CHADS$_2$ AND CHA$_2$DS$_2$-VASc FOR ASSESSING STROKE RISK IN PATIENTS WITH ATRIAL FIBRILLATION

Stroke risk stratification assists practitioners in determining when to use oral anticoagulation in atrial fibrillation (AF). A number of scoring systems have been devised to estimate stroke risk. Traditionally, the CHADS$_2$ score (outlined below) has been the most widely used scoring system. The CHADS$_2$ score has limitations, however, as it does not include several additional known risk factors for stroