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Clinical Decision Tool Reviews

CHA_2DS_2-VASc Score for Atrial Fibrillation Stroke Risk [Updated]

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Abstract

The CHA2DS2-VASc score is a widely used tool for assessing the annual risk of thromboembolic events and stroke in patients with atrial fibrillation (AF). The score has been validated in numerous studies across various patient populations and settings. The score assigns points to risk factors, including congestive heart failure, hypertension, age, diabetes, previous stroke or transient ischemic attack, vascular disease, age over 75, sex, and presence of vascular disease. Recent guidelines emphasize the benefit of anticoagulation over antiplatelet therapy, recommending that patients with non-valvular AF and a CHA2DS2-VASc score of 0 (men) or 1 (women) typically do not require anticoagulation. However, anticoagulation should be considered for scores of 1 in men and 2 in women and is recommended for scores greater than 2 in men and 3 in women. The role of sex in the score has been reconsidered, with new evidence suggesting its removal could lead to a more unified approach to anticoagulation, as exemplified by the updated CHA2DS2-VA score adopted in the 2024 European Society of Cardiology guidelines. This ongoing research highlights the evolving nature of risk stratification tools in AF management, with potential modifications to the CHA2DS2-VASc score to better reflect current understanding and clinical practice.

HOW TO USE

When to Use

The CHA_2DS_2-VASc score is one of several risk stratification schemas that can help determine the one-year risk of a thromboembolic event in a non-anticoagulated patient with non-valvular atrial fibrillation. The CHA_2DS_2-VASc score, among other risk stratification schemas, can be used to provide an idea of a patient's risk for thromboembolic (TE) events.[1-3]

Pearls and Pitfalls

CHA_2DS_2-VASc score was developed after identifying additional stroke risk factors in patients with atrial fibrillation. The main validation study included 1,084 patients with non-valvular AF, not on anticoagulation, over age 18 with EKG or Holter diagnosed AF in the ambulatory and hospital settings from 182 hospitals in 35 countries from 2003 to 2004, and had known thromboembolic status at 1 year from the Euro Heart Survey database. The endpoint used was stroke or other TE events. The study used previously developed Birmingham 2009 schema, under the acronym CHA_2DS_2-VASc. The study showed that as the CHA_2DS_2-VASc score increased, the rate of TE events within 1 year in non-anticoagulated patients with non-valvular AF increased as well. It considered score of 0 to be low risk for TE events (none seen in cohort at one year), score of 1 intermediate risk (0.6% rate at 1 year), and greater than 1 high risk (3% rate at 1 year).

Points to keep in mind: 31% of the patients in their original study group were lost to follow-up at one year and thus were not included in the analysis. These patients could have had TE events, causing them to be lost to follow-up. There was no statistically significant difference found between the CHA_2DS_2-VASc and $CHADS_2$ risk stratification schema in predicting TE events. None of the included patients were anticoagulated. Those at particularly high risk for a TE event may have already been anticoagulated by their primary care doctor, potentially skewing the TE rates.

A subsequent study examining the performance of CHA_2DS_2-VASc in predicting TE events in anticoagulated patients also identified coronary artery disease and smoking as potential additional risk factors for TE in this subset of patients. However, that study also did not show a statistical difference in the predictive risk stratification abilities of the scores.

Subsequent research suggests that the only 'truly low risk' patients are males with a score of 0, or females with a

score of 1, and that the default position should be one of anticoagulation.

The risks of paroxysmal AF and permanent AF are similar, and anticoagulation decisions should not be based on whether AF is permanent or paroxysmal.[1-11]

Why to Use

The score helps with long-term stroke risk stratification for atrial fibrillation patients.

NEXT STEPS

Advice

Recent guidelines emphasize the strong evidence of benefit with anticoagulation and the lack of benefit from antiplatelet treatment. There has been recent work suggesting that sex as a risk factor should be removed from CHA_2DS_2-VASc.

Management

Most guidelines suggest that scores of 0 (men) or 1 (women) do not require treatment; however, all other patients should receive anticoagulation, preferably with a direct oral anticoagulant (unless contraindicated). Anticoagulation is not recommended in patients with non-valvular AF and a CHA_2DS_2-VASc score of 0 if male or 1 if female, as these patients had no TE events in the original study. Depending on a patient's preferences and individual risk factors, anticoagulation can be considered for a CHA_2DS_2-VASc score of 1 in males and 2 in females. Anticoagulation should be started in patients with a CHA_2DS_2-VASc score of ≥2 if male or ≥3 if female.

