In a large primary care dataset, the CHA_2DS_2-VASc score leads to almost universal recommendation for anticoagulation treatment in those aged ≥65 years with atrial fibrillation

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Running title: $CHADS_2$ vs CHA_2DS_2-VASc in AF patients aged ≥65+ years

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Abstract

From 2012-16, the oral anticoagulant (OAC) treatment determination for atrial fibrillation (AF) patients moved from the $CHADS_2$ to the CHA_2DS_2-VASc score. A dataset collated during previous studies (2011-2019) with deidentified data extracted from clinical records at a single-timepoint for active adult patients (n=285,635; 8,294 with AF) attending 164 general practices in Australia was analysed. The CHA_2DS_2-VASc threshold (score ≥2 men/≥3 women) captured a significantly higher proportion than $CHADS_2$≥2 (all ages: 85% vs 68%,p<0.0001;≥65 years: 96% vs 76%,p<0.0001). The change from $CHADS_2$ to CHA_2DS_2-VASc resulted in a significantly higher proportion of AF patients being recommended OAC, driven by the revised scoring for age.

Keywords: stroke prevention, general practice, atrial fibrillation

1. Introduction

Atrial fibrillation (AF) is the most common arrhythmia, and can cause a 5-fold increase in stroke risk.[1] However, for AF patients at high risk, treatment with oral anticoagulants (OAC) risk can reduce stroke risk by almost two-thirds.[2]

Several different scores and risk stratification tools have been created to predict stroke and thromboembolism risk in AF patients, and to identify high risk patients who should receive OAC treatment. The $CHADS_2$ score gives 1 point each for a history of congestive heart failure (C), hypertension (H), age≥75 years (A) and diabetes (D), and 2 points for a history of stroke or transient ischaemic attack (TIA).[3] Between 2010-16, the OAC treatment recommendations in key international guidelines moved from using a $CHADS_2$ score ≥2 to a CHA_2DS_2-VASc score ≥2 in men or ≥3 in women.[4-6] Instead of focusing on identifying high risk patients, the CHA_2DS_2-VASc aimed to identify truly low risk AF patients who did not need OAC treatment. The CHA_2DS_2-VASc score[7] revised the scoring for age as 1 point for 65-74 years or 2 points for ≥75 years, and added 1 point each for female sex and vascular disease history.

In 2018, a "sexless" version of the CHA_2DS_2-VASc, called the CHA_2DS_2-VA, was introduced in the Australian guidelines.[8] The aim was to simplify the CHA_2DS_2-VASc treatment thresholds by removing the sex category from the score entirely, instead of using differing treatment thresholds for men and women. Thus, the Australian guidelines recommend OAC treatment for AF patients with a CHA_2DS_2-VA≥2, which is equivalent to the CHA_2DS_2-VASc threshold of ≥2 in men or ≥3 in women.[8]

This study aimed to compare the proportion of AF patients (and controls without AF) for whom OAC treatment was recommended under the $CHADS_2$ and CHA_2DS_2-VASc thresholds, and to look at reasons for any differences, using a large dataset from Australian general practice.

2. Methods

Analyses were conducted on a large Australian general practice dataset collated during previous cardiovascular quality improvement and AF screening studies (2011-2019).[9-13] Each of these studies had ethics approval. The dataset comprised deidentified data extracted from the clinical records system at a single baseline timepoint for 'active' adult patients from 164 practices. Active patients were defined as

those aged ≥18 years who had attended the practice at least three times in the past 2 years, and at least once in the past 6 months.

$CHADS_2$ and CHA_2DS_2-VASc scores were calculated for those with sufficient data available. For patients with AF, the proportion recommended OAC under $CHADS_2$≥ and CHA_2DS_2-VASc≥2 (men) or ≥3 (women) was compared. Chi-square tests were used to compare proportions and two-tailed t-tests were used to compare means with $p<0.05$ considered significant. Analyses were done in Microsoft Excel and Graphpad Prism.

3. Results

There were records for 340,463 patients. Of these patients, there were 8,294 with AF and sufficient data available to calculate $CHADS_2$ and CHA_2DS_2-VASc scores. Baseline demographics for the study population are shown in Table 1.

Table 1 – baseline demographics of study population

Measure	Patients with AF
AF patients with sufficient data to calculate stroke risk scores	N=8,294
Male	54%
Congestive heart failure	14%
Hypertension	89%
Age (mean)	75.4 years
Diabetes	23%
Stroke / transient ischaemic attack	13%
Vascular disease	3%
Current smoker	6%
Height (mean)	168cm
Body mass index (mean)	29.1 kg/m^2

AF, atrial fibrillation

Among adult AF patients of all ages, the CHA_2DS_2-VASc threshold captured a significantly higher proportion of patients than the $CHADS_2$ threshold (85% vs 68%, $p<0.0001$) (Table 2). Similarly, among AF

patients aged ≥65 years, the CHA_2DS_2-VASc threshold captured a significantly higher proportion than $CHADS_2$ (96% vs 76%, p<0.0001). Breaking this down further, the largest absolute difference between CHA_2DS_2-VASc and $CHADS_2$ was in those aged 65-74 years (87% vs 36%, p<0.0001), with a smaller absolute difference in patients aged ≥75 years (100% vs 95%, p<0.0001).

The vast majority of older patients (≥65 years) who were captured by CHA_2DS_2-VASc but not $CHADS_2$ qualified on the basis of age alone, with only 1.4% qualifying because of age 65-74 years and vascular disease history.

In contrast, there was almost no difference in the proportion of patients aged <65 years recommended OAC using the CHA_2DS_2-VASc and $CHADS_2$ scores. There were only 3 additional patients aged <65 years who qualified for OAC using CHA_2DS_2-VASc due to vascular disease history.

Table 2 – Proportion of atrial fibrillation patients recommended oral anticoagulant treatment using $CHADS_2$ and CHA_2DS_2-VASc scores

Age group	Patients with AF, n	$CHADS_2$≥2, n (%)	CHA_2DS_2-VASc ≥2 (men) or ≥3 (women) n (%)	Difference between CHA_2DS_2-VASc and $CHADS_2$ OAC recommendation, n
<65 years	1,376	399 (29%)	402 (29%)	3
≥65 years	6,918	5,237 (76%)	6,632 (96%)*	1,395
65-74 years	2,233	804 (36%)	1,947 (87%)*	1,143
75+ years	4,685	4,433 (95%)	4,685 (100%)*	252
Total (all ages)	**8,294**	**5,636 (68%)**	**7,034 (85%)***	**1398**

*p<0.0001 CHA_2DS_2-VASc vs $CHADS_2$; AF, atrial fibrillation

4. Discussion

Our results show that a significantly higher proportion of AF patients are recommended OAC treatment using the CHA_2DS_2-VASc threshold compared to the $CHADS_2$. This difference is driven almost entirely by the revised scoring for age. In patients aged ≥65 years with AF, almost all (96%) were recommended OAC treatment under CHA_2DS_2-VASc.

These findings are consistent with earlier analyses by Lip et al, which compared different stroke risk scores across a subgroup of 1084 AF patients from the EuroHeart Survey.[7] They found that compared to the $CHADS_2$, the CHA_2DS_2-VASc score was more likely to categorise a patient as high risk (76% vs 18%) and less likely to categorise a patient at low risk (20% vs 9%).

Our findings also reinforce the argument that opportunistic AF screening recommendations in those ≥65 years[14 15] are justified, as almost all new cases identified are likely to be eligible for OAC treatment. In addition, high rates of associated vascular pathology in AF patients suggest that additional risk factor management strategies are also justified, including promotion of exercise, smoking cessation, and treatment of associated conditions such as hypertension and diabetes,[16] as now recommended in guidelines.[15]

There could be an argument for simplifying the treatment message for general practitioners (GPs), which may reduce barriers to treatment and further improve treatment rates. This is the approach taken by the Canadian guidelines, which automatically recommend OAC treatment for all AF cases ≥65 years.[17] While OAC treatment rates have improved in many countries (up to 70-80%),[9 18 19] there are still important gaps, especially in GPs' confidence in prescribing treatment. A recent qualitative meta-synthesis looking at clinicians' views on prescribing OAC for AF patients found that clinicians had concerns with the format of guidelines, and that many primary care physicians had a lack of knowledge of the CHA_2DS_2-VASc score, stroke risks and how to individualise treatment.[20] The authors concluded that multi-disciplinary interventions, including nurses and anticoagulation clinic staff, were needed to improve clinicians' confidence in prescribing OAC treatment.[20] However, we acknowledge that whichever threshold is selected involves trade-offs between potential over- and under-treatment. Perhaps the treatment question for those aged ≥65 years could be less "for whom OAC treatment is indicated" (which is almost all AF patients in this age group) and instead, as the ESC guidelines suggest, to identify those with a reversible cause of increased bleeding risk that should be managed.[8 15]

This study has several limitations. First, as the data were limited to 'active patients', it may be biased towards patients who have chronic conditions and attend their general practice more often. That is, patients with more comorbidities may be more strongly represented.

In addition, the data extracted from practices was routinely collected general practice data with some inherent limitations. For example, an AF diagnosis may have been recorded as free-text notes instead of

using the coded list, and would therefore not be counted as an AF patient in our analyses. This may underestimate the true proportion of patients in the dataset with AF.

In conclusion, the change in OAC recommendation threshold from $CHADS_2$≥2 to CHA_2DS_2-VASc≥2 (men) or ≥3 (women) in international guidelines resulted in a significantly higher proportion of AF patients being recommended OAC treatment, driven by the revised scoring for age. In those ≥65 years, almost all were recommended treatment under CHA_2DS_2-VASc. There is an argument for simplifying the treatment message for general practitioners and practice nurses to recommending OAC for all AF patients aged ≥65, which may reduce barriers and improve treatment rates.

Competing interests

JJO, KG, NL and BF report investigator-initiated grants to their institution from Pfizer/BMS. BF also reports prior fees and advisory board honoraria from Bayer Pharma AG, Daiichi-Sankyo, Omron and Pfizer/BMS. LN reports speaker fees from Daiichi-Sankyo, grants and honoraria from Pfizer/BMS, Bayer and Boehringer Ingelheim. JWO, ALG and CH have no disclosures. CH reports independent research grants from Amgen and Sanofi, and honoraria for education/advisory boards from AstraZeneca, Boehringer Ingelheim and Pfizer.

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Data availability statement

Some data are available from the corresponding author on reasonable request.

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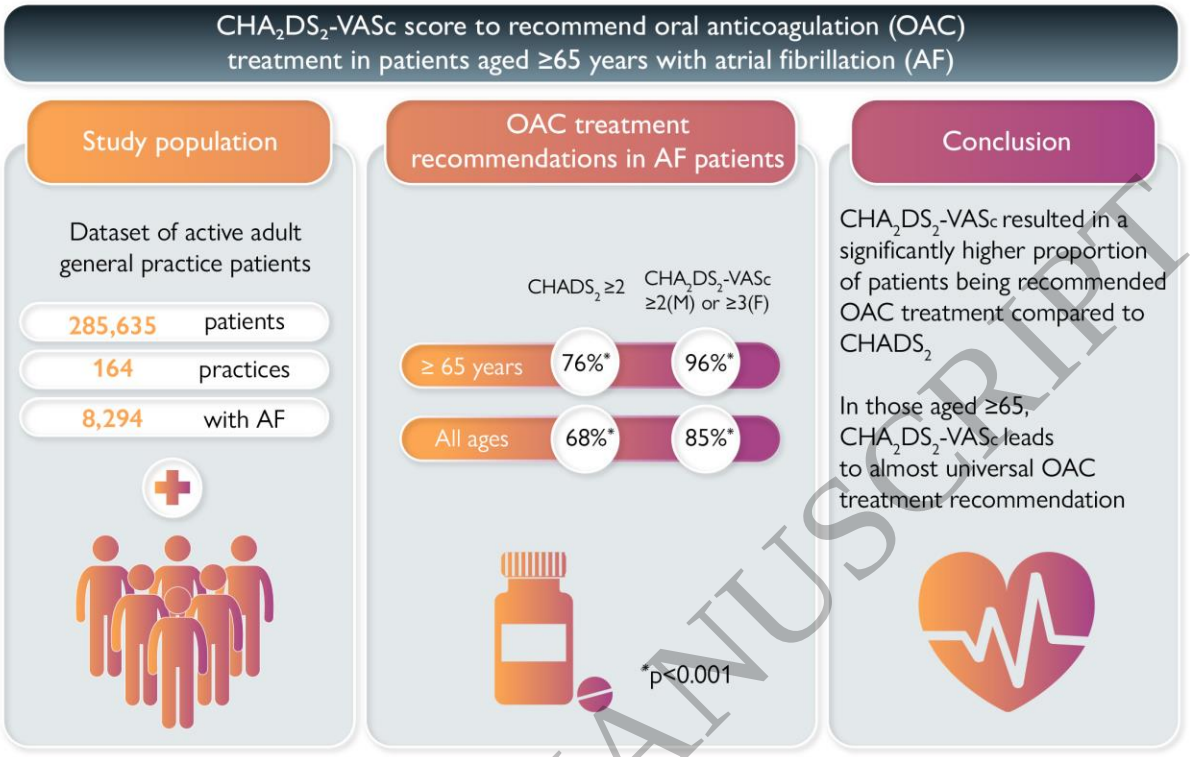
Highlights box – novelty

- This is the first study to look at how the change in oral anticoagulant (OAC) treatment guidelines for those with atrial fibrillation (AF) from the $CHADS_2$ score to the CHA_2DS_2-VASc score have affected the number of patients recommended OAC in Australia.
- The change in OAC recommendation threshold from $CHADS_2 \geq 2$ to CHA_2DS_2-VASc ≥2 (men) or ≥3 (women) resulted in a significantly higher proportion of AF patients being recommended OAC treatment, driven by the revised scoring for age.
- There is an argument for simplifying the treatment message for general practitioners and practice nurses to recommending OAC for all AF patients aged ≥65, which may reduce barriers and improve treatment rates.



Graphical Abstract