CLINICAL RESEARCH STUDY

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Does CHA_2DS_2-VASc Improve Stroke Risk Stratification in Postmenopausal Women with Atrial Fibrillation?

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ABSTRACT

BACKGROUND: Risk stratification of atrial fibrillation patients with a congestive heart failure (C), hypertension (H), age $\geq$ 75 (A), diabetes (D), stroke or transient ischemic attack (TIA) (S_2) ($CHADS_2$) score of $<$2 remains imprecise, particularly in women. Our objectives were to validate the $CHADS_2$ and congestive heart failure (C), hypertension (H), age $\geq$ 75 (A_2), diabetes (D), stroke, TIA or prior thromboembolic disease (S_2)- vascular disease (V), age 65-74 (A), female gender (S) (CHA_2DS_2-VASc) stroke risk scores in a healthy cohort of American women with atrial fibrillation and to determine whether CHA_2DS_2-VASc further risk-stratifies individuals with a $CHADS_2$ score of $<$2.

METHODS: We identified a cohort of 5981 women with atrial fibrillation not on warfarin at baseline (mean age 65.9 $\pm$ 7.2 years) enrolled in the Women's Health Initiative and followed for a median of 11.8 years. Univariate and multivariate proportional hazards analyses were used to examine these 2 risk scores, with main outcome measures being annualized event rates of ischemic stroke or transient ischemic attack stratified by risk score.

RESULTS: Annualized stroke/transient ischemic attack rates ranged from 0.36% to 2.43% with increasing $CHADS_2$ score (0-4+) (hazard ratio [HR] 1.57; 95% confidence interval [CI], 1.45-1.71 for each 1-point increase) and 0.20%-2.02% with increasing CHA_2DS_2-VASc score (1-6+) (HR 1.50; 95% CI, 1.41-1.60 for each 1-point increase). CHA_2DS_2-VASc had a higher *c* statistic than $CHADS_2$: 0.67 (95% CI, 0.65-0.69) versus 0.65 (95% CI, 0.62-0.67), P $<$.01. For $CHADS_2$ scores $<$2, stroke risk almost doubled with every additional CHA_2DS_2-VASc point.

CONCLUSIONS: Although both $CHADS_2$, and CHA_2DS_2-VASc are predictive of stroke risk in postmenopausal women with atrial fibrillation, CHA_2DS_2-VASc further risk-stratifies patients with a $CHADS_2$ score $<$2.

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KEYWORDS: Atrial fibrillation; $CHADS_2$; CHA_2DS_2-VASc; Stroke; Women

Reported stroke rates in patients with atrial fibrillation not treated with anticoagulation range from $<$1% (low risk) to $>$18% (high risk) per year,[1-3] and studies show that women are at higher risk.[3-7] Although guidelines recommend treatment with anticoagulants in higher-risk and aspirin in lower-risk patients, the distinction between these 2 risk categories remains unclear.[8,9]

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Of the many scoring systems developed to predict stroke risk in atrial fibrillation, congestive heart failure (C), hypertension (H), age ≥ 75 (A), diabetes (D), stroke or transient ischemic attack (TIA) (S_2) ($CHADS_2$)[1] and congestive heart failure (C), hypertension (H), age ≥ 75 (A_2), diabetes (D), stroke, TIA or prior thromboembolic disease (S_2)- vascular disease (V), age 65-74 (A), female gender (S) (CHA_2DS_2-VASc)[6] are the most widely used. $CHADS_2$, developed from a combination of Atrial Fibrillation Investigators and Stroke Prevention in Atrial Fibrillation, was validated using the National Registry of Atrial Fibrillation comprising 1733 Medicare beneficiaries aged 65-95 years with nonrheumatic atrial fibrillation not on warfarin at hospital discharge.[1] In this score, whereas congestive heart failure (C), hypertension (H), age ≥75 years (A), and diabetes (D) receive 1 point each, stroke or transient ischemic attack (S_2) receives 2 points.

CLINICAL SIGNIFICANCE

- $CHADS_2$, and CHA_2DS_2-VASc, the most widely used stroke risk scores for patients with atrial fibrillation, guide decisions about anticoagulation.
- $CHADS_2$ classifies more than half of patients with atrial fibrillation as being at low or intermediate risk for stroke (score <2).
- CHA_2DS_2-VASc further risk-stratifies $CHADS_2$ <2 patients, which may help to guide clinical decisions about anticoagulation.

CHA_2DS_2-VASc, a modification of the 2006 Birmingham/National Institute for Health and Clinical Excellence scheme,[8] was validated in a cohort of 1084 hospitalized, ambulatory patients not anticoagulated at baseline from the Euro Heart Survey on atrial fibrillation.[6] CHA_2DS_2-VASc expands on $CHADS_2$ by 1) including a history of systemic thromboembolism (S_2) in the stroke category and 2) adding vascular disease (defined as prior myocardial infarction, peripheral arterial disease, or aortic plaque [V]), age (65-74 years [A]), and female sex (S) as risk factors. All risk factors receive 1 point, except age ≥75 years and history of prior stroke/transient ischemic attack/thromboembolism, which receive 2 points each.

As there are no validation studies comparing $CHADS_2$ and CHA_2DS_2-VASc in an ambulatory US population of women with atrial fibrillation, our objectives were to validate and compare the predictive power of these scores, determine the annualized rates of stroke, and clarify the discriminatory ability of CHA_2DS_2-VASc in such a population.

METHODS

Study Population

The study design has been described previously.[10,11] Study participants were members of the Women's Health Initiative (WHI) cohort: a prospective, multiarm clinical trial and observational study that focused on the causes and prevention of cardiovascular disease, cancer, and osteoporosis in women. Major exclusion criteria were predicted survival <3 years, alcohol or drug dependency, dementia, severe mental illness, and participation in another clinical trial. WHI comprised an observational study and 4 randomized clinical trials: 1) estrogen plus progestin versus placebo, 2) estrogen alone versus placebo in hysterectomized women, 3) dietary modification trial, and 4) calcium/vitamin D versus placebo trial.

Beginning in 1993, 161,809 postmenopausal women aged 50-79 years were prospectively enrolled in WHI. Events through September 2010 were used for this retrospective analysis. The initial study population consisted of women who reported a history of atrial fibrillation or had an electrocardiogram with documented atrial fibrillation at baseline (n = 7108). From this group, we excluded 291 with valvular heart disease or hyperthyroidism, 85 with missing values for either $CHADS_2$ or CHA_2DS_2-VASc, and 790 on warfarin at WHI randomization or enrollment. There were 1127 excluded, leaving a final sample of 5981, of whom 2390 were participants in one of the clinical trials and 3591 were enrolled in the observational study; 5901 women with atrial fibrillation were identified by self-report, 24 by electrocardiogram, and 56 had both.

Definition of Variables

Congestive heart failure, *diabetes mellitus*, and *prior stroke or transient ischemic attack* were defined by self-report at initial examination. *Hypertension* was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or use of any antihypertensive medication. *Vascular disease* was defined as self-report of any of the following: myocardial infarction, percutaneous coronary intervention, coronary artery bypass surgery, or peripheral vascular disease. Information on aortic plaque and systemic thromboembolism, although included among the CHA_2DS_2-VASc risk factors,[6] was not collected by WHI.

Follow-Up and End-Point Determination

Intensity of follow-up visits varied based on enrollment arm, ranging from every 6 months (clinical trials) to every 3 years (observational study). When a potential outcome was identified, medical records were obtained and stroke (including self-reports) and transient ischemic attack (only the first event) were centrally adjudicated.[12] No bleeding end points were collected. We lost 2.3% of our cohort to follow-up and 4.2% stopped follow-up early.

Statistical Analysis

We summarized baseline characteristics with means and SDs for continuous variables and frequencies and percentages for

categorical variables. Annualized percentages for each construct are presented, calculating the percentage for each $CHADS_2$ and CHA_2DS_2-VASc level as the total number of events divided by the total at-risk follow-up time.

Proportional hazards modeling was used to evaluate the relationship between the 2 constructs and stroke. Both constructs were evaluated in a continuous and categorical form, modeling the stroke outcome by each construct, with nonstroke participants censored at death or when lost to follow-up. Hazard ratios (HR) and corresponding *P*-values are presented for each model.

For each model, Harrell's *c* statistic was calculated to quantify the discriminatory ability of the constructs, and 95% confidence intervals (CI) for each *c* statistic and the difference between *c* statistics using bootstrapping with 1000 replications were computed.

