart Rhythm Society published a revised guideline for atrial fibrillation (AF) treatment recommending use of a refined stroke risk score and revised threshold for oral anticoagulation (OAC) initiation. We assessed the potential effect of this new guideline by comparing the proportion of patients with AF recommended for OAC under the 2011 and 2014 guidelines.

Methods | We used data from the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation (ORBIT-AF) study, a national, prospective, outpatient registry of AF in patients 18 years or older at 176 sites in the United States. The primary outcome was the proportion of patients recommended for OAC at baseline under each guideline. The CHADS2 score, recommended for stroke risk assessment by the 2011 guideline, incorporates information on prior stroke and transient ischemic attack, congestive heart failure and dysfunction, hypertension, age of 75 years or older, and diabetes mellitus (score range, 0-6). The revised 2014 guideline recommends use of the CHA2DS2-VASc score, which increases the point value from 1 to 2 for age of 75 years and older and adds elements for female sex, vascular disease, and age of 65 through 74 years (score range, 0-9). We considered only those patients with a definitive recommendation to be OAC recommended (CHADS2 score ≥2 under the 2011 guideline, incorporates information on prior stroke and transient ischemic attack, congestive heart failure and dysfunction, hypertension, age of 75 years or older, and diabetes mellitus (score range, 0-6). The revised 2014 guideline recommends use of the CHA2DS2-VASc score, which increases the point value from 1 to 2 for age of 75 years and older and adds elements for female sex, vascular disease, and age of 65 through 74 years (score range, 0-9). We considered only those patients with a definitive recommendation to be OAC recommended (CHADS2 score ≥2 under the 2011 guideline and CHA2DS2-VASc score ≥2 under the 2014 guideline). We also examined changes in recommendations according to age (<65 and ≥65 years) and sex. We used Pearson χ2 tests to compare the proportions.

Results | From May 29, 2010, through August 8, 2011, a total of 10 132 patients were enrolled in ORBIT-AF (age, median [IQR], 75 years [67-82 years]; 42.3% female). The overall proportion of patients recommended for OAC increased by 19.0% from 71.8% (95% CI, 70.9%-72.7%) under the 2011 guideline to 90.8% (95% CI, 90.2%-91.4%) under the 2014 guideline (P < .001; Figure). For patients younger than 65 years, the proportion recommended for OAC increased from 43.1% to 60.6%, whereas the proportion recommended for patients 65 years or older increased from 79.1% to 98.5%. Among women, the percentage recommended increased from 76.7% to 97.7%.

Of 1926 patients who were newly recommended for OAC, 43.6% were reclassified because of a single risk factor, 49.5% because of 2 risk factors, and 6.9% because of 3 risk factors. Female sex was a contributing factor for 46.8% of patients who were reclassified, age for 81.4%, and vascular disease for 35.1%. Among those reclassified because of a single risk factor, 20.7% were reclassified because of female sex, 63.8% because of age, and 15.5% because of vascular disease. Extrapolating under the assumption that the stroke risk distribution in ORBIT-AF is representative of that of the broader US AF population, adoption of the 2014 guideline could result in reclassification of 988 500 individuals as newly recommended for OAC (Table).

Discussion | The 2014 AF treatment guideline revision substantially increases the proportion of patients recommended...
for OAC, with near-universal indication for women and for patients older than 65 years. Under the 2014 guideline, 2 of 3 patients with AF who were not previously recommended for OAC were reclassified as being recommended for OAC. The increase in patients with AF who were recommended for OAC is due to adoption of the CHA2DS2-VASc score, which was created to better identify patients with AF with truly low risk of stroke by incorporating information on female sex, younger age, and vascular disease.5 Although a previous analysis6 suggested that CHA2DS2-VASc has superior discrimination compared with CHADS2 in low-risk patients, the 2014 guideline authors acknowledge that ongoing refinement of methods to estimate thromboembolic risk in AF is needed.

Conclusions | Two-thirds of patients with AF who were previously not recommended for OAC are newly recommended under the 2014 guideline. Future studies evaluating longitudinal changes in anticoagulation treatment patterns and outcomes among patients reclassified by the new guideline are warranted.

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Table. Estimated Change in the Number of Patients Recommended for Oral Anticoagulation in the US Population*

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. Recommended Under Guideline</th>
<th>Change From 2011 to 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>3,734 100</td>
<td>4,722 600</td>
</tr>
<tr>
<td>Men</td>
<td>2,046 400</td>
<td>2,572 300</td>
</tr>
<tr>
<td>Women</td>
<td>1,687 800</td>
<td>2,150 400</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;65</td>
<td>452 700</td>
<td>636 500</td>
</tr>
<tr>
<td>≥65</td>
<td>3,281 300</td>
<td>4,086 300</td>
</tr>
</tbody>
</table>

* Numbers are rounded to the nearest hundred and based on atrial fibrillation prevalence estimates of 5.2 million and similar age and sex distributions to the Outcomes Registry for Better Informed Treatment of Atrial Fibrillation population.
The recent 2014 American Heart Association, American College of Cardiology, and Heart Rhythm Society guideline for the management of patients with atrial fibrillation (AF) recommends using the CHA2DS2-VASc stroke risk score instead of the older CHADS2 score when deciding whether to recommend anticoagulant therapy, in essence lowering the threshold at which oral anticoagulation is recommended.1 As O’Brien et al2 report, the net effect of using the CHA2DS2-VASc score is to recategorize a large proportion of patients with AF as being at high risk for stroke, thereby making oral anticoagulation recommended for most patients with AF.

Is this a good thing? Oral anticoagulation is underused in patients with AF.3 This updated guideline will probably widen the gap between what guidelines recommend and what actually occurs in clinical practice. In particular, women and patients aged 65 to 74 years will be disproportionately affected because these characteristics are now factored into determining stroke risk. Using CHA2DS2-VASc to risk stratify patients means that oral anticoagulation will be recommended for nearly all women and virtually all people older than 65 years. Take, for example, a 66-year-old woman with AF but no other medical issues. Using the older CHADS2 score, her risk would be considered low enough so that even aspirin may not be recommended. By the CHA2DS2-VASc score, her risk would be considered high enough to warrant oral anticoagulation. Which is the better course of action?

It is important to realize that risk schemes for stroke have only modest predictive ability, and when directly compared with each other, neither risk scheme emerges as clearly superior.3 In fact, CHA2DS2-VASc and CHADS2 have nearly identical discrimination based on their C statistics. Where they most differ is in the proportion of patients they categorize as being at high risk for stroke when a cutoff score of 2 is used. A CHA2DS2-VASc score of 2, the level at which the 2014 guideline recommends oral anticoagulation, corresponds to stroke rates that were previously considered intermediate or low.

Stroke rates have decreased to historically low levels, likely a result of more intensive cardiovascular risk factor modification.4 A score that used to correspond to a high risk of stroke may not reflect the real risk in recent populations. In fact, use of more contemporary estimates of stroke rates will also shift the threshold for prescribing oral anticoagulation from lower to higher CHADS2 scores.5

Currently, there is no evidence that changing from one risk scheme to another will lead to improved net clinical outcomes. It is possible that the new guideline, which recommends anticoagulation for a wider swath of the population, will result in lower stroke rates. However, more widespread anticoagulation will also increase the number of bleeding complications. Before we can be sure that adopting one risk scheme over another is really a good thing, it is necessary to consider what the actual net clinical benefit of such a change will be, accounting for strokes prevented and bleeds induced. Patients who gain the largest net benefit from anticoagulation are mostly at the higher end of stroke risk,6 and anticoagulants are considered reasonably cost-effective in patients with AF who are at high risk for stroke and have no contraindications to therapy.7 However, because the updated guideline primarily affects people at the lower end of stroke risk, increased anticoagulant use may lead to substantial increases in healthcare costs with uncertain net clinical benefit. Only studies that directly compare the tradeoffs of bleeding and stroke can determine which risk scheme is preferable.

In summary, the implication of using the recently updated guideline is to encourage oral anticoagulation for more patients at intermediate to low risk of stroke. Lacking evidence that this approach leads to overall improved outcomes for patients, we must be aware that the likely consequence is increased bleeding risk and uncertain benefit.

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Pneumonia was considered a major contributor if the patient had stable medical conditions and death would not have occurred in the absence of pneumonia, and a minor contributor if the patient had advanced life-threatening illnesses (ie, met criteria for palliative care)\(^5\) and pneumonia was on the final pathway to death.

The study was approved by the Baystate Medical Center Institutional Review Board. As this was a retrospective chart review, no patient consent was necessary.

**Results** | A total of 202 deaths were included; mean patient age was 78.5 years, 54.5% of patients were female, and 56.4% had a do-not-resuscitate order at admission. During hospitalization, 30.2% were admitted to an intensive care unit, 23.8% were intubated, and 24.8% died in the intensive care unit (Table 1).

Most patients had severe debilitating illnesses: 24.1% had advanced dementia, 9.3% showed failure to thrive, 18.2% had cerebrovascular disease with severe functional impairment, and 7.4% had lung cancer. In addition, 2.9% of patients had a feeding tube and 1.9% received long-term mechanical ventilation.

Pneumonia played a major role in the deaths of 37 patients (18.3%). Examples of deaths with pneumonia as a major and minor contributor appear in Table 2. Compared with patients with pneumonia as a minor contributor, patients with pneumonia as a major contributor received more intense care. Of 165 patients with life-threatening illnesses, 57.6% had do-not-resuscitate orders at admission and 57.0% refused intubation. Invasive and noninvasive mechanical ventilation were discontinued before death in 83.3% and 91.2% of the patients with life-threatening illnesses, respectively. Of the 202 deaths, 95 patients (47.0%) had life-limiting illnesses meeting the criteria for palliative care and had do-not-resuscitate orders at admission.

**Discussion** | In this detailed retrospective medical record review of patients identified with pneumonia by the Centers for Medicare & Medicaid Services risk-standardized mortality rate measures, we found that pneumonia was a major contributor to death in only 18.3% of cases. Almost half of the deaths occurred among patients who, at the time of admission, had appropriately decided to forgo aggressive treatment. The deaths of these patients cannot be assumed to represent poor-quality care because survival was not necessarily the goal of therapy. In many other cases, care was ultimately withdrawn, but we were unable to determine whether the overall quality of care contributed to the patient's death.

Only 57.6% of the patients with advanced illnesses had do-not-resuscitate orders and many of these patients received aggressive care, which suggests opportunities to improve end-of-life discussions. Currently, the mortality measures include patients with a terminal illness and may penalize hospitals that take a more patient-centered approach and use palliative care, while encouraging hospitals to provide inappropriately aggressive treatment when a patient is at the end of life.\(^2,6\)

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**Letters**

### Death Among Patients Hospitalized With Pneumonia: Implications for Hospital Outcome Measures

The Affordable Care Act established the Value-Based Purchasing Program, launched in 2013, which uses risk-standardized mortality rates as a benchmark to penalize or reward hospitals.\(^1\) The risk-standardized mortality rate is calculated using administrative data and includes patients with life-threatening illnesses for whom pneumonia may be the last insult in the setting of terminal illness. Moreover, preferences for limiting the use of or withdrawing life-sustaining therapy are considered only for patients already enrolled in hospice on the day of admission. Therefore, risk-standardized mortality rates measure the outcome of care but not necessarily the appropriateness and value of care.\(^2\)

We sought to determine the proportion of patients identified with pneumonia by the Centers for Medicare & Medicaid Services risk-standardized mortality measures for whom pneumonia was a major contributor to death and to describe the intensity of care and patient preference for life-sustaining therapies.

**Methods** | Centers for Medicare & Medicaid Services criteria\(^3\) were used to identify all adult patients who died with a principal diagnosis of pneumonia between January 1, 2008, and December 31, 2012, at 3 Massachusetts hospitals.

Guided by the Mortensen et al\(^4\) classification schema, 2 of us (R.J. and J.F.) assessed patients' medical records to determine if pneumonia was a minor or major contributor to death.