Impact of CHA$_2$DS$_2$-VASc Risk Factors on Anticoagulant Prescription in Patients with Atrial Fibrillation: Insights from the NCDR® PINNACLE Registry

Lauren E Thompson MD, Thomas M Maddox MD MSc; Lanyu Lei MSc, Steven M Bradley MD MPH, Gary K Grunwald PhD, Pamela N Peterson MD MSPH, Frederick A Masoudi MD MSPH, Yuichi J Shimada MD MPH, Alexander Turchin MD, Yang Song MS, Gheorghe Doros PhD, Melinda B Davis MD, Stacie L Daugherty MD MSPH
Funding Support and Disclaimer

This research was supported by the American College of Cardiology Foundation’s National Cardiovascular Data Registry (NCDR), Bristol-Myers Squibb and Pfizer Inc. The views expressed in this presentation represent those of the author(s), and do not necessarily represent the official views of the NCDR or its associated professional societies identified at www.ncdr.com.
Financial Disclosures

• None
Background

- Risk treatment paradox for oral anticoagulant (OAC) use in women with atrial fibrillation (AF)

- Female gender is an independent risk factor in guideline recommended CHA$_2$DS$_2$-VASc
Study Aims

• Compare association between each CHA$_2$DS$_2$-VASc component with OAC use among patients with AF and a guideline-based indication for anticoagulation
Data Source

• National Cardiovascular Data Registry’s (NCDR): PINNACLE Registry

• Voluntary nationwide registry

• >95 out-patient cardiology practices

• Data quality assurance measures
Study Population

• Eligible
  – All patients with non-valvular AF from 2010-14

• Inclusions
  – CHA\textsubscript{2}DS\textsubscript{2}-VASc ≥ 2

• Exclusions
  – Missing gender
  – Reversible causes of AF
  – Other indications for OAC
  – Contraindication to OAC
Primary Predictor

- CHA$_2$DS$_2$-VASc score:
  - C - Congestive Heart failure, ever
  - H - Hypertension
  - A$_2$ - Age $\geq$ 75 years (**2 points**)
  - D - Diabetes Mellitus
  - S$_2$ - Prior stroke/TIA or thromboembolism (**2 points**)
  - V - Vascular Disease (PAD, CAD, hx of MI)
  - A - Age 65-74 years
  - S - Female gender

Bushnell et al. Stroke, 2014
Primary outcome

• OAC prescription
  – Warfarin or Direct Oral Anti-coagulation (DOAC)

• Prescription within one year of first AF diagnosis
Statistical Analysis

- Multivariable regression models

- Adjusted for patient characteristics, bleeding risk, and providers characteristics at that site
  - Included individual CHA$_2$DS$_2$-VASc components

- Accounted for clustering by provider within practices
  - Generalized Estimating Equations
Study Population

738,864 Patients with NVAF and CHA$_2$DS$_2$-VASc ≥ 2

Exclusions 32,556 (4.4%)
- 1,798 (0.2%) Missing gender
- 1,318 (0.2%) Reversible AF
- 4,717 (0.6%) Other indication for OAC
- 28,704 (3.4%) Contraindication for OAC

706,308 Patients
# Baseline Demographics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Patients (n=706,308)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>74.4 ± 10.7</td>
</tr>
<tr>
<td>White</td>
<td>65%</td>
</tr>
<tr>
<td>Private Insurance</td>
<td>47%</td>
</tr>
<tr>
<td>mHASBLED</td>
<td>2.2 ± 0.8</td>
</tr>
<tr>
<td>CHA₂DS₂-VASc</td>
<td>3.9 ± 1.4</td>
</tr>
<tr>
<td>CHF</td>
<td>26%</td>
</tr>
<tr>
<td>HTN</td>
<td>80%</td>
</tr>
<tr>
<td>Age ≥ 65</td>
<td>84%</td>
</tr>
<tr>
<td>DM</td>
<td>24%</td>
</tr>
<tr>
<td>CAD</td>
<td>51%</td>
</tr>
<tr>
<td>PAD</td>
<td>9%</td>
</tr>
<tr>
<td>Female</td>
<td>48%</td>
</tr>
<tr>
<td>Cerebrovascular Event</td>
<td>4%</td>
</tr>
</tbody>
</table>
Patient distribution by CHA$_2$DS$_2$-VASc

% of Patients

- 2: 17.2%
- 3: 24.2%
- 4: 26.9%
- 5: 18.0%
- 6+: 13.7%
Overall use of OAC is low

% on Anticoagulation

CHA$_2$DS$_2$-VASc Score

- 2: 18.0% (DOAC) 35.8% (Warfarin)
- 3: 17.3% (DOAC) 41.9% (Warfarin)
- 4: 15.6% (DOAC) 44.9% (Warfarin)
- 5: 13.5% (DOAC) 46.8% (Warfarin)
- 6+: 12.4% (DOAC) 47.2% (Warfarin)

DOAC
Warfarin

NCDR
NATIONAL CARDIOVASCULAR DATA REGISTRY
Female gender and vascular disease associated with decreased odds of OAC use

<table>
<thead>
<tr>
<th>Component</th>
<th>OR, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Gender</td>
<td>0.79 (0.78, 0.80)</td>
</tr>
<tr>
<td>CHF</td>
<td>1.31 (1.29, 1.33)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2.57 (2.46, 2.69)</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>3.35 (3.20, 3.51)</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>3.36 (3.21, 3.52)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>1.17 (1.15, 1.18)</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>0.91 (0.85, 0.96)</td>
</tr>
<tr>
<td>Stroke/TIA</td>
<td>1.32 (1.28, 1.36)</td>
</tr>
</tbody>
</table>

All P <0.001, except Vascular Disease p = 0.001
Conclusions

• Female gender and vascular disease are associated with decreased OAC use

• HTN and age categories were associated with increased OAC use
Limitations

• Later incorporation of CHA$_2$DS$_2$-VASc into US clinical guidelines

• Incomplete capture of OAC use

• Unable to assess reasons for OAC use or non-use
Implications

• Potential under recognition of female gender and vascular disease as a risk factor for thromboembolic events

• Risk factors for thromboembolic events may be weighed differently in decisions to use OAC
Thank You

• Questions?
Women less likely to get OAC in all thromboembolic risk strata

<table>
<thead>
<tr>
<th>CHA₂DS₂-VASc Score</th>
<th>Risk Ratio, 95% CI (W vs M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.70, 0.69-0.71</td>
</tr>
<tr>
<td>3</td>
<td>0.83, 0.82-0.84</td>
</tr>
<tr>
<td>4</td>
<td>0.91, 0.90-0.92</td>
</tr>
<tr>
<td>5</td>
<td>0.90, 0.89-0.91</td>
</tr>
<tr>
<td>≥6</td>
<td>0.91, 0.91-0.91</td>
</tr>
</tbody>
</table>
OAC use by stratified by CHADS2