Components of each construct as predictors of stroke were evaluated using both univariate and multivariate modeling. Events and annualized rates for each component level are presented with their corresponding univariate *P*-value from a model evaluating each component individually. All components were put into a single model with resulting HRs and corresponding *P*-values presented.

All proportional hazards models were adjusted for aspirin use and stratified within the model by WHI hormone trial arm (not randomized, active, placebo), dietary modification trial arm (not randomized, intervention, comparison), and calcium/vitamin D arm (not randomized, active, placebo). Analyses were completed using SAS version 9.1 (SAS Institute Inc., Cary, NC).

To compare $CHADS_2$ and CHA_2DS_2-VASc on stroke risk prediction, we used the Net Reclassification Improvement Index (NRI), which identifies how many participants are correctly and incorrectly reclassified into different risk categories (upward for events, downward for nonevents).[13] Because 3.5% of our atrial fibrillation participants had a stroke/transient ischemic attack event over the first 5 years of follow-up, we examined the <3%, 3%-<6%, 6%-<9%, and ≥9% risk groups, excluding participants censored before 5 years of follow-up.

RESULTS

Baseline Characteristics

In the WHI cohort with atrial fibrillation not on warfarin at baseline, 64.9% were hypertensive, 3.7% had congestive heart failure, 9.2% had diabetes mellitus, 2.6% had prior stroke, 4.9% had prior transient ischemic attack, 10.3% had prior coronary artery disease, and 5.2% had peripheral vascular disease (**Table 1**). Warfarin users (not included in this analysis) had a significantly higher prevalence of $CHADS_2$ and CHA_2DS_2-VASc risk factors than nonusers. The WHI did not collect information about why patients were not on anticoagulation.

Table 1 Demographic and Clinical Characteristics of Participants with Baseline Atrial Fibrillation by Warfarin Use at Baseline

	Nonusers (n = 5981)		Warfarin Users (n = 753)		
Baseline Characteristic	n	%	n	%	*P*-Value
Congestive heart failure	222	3.7	145	19.3	<.001
Hypertension (BP ≥140/90 mm Hg or meds use)	3879	64.9	615	81.7	<.001
Age, years: mean (SD)	65.85 (7.18)		69.03 (5.97)		<.001
<65	2469	41.3	161	21.4	
65-74	2789	46.6	447	59.4	
≥75	723	12.1	145	19.3	
Diabetes mellitus	553	9.2	102	13.5	<.001
Prior stroke	156	2.6	102	13.5	<.001
Prior TIA	296	4.9	127	16.9	<.001
Clopidogrel (Plavix) use	1	0.0	0	0.0	.723
Aspirin use (≥80 mg/day)	2041	34.1	49	6.5	<.001
Hormone use					<.001
Never	2455	41.0	394	52.3	
Past	1184	19.8	147	19.5	
Current	2336	39.1	212	28.2	
History of coronary artery disease (MI/CABG/PTCA)	616	10.3	109	14.5	<.001
History of MI	511	8.5	81	10.8	.043
History of CABG/PTCA	259	4.3	57	7.6	<.001
History of PVD	312	5.2	59	7.8	.012

BP = blood pressure; CABG = coronary artery bypass graft; MI = myocardial infarction; PTCA = percutaneous transluminal coronary angioplasty; PVD = peripheral vascular disease; TIA = transient ischemic attack.

Stroke Rate

During a median of 11.8 years of follow-up (interquartile range 8.0-13.6), there were 457 stroke/transient ischemic attack events (137 of which were transient ischemic attacks) among the 5981 women. Annualized stroke/transient ischemic attack rates ranged from 0.36% to 2.43% with increasing $CHADS_2$ score (0-4+), and 0.20% to 2.02% with increasing CHA_2DS_2-VASc score (1-6+, because all were female) (Table 2). Kaplan-Meier curves for survival free from stroke/transient ischemic attack, stratified by $CHADS_2$ and CHA_2DS_2-VASc score, demonstrate a progressive decrease in event-free survival over time as the respective scores increase (Figure).

Stroke Scheme Performance

Although both risk scores were predictive of stroke risk according to univariate proportional hazards analysis ($P < .001$ for both), the discriminatory ability of CHA_2DS_2-VASc was higher than that of $CHADS_2$ ($P < .01$). For every 1-point increase, while $CHADS_2$ had a HR of 1.57 (95% CI, 1.45-1.71, *c* statistic: 0.65 [95% CI, 0.62-0.67]), CHA_2DS_2-VASc had a HR of 1.50 (95% CI, 1.41-1.60, *c* statistic: 0.67 [95% CI, 0.65-0.69]) (Table 3).

All individual construct components of the risk scores were predictive of stroke in univariate analysis, but congestive heart failure was not significant in multivariate analysis (HR 1.05; 95% CI, 0.68-1.64, $P = .827$) (Table 4). The most predictive variables by multivariate analysis were age ≥75 years (HR 2.91; 95% CI, 2.19-3.86, $P < .001$) and history of stroke or transient ischemic attack (HR 2.13; 95% CI, 1.60-2.82, $P < .001$).

To determine the possible effect of hormone replacement therapy on the prognostic ability of these risk scores, we evaluated a subgroup interaction between both the continuous $CHADS_2$ and CHA_2DS_2-VASc scores and hormone therapy, defined by intervention assignment if enrolled in the hormone therapy trial and by baseline hormone use if not. For both $CHADS_2$ ($P = .70$) and CHA_2DS_2-VASc ($P = .43$), the association of the score was not significantly modified by hormone use.

Table 2 Annualized Rates of Stroke/TIA by $CHADS_2$ and CHA_2DS_2-VASc Scores

	Stroke†/TIA		
Construct, Level	n	Events	Annual %
$CHADS_2$ score			
0	1760	71	0.36
1	2879	219	0.72
2	922	106	1.27
3	299	38	1.45
4+	121	23	2.43
CHA_2DS_2-VASc score			
1	951	22	0.20
2	1794	96	0.48
3	1799	152	0.82
4	911	108	1.30
5	343	51	1.71
6+	183	28	2.02

TIA = transient ischemic attack.
Does not include hemorrhagic stroke.

Risk Score Comparison

Although $CHADS_2$ is helpful for scores ≥2, clinical decision-making becomes more ambiguous when the score is <2. Because the 2 highest frequency $CHADS_2$ scores in our population were 1 (n = 2879, 48%) and 0 (n = 1760, 29%), we compared the classification of these patients in both schemes to see if CHA_2DS_2-VASc would have an added benefit (Table 5). Table 5 demonstrates that *within* any $CHADS_2$ score column, a higher CHA_2DS_2-VASc score corresponds to a higher event rate, but the same is not true when stratifying risk within any given CHA_2DS_2-VASc score row. For $CHADS_2$ scores <2, stroke risk almost doubles with every additional CHA_2DS_2-VASc point. Further, when using CHA_2DS_2-VASc at 5-year follow-up, the NRI was 21.1%, *z*-stat = 4.70, $P < .001$: 65 of 212 patients with a stroke/thromboembolic event (30.7%) and 897 of 5372 patients without an event (16.6%) were reclassified to a higher risk category.

DISCUSSION

This study validated $CHADS_2$ and CHA_2DS_2-VASc for predicting stroke risk in a US population of postmenopausal women with atrial fibrillation followed for a median of 11.8 years. While both scores have modest but similar discriminative accuracy, CHA_2DS_2-VASc appears to be useful in further risk-stratifying women with $CHADS_2$ <2.

In the original validation study, $CHADS_2$ had a *c* statistic of 0.82 (95% CI, 0.80-0.84), while the Atrial Fibrillation Investigators and Stroke Prevention in Atrial Fibrillation studies had *c* statistics of 0.68 (95% CI, 0.65-0.71) and 0.74 (95% CI, 0.71-0.76), respectively.[1] Largely based on this study, current US guidelines[14] recommend risk-stratification and anticoagulation treatment as follows: aspirin 81-325 mg daily, $CHADS_2 = 0$; aspirin or anticoagulation with warfarin or dabigatran, $CHADS_2 = 1$; and anticoagulation, $CHADS_2 \geq 2$.

Although $CHADS_2$ is a useful risk-stratification scheme that has been adopted by the American College of Cardiology, American Heart Association, European Society of Cardiology, and Heart Rhythm Society,[9,14,15] one drawback is that it places a large percentage of patients (up to 47% by some estimates; 48% of our cohort)[16] in an intermediate risk category ($CHADS_2 = 1$) with subsequent ambiguity as to the appropriate anticoagulation strategy. If aspirin, dabigatran, rivaroxaban, apixaban, and warfarin all offered equivalent protection from stroke, this recommendation would be uncontroversial. However, while warfarin decreases stroke risk in atrial fibrillation patients by

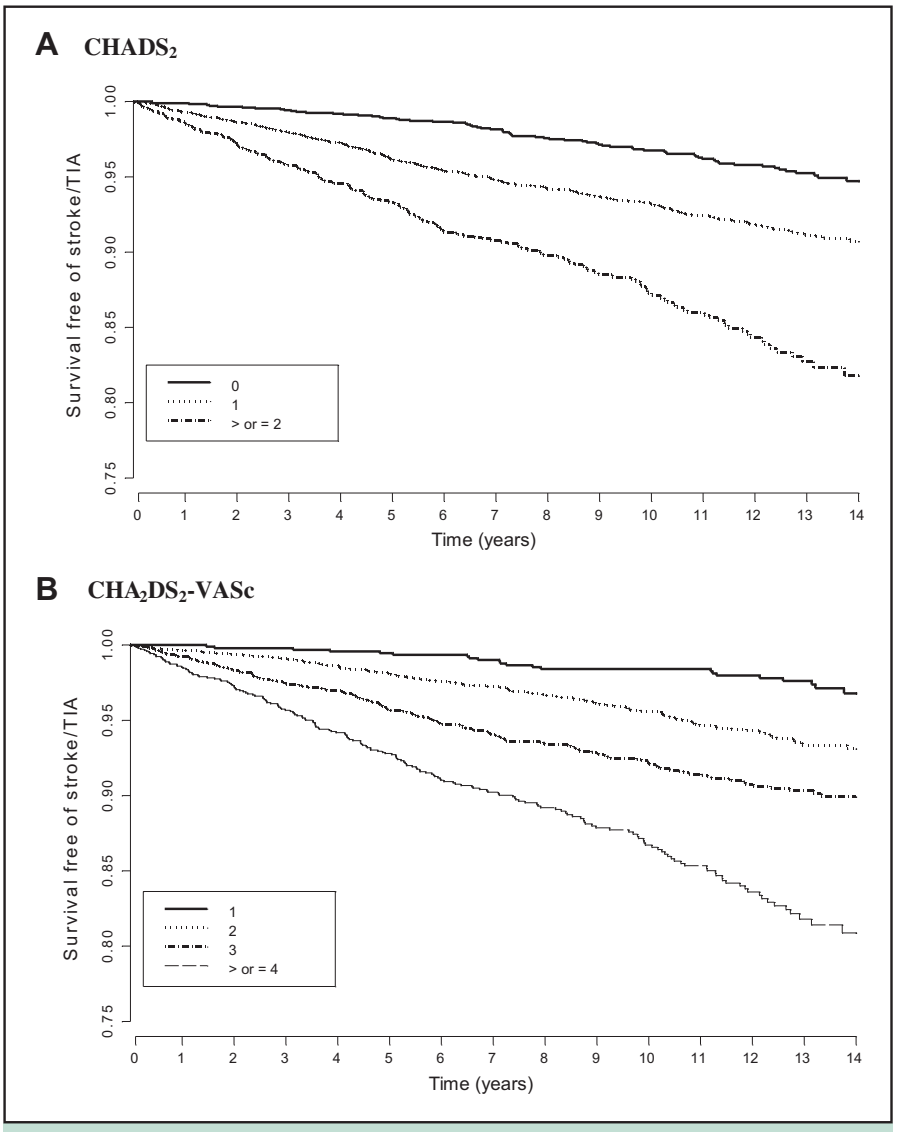

Figure Kaplan-Meier curves of stroke/transient ischemic attack (TIA)-free survival stratified by $CHADS_2$ and CHA_2DS_2-VASc score.

approximately 68%, aspirin has been shown to provide only a 20%-36% reduction in ischemic stroke risk.[17-20] Moreover, aspirin is often used even when warfarin is indicated, because of its ease of administration and the widely held view that it provides a decreased risk of major bleeding, studies demonstrating equivalent risk notwithstanding.[17,21,22]

Lip et al (2010)[6] suggested that a significant advantage of CHA_2DS_2-VASc was that it classified very few women as intermediate risk (score of 1 = 15.1%) compared with $CHADS_2$ (1 score = 34.9%). Also, there was a very low event rate in the CHA_2DS_2-VASc 0-1 group (0 score = 0%; 1 score = 0.6%). In their analysis, $CHADS_2$ and CHA_2DS_2-VASc had *c* statistics of 0.586 and 0.606, respectively. Based on these findings, the European Society of Cardiology guidelines recommend that CHA_2DS_2-VASc be used when $CHADS_2 \leq 1$ and that anticoagulation be prescribed when CHA_2DS_2-VASc ≥ 2, aspirin 75-325 mg or anticoagulation when CHA_2DS_2-VASc = 1 (anticoagulation preferred), and aspirin only when CHA_2DS_2-VASc = 0.[15]

Several studies have validated and compared CHA_2DS_2-VASc to $CHADS_2$ in recently hospitalized populations not on anticoagulation. In a cohort of Danish patients, Olesen et al (2011)[23] found that both were predictive of stroke risk ($CHADS_2$: *c* statistic of 0.812; CHA_2DS_2-VASc: *c* statistic of 0.885). Friberg et al (2012)[24] evaluated stroke risk schemes in a cohort from the National Swedish Drug registry over a median of 1.4 years and found that both schemes were predictive of stroke risk ($CHADS_2$: *c* statistic of 0.62; CHA_2DS_2-VASc: *c* statistic of 0.67). In both studies, CHA_2DS_2-VASc was better at identifying patients assessed as truly low risk for thromboembolic stroke (0 score). Olesen et al (2012)[25] validated CHA_2DS_2-VASc in a population with a

Table 3 Univariate Proportional Hazards Analyses* of Stroke/TIA by $CHADS_2$ and CHA_2DS_2-VASc Constructs

	Stroke/TIA (n = 5981)		
Construct, Level	HR (95% CI)	*P*-value	*c* statistic (95% CI)
$CHADS_2$ score			
Continuous - 1 pt increase	1.57 (1.45-1.71)	<.001	0.65 (0.62-0.67)
Categorical		<.001	0.65 (0.62-0.67)
0	1.00 (ref)		
1	2.00 (1.53-2.61)		
2	3.55 (2.62-4.81)		
3	4.02 (2.70-5.99)		
4+	6.69 (4.16-10.78)		
CHA_2DS_2-VASc score			
Continuous - 1 pt increase	1.50 (1.41-1.60)	<.001	0.67 (0.65-0.69)
Categorical		<.001	0.67 (0.65-0.69)
1	1.00 (ref)		
2	2.45 (1.54-3.90)		
3	4.16 (2.65-6.52)		
4	6.67 (4.20-10.60)		
5	8.92 (5.38-14.78)		
6+	10.34 (5.87-18.23)		

CI = confidence interval; HR = hazard ratio; TIA = transient ischemic attack.

*All models are adjusted for aspirin use and stratified within the model by WHI hormone trial arm (not randomized, active, placebo); WHI dietary modification arm (not randomized, intervention, comparison); WHI calcium/vitamin D arm (not randomized, active, placebo).

$CHADS_2$ score <2 and, as in our study, found that CHA_2DS_2-VASc improved on the predictive ability of $CHADS_2$ (NRI = 14.2; P <.001).

Our study offers unique data in a large prospective cohort of American women by validating $CHADS_2$ and CHA_2DS_2-VASc in a population of healthy, ambulatory, postmenopausal women with more than 11 years of follow-up. This is particularly important because all validations to date of CHA_2DS_2-VASc have been performed in recently hospitalized, non-US cohorts. Second, it provides additional evidence that the risk factors of age 65-74 years and history of vascular disease included in CHA_2DS_2-VASc may help to further risk-stratify those patients who would otherwise fall into either a low or intermediate risk category ($CHADS_2 \leq 1$).

A first limitation of this study involves the inherent confines of the WHI cohort. Because it did not include men, no conclusions can be made about the effect of female sex on stroke risk, and because information on aortic plaque and systemic thromboembolism was not available, these variables were not able to be included in the evaluation of CHA_2DS_2-VASc.

Another limitation is that the designation of atrial fibrillation (and of many of the risk factors) was made by self-report in the majority of participants (5901 of 5981), which could have led to participant misclassification and lower-than-expected event rates (**Table 2**).[1,6] However, a recent study suggests that self-report of atrial fibrillation is as predictive of stroke risk as documentation by electrocardiogram.[26] An alternative explanation for the relatively low stroke/transient ischemic attack rates may be the relative health of our cohort. A recent comparison of stroke risk schemes in a cohort of 13,559 patients with atrial fibrillation by Fang et al[2] found similar annual stroke rates

Table 4 Univariate and Multivariate Proportional Hazards Analyses of Stroke/TIA by Risk Factor

Risk Factor	Group Event (Ann %)	Univariate *P*-Value	Multivariate HR (95% CI)	Multivariate *P*-Value
Hx of CHF	22 (1.14)	.042	1.05 (0.68-1.64)	.827
Hypertension	351 (0.90)	<.001	1.55 (1.24-1.94)	<.001
Age, years (ref <65)		<.001		<.001
65-74	248 (0.88)		1.95 (1.56-2.45)	
75+	93 (1.46)		2.91 (2.19-3.86)	
Hx of diabetes	58 (1.15)	<.001	1.38 (1.04-1.83)	.027
Hx of stroke/TIA	59 (1.80)	<.001	2.13 (1.60-2.82)	<.001
Hx of CAD/PVD	99 (1.29)	<.001	1.46 (1.15-1.85)	.002

CAD = coronary artery disease; CHF = congestive heart failure; HR = hazard ratio; Hx = history; PVD = peripheral vascular disease; TIA = transient ischemic attack.

Table 5 Event Totals/Participant Totals and (Annualized Rates of Stroke/TIA) by Risk Score

Total Participants	$CHADS_2$				
CHA_2DS_2-VASc	0	1	2	3	≥4
1	22/951 (0.20)				
2	44/755 (0.53)	52/1039 (0.44)			
3	5/54 (0.91)	136/1601 (0.82)	11/144 (0.77)		
4		31/239 (1.43)	71/610 (1.29)	6/62 (0.98)	
5			24/168 (1.68)	26/169 (1.73)	1/6 (1.61)
≥6				6/68 (1.19)	22/115 (2.49)

TIA = transient ischemic attack.

in low- and intermediate-risk patients. It also is possible that some of the women may have started warfarin during the follow-up period, which may have influenced (presumably by decreasing) the event rate of stroke/transient ischemic attack. However, at year 3, only 340 of the 5021 women on whom we have medication data had started warfarin. Further, re-analysis after excluding these women did not substantially change the stroke rates. It also is possible that patients in our cohort died of causes other than a stroke, because the annualized death rates in our cohort more closely approximate the annualized stroke/transient ischemic attack rates in the original studies (**Table 6**).[1,6]

A further finding of our study that does not correlate with some of the prior cohorts is that a history of congestive heart failure was not predictive of stroke/transient ischemic attack in multivariate analysis. This could be due to the low incidence of congestive heart failure in our cohort, possibly because women are more likely to have diastolic heart failure, thereby attenuating the impact of systolic heart failure in this cohort or because these women underreported diagnoses of heart failure. Nonetheless, at least 2 other studies have failed to support congestive heart failure as a risk factor for stroke in atrial fibrillation.[24,27]

Table 6 Annualized Rates of Death by $CHADS_2$ and CHA_2DS_2-VASc Scores

		Death	
Construct, Level	*n*	Events	Annual %
$CHADS_2$ Score			
0	1760	175	0.87
1	2879	494	1.57
2	922	309	3.53
3	299	97	3.49
4+	121	63	6.13
CHA_2DS_2-VASc Score			
1	951	56	0.50
2	1794	204	1.00
3	1799	345	1.80
4	911	307	3.53
5	343	133	4.18
6+	183	93	6.28

In conclusion, both $CHADS_2$, and CHA_2DS_2-VASc are predictive of stroke risk in ambulatory, postmenopausal female patients with atrial fibrillation. This study provides valuable information on the added value of using CHA_2DS_2-VASc to further risk-stratify women who have a $CHADS_2$ score <2, which, when combined with an assessment of bleeding risk, may have clinical implications for identifying patients who should be offered anticoagulation instead of aspirin therapy. Future studies are needed to clarify anticoagulation recommendations for $CHADS_2$ <2 individuals, particularly in the era of new oral anticoagulants.

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