For those patients in whom anticoagulation is considered, bleeding risk scores such as ATRIA can be used to determine the risk for warfarin-associated hemorrhage. However, these should usually be used as a reminder to regularly address reversible risk factors for bleeding, as the risk-benefit ratio of anticoagulation usually remains favorable.

One should carefully consider all the risks and benefits prior to initiating anticoagulation in patients with non-valvular AF.[1-11]

EVIDENCE

Evidence Appraisal

The CHA_2DS_2-VASc Score was constructed as an update to the older $CHADS_2$ Score[12] and was intended as a simple clinical tool for predicting and stratifying the 1-year TE risk in patients with non-valvular AF. Although the derivation study had some methodological shortcomings (e.g., a significant proportion of patients were excluded due to missing outcome data, no consideration given to death as a competing event), the CHA_2DS_2-VASc Score has since been validated in a large number of cohort studies from a wide range of regions. Its overall discrimination is consistently modest, with a c-statistic of around 0.6-0.7 in most studies, which is only marginally higher than that achieved by the $CHADS_2$ Score. However, the low-risk classification of the CHA_2DS_2-VASc Score has demonstrated remarkable negative predictive values, meaning that those who were deemed low risk truly had an exceedingly low TE risk at 1 year. This was a significant improvement over the $CHADS_2$ Score and has substantial clinical relevance, as it allows clinicians to reliably identify patients with non-valvular AF who do not require anticoagulation.

As such, the CHA_2DS_2-VASc Score has been established as one of the most extensively validated TE risk scores for non-valvular AF and has been consistently included in subsequent international societal guidelines for the management of AF. The CHA_2DS_2-VASc Score has also been explored as a prognostic marker in other patient groups (e.g., patients without AF with acute ischemic stroke). However, these uses are not clinically common or suggested by societal guidelines, and the main use of the score remains the same as its original purpose.[8,11]

Since its original publication in 2010,[1] there have been substantial changes in the epidemiology of risk factors and management options for non-valvular AF. One of the more controversial and better-explored areas is the role of sex in the CHA_2DS_2-VASc Score, as multiple studies have shown that removal of sex from the CHA_2DS_2-VASc Score may result in non-inferior or even superior discrimination abilities. This was formally recognized by the 2024 European Society of Cardiology guidelines,[12, 13] which advocated the use of the CHA_2DS_2-VA Score (i.e., with the "sex category" variable removed) over the CHA_2DS_2-VASc Score. This would allow unification of the anticoagulation threshold across sexes (i.e., no anticoagulation for a score of 0, to consider anticoagulation for a score of 1, and start anticoagulation for scores ≥2), with the potential benefit of being more inclusive toward non-binary individuals. A Finnish study by Teppo et al. has shown that the CHA_2DS_2-VA Score performs similarly to the CHA_2DS_2-VASc Score, especially in more recent times.[14] An even more recent British study by Champsi et al. showed that CHA_2DS_2-VA is superior to CHA_2DS_2-VASc in overall discrimination, although the difference was small.[15] There have also been calls to incorporate other well-known TE risk factors into the CHA_2DS_2-VASc Score, such as cancer.[16]

The CHA_2DS_2-VASc Score overall performs very well as a clinical decision tool, particularly in Predictive value, Clinical importance, Applicability, Feasibility & Usability. While the score does not perfectly identify individual stroke risk, it remains a highly valuable and practical tool in clinical practice.

Table 1. CHA_2DS_2-VASc Score

Criteria	Value	Points
Age	<65 years old	0
	65-74 years old	+1
	≥75 years old	+2
Sex	Male	0
	Female	+1
Congestive heart failure history	Y/N	+1
Hypertension history	Y/N	+1
Stroke / TIA / thromboembolism history	Y/N	+2
Vascular disease history	Y/N	+1
Diabetes mellitus history	Y/N	+1

Formula

Please see Table 1.

MDCALC URL

https://www.mdcalc.com/calc/801/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk

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