PERSPECTIVE

# Risk scores to predict stroke in atrial fibrillation

JOHN AMERENA MB BS, FRACP, FACC, FCSANZ

*We are in an era where there are rapidly evolving therapeutic changes in the management of atrial fibrillation, particularly with respect to anticoagulation.*

## Key points

- **Stroke prevention in patients with nonvalvular atrial fibrillation (AF) should be the major therapeutic consideration.**
- **The $CHADS_2$ score is the most widely used and validated risk calculator for stroke in patients with nonvalvular AF.**
- **Bleeding risk also needs to be taken into account when considering anticoagulation in patients with nonvalvular AF.**
- **Well-controlled warfarin treatment is effective in stroke prevention in patients with nonvalvular AF but dabigatran is easier to use, safer and more effective.**

CARDIOLOGY TODAY 2011; 1(3): 29-32

Associate Professor Amerena is a Cardiologist at Barwon Health, Geelong Hospital; Associate Professor at the School of Medicine, Deakin University; Senior Lecturer at the Department of Epidemiology and Preventive Medicine, Monash University; Director of the Geelong Cardiology Research Unit at Geelong Hospital; and Director of Cardiac Services at Geelong Private Hospital, Geelong, Vic.

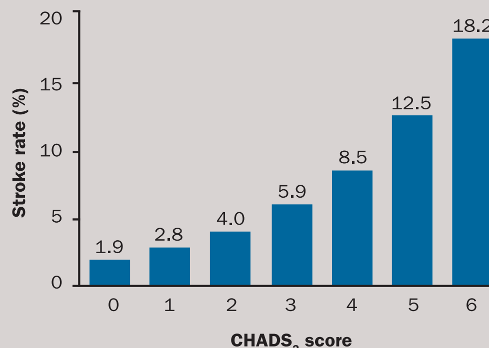
## $CHADS_2$ versus $CHA_2DS_2$-VASc score for assessing risk of stroke

Nonvalvular atrial fibrillation (AF) is increasing in prevalence as our population ages and hypertension, diabetes and obesity become more common in older populations. AF in most patients is nominally labelled as nonvalvular because even if patient have associated valvular heart disease, most are not being considered for intervention (surgical or percutaneous) and thus are classified as having nonvalvular AF. These are the patients who have been included in the trials demonstrating the benefit of anticoagulation in reducing stroke risk in those with AF.[1]

The most commonly used tool for assessing risk of stroke in nonvalvular AF is the $CHADS_2$ score, which was published more than 10 years ago.[2] This score assigns 1 point for a history of congestive cardiac failure, hypertension, diabetes, or age over 75 years, and 2 points for a history of stroke or transient ischaemic attack. The risk of stroke increases exponentially with an increasing $CHADS_2$ score (Figure), and it has also been shown that the risk of bleeding with anticoagulation also increases with risk of stroke.

The 2006 American College of Cardiology, American Heart Association and the European Society of Cardiology guidelines

Figure. $CHADS_2$ helps to predict stroke risk in patients with AF.[2]




| Risk factor | Points |
|---|---|
| Congestive heart failure | 1 |
| Hypertension | 1 |
| Aged over 75 years | 1 |
| Diabetes | 1 |
| Prior stroke or transient ischaemic attack | 2 |

© PHOTOLIBRARY



Downloaded for personal use only. No other uses permitted without permission. ©MedicineToday 2011.

(ACC/AHA/ESC)[3] recommend that for a $CHADS_2$ score of 0 aspirin or nothing be considered, and for a $CHADS_2$ score of 2 or more anticoagulation is appropriate. For a $CHADS_2$ score of 1, the recommendation is that either aspirin or anticoagulation can be used but there is considerable debate around the $CHADS_2$ 1 category. Many physicians feel that the magnitude of stroke risk is not the same for hypertension, heart failure, age and diabetes as it is commonly thought that age over 75 years is as potent a risk factor for stroke as a history of previous stroke; this has been reflected in the more recent ESC guidelines for anticoagulation in nonvalvular AF.[4]

**Table 1. $CHA_2DS_2$-VASc risk criteria[4]**

| Risk factor | Points |
|---|---|
| Congestive heart failure | 1 |
| Hypertension | 1 |
| Age over 75 years* | 2 |
| Diabetes mellitus | 1 |
| Stroke, transient ischaemic attack, thromboembolism* | 2 |
| Vascular disease | 1 |
| Age 65 to 74 years | 1 |
| Female gender | 1 |

* These are all major risk factors. Note: maximum score is 9.

**Table 2. Adjusted stroke rate according to the $CHA_2DS_2$-VASc score[4]**

| $CHA_2DS_2$-VASc score | Patients (n = 7329) | Adjusted stroke rate (% year) according to the $CHA_2DS_2$-VASc score |
|---|---|---|
| 0 | 1 | 0 |
| 1 | 422 | 1.3 |
| 2 | 1230 | 2.2 |
| 3 | 1730 | 3.2 |
| 4 | 1718 | 4.0 |
| 5 | 1159 | 6.7 |
| 6 | 679 | 9.8 |
| 7 | 294 | 9.6 |
| 8 | 82 | 6.7 |
| 9 | 14 | 15.2 |

In recognition of this inequality of risk in the traditional $CHADS_2$ score, the ESC has recently published the $CHA_2DS_2$-VASc score, which is a more detailed risk assessment tool (Tables 1 and 2).[3] It still assigns 1 point for a history of congestive cardiac failure, hypertension and diabetes but also assigns 1 point for female gender, age 65 to 74 years and coexistent coronary or peripheral vascular disease. It also upgrades the risk of stroke for those aged over 75 years to 2 points, which is at the same level as having a history of previous stroke or transient ischaemic attack. For patients with $CHA_2DS_2$-VASc score of 0, their recommendation is aspirin or no treatment with a preference to no treatment. For patients with $CHA_2DS_2$-VASc score of 2 or more, anticoagulation is recommended. For patients with a $CHA_2DS_2$-VASc score of 1, they recommend that aspirin or anticoagulation be considered with a preference to anticoagulation. This represents a more aggressive approach to anticoagulation in patients with nonvalvular AF. This has yet to be widely adopted, and even in Europe there has been considerable controversy as to the appropriateness of these recommendations.

In Australia we are encouraging physicians to use the $CHADS_2$ score, particularly as there have been no Australian guidelines to date. With the advent of new antithrombotic agents that are easier to use, however, many physicians will decide to anticoagulate patients whose $CHADS_2$ or $CHA_2DS_2$-VASc score is 1, as new agents, particularly dabigatran, have been shown to be more effective and safer to use than warfarin.[5]

## Dabigatran: a new direct thrombin inhibitor

Dabigatran is a new direct thrombin inhibitor affecting the coagulation cascade at a different level from warfarin, with a more selective inhibition of thrombosis. Due to its predictable and reliable anticoagulant effects it does not require patient monitoring, and it has a rapid onset (two hours) and offset (12 to 24 hours) of action. There are no significant drug or food interactions, thus no dose adjustment is needed.

In the RELY study – The Randomised Evaluation of Long-Term Anticoagulation Therapy study – published in 2009, dabigatran was studied in patients with nonvalvular AF and at least one risk factor for stroke.[5] Open-label warfarin with a target international normalised ratio (INR) of 2 to 3 was compared with two doses of dabigatran but the dose (110 mg twice daily or 150 mg twice daily) was blinded to patients and the researchers. The study showed superiority of the higher dose of dabigatran in reducing stroke and systemic embolisation compared with warfarin, which was well controlled as the mean time in therapeutic range in the study was 65%. There was comparable major bleeding to warfarin with the 150 mg twice daily dose of dabigatran, but there was an excess of gastrointestinal haemorrhage with this dose, thought to be predominantly in patients over 75 years of age. The lower 110 mg twice daily dose showed similar efficacy to warfarin in reducing stroke with significantly lower rates of major bleeding. Both doses showed



Downloaded for personal use only. No other uses permitted without permission. ©MedicineToday 2011.

a significant and marked reduction of intracranial haemorrhage of about 70% compared with warfarin. Side effects were infrequent with dabigatran, with dyspepsia the most common cause of discontinuation, occurring in only 2% of patients for this reason.[5] Dabigatran is renally excreted, so in patients with moderate renal dysfunction (estimated glomerular filtration rate of 30 to 50 mL/sec), the lower dose should be considered. In patients whose estimated glomerular filtration rate is below 30 mL/sec dabigatran should not be used.

## Risk of bleeding and the HAS-BLED score

When anticoagulation is considered in patients, it is always important to evaluate the risk of bleeding. This has been done intuitively by many physicians in the past, but the ESC has recently released the HAS-BLED score so that a more systematic approach to bleeding risk can be undertaken (Tables 3 and 4).[4,6] This scoring system assigns 1 point for a history of hypertension, abnormal renal or liver function, stroke, previous bleeding, labile INR control and drug or alcohol abuse, and age over 65 years. There is a progressive increase in bleeding risk with increasing HAS-BLED score and this should be taken into account when anticoagulation is being considered, particularly with respect to dosage of dabigatran as if patients have a high risk of bleeding the lower dose would be recommended.

For all patients with nonvalvular AF who are being considered for anticoagulation with warfarin or dabigatran, the risk–benefit ratio of stroke reduction versus bleeding should be considered. Although doctors tend to be risk averse and are hesitant to prescribe therapy that increases the risk of bleeding, it needs to be recognised that most patients who bleed survive without permanent disability, whereas stroke in patients with AF is more likely to be fatal or disabling.[7] Frequent falls are often thought to be a relative contraindication to anticoagulation, but it has been calculated that a patient would have to have a bad fall nearly every day to make the risk of falls on anticoagulation greater than the risk of stroke without anticoagulation in those with nonvalvular AF.[8]

**Table 3. HAS-BLED risk criteria[4]**

| HAS-BLED risk criteria | Score |
|---|---|
| Hypertension | 1 |
| Abnormal renal and/or liver function (1 point each) | 1 or 2 |
| Stroke | 1 |
| Bleeding | 1 |
| Labile international normalised ratio | 1 |
| Elderly (e.g. aged over 65 years) | 1 |
| Drugs and/or alcohol (1 point each) | 1 or 2 |

**Table 4. Bleeding risk assessment using the HAS-BLED score[6]**

| HAS-BLED total score | Patients | Number of bleeds | Bleeds per 100 patient years |
|---|---|---|---|
| 0 | 798 | 9 | 1.13 |
| 1 | 1286 | 13 | 1.02 |
| 2 | 744 | 14 | 1.88 |
| 3 | 187 | 7 | 3.74 |
| 4 | 46 | 4 | 8.70 |
| 5 | 8 | 1 | 12.50 |
| 6 | 2 | 0 | 0 |
| 7 | – | – | – |
| 8 | – | – | – |
| 9 | – | - | – |

## Conclusion

We are in an era where there are rapidly evolving therapeutic changes in the management of AF, particularly with respect to anticoagulation. Stroke in patients with AF is a devastating event with a higher mortality and disability compared with nonAF-related stroke. Increasing the safety and efficacy of antithrombotic strategies in patients with AF will be of great benefit to patients on an individual basis but also to the community in terms of reducing the need for hospitalisation and long-term residential care. CT

## References

1. Hart RG, Pearce LA, Aguilar MI. Meta-analysis: antithrombotic therapy to prevent stroke in patients who have non-valvular atrial fibrillation. Ann Intern Med 2007; 146: 857-867.
2. Gage BF, Waterman AD, Shannon W, Boechler M, Rich MW, Radford MJ. Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. JAMA 2001; 285: 2864-2870.
3. European Heart Rhythm Association, Fuster V, Ryden LE, Cannom DS, et al. ACC/AHA/ESC guidelines for anticoagulation in atrial fibrillation. J Am Coll Cardiol 2006; 48: 854.
4. European Heart Rhythm Association; European Association for Cardio-Thoracic Surgery, Camm AJ, Kirchhof P, Lip GY, et al. Guidelines for the management of atrial fibrillation. The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology. Eur Heart J 2010; 31: 2369-2429.
5. Connolly S, Ezekowitz M, Yusuf S, et al. Dabigatran versus warfarin in patients with atrial fibrillation. NEJM 2009; 361: 1139-1151.
6. Pisters R, Lane DA, Nieuwlaat R, de Vos CB, Crijns HJ, Lip GY. A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation: the Euro Heart Survey. Chest 2010; 138: 1093-1100.
7. Lin HJ, Wolf PA, Kelly-Hayes M, et al. Stroke severity in atrial fibrillation: the Framingham Study. Stroke 1996; 27: 1760-1764.
8. Man-Son-Hing M, Nichol G, Lau A, Laupacis A. Choosing antithrombotic therapy for elderly patients with atrial fibrillation who are at risk for falls. Arch Intern Med 1999; 159: 677-685.

COMPETING INTERESTS: Associate Professor Amerena was a national co-ordinator for the RELY study and is on the Advisory board for Boehringer Ingelheim for dabigatran. He has also given lectures for honoraria on this subject for Boehringer Ingelheim.



Downloaded for personal use only. No other uses permitted without permission. ©MedicineToday 2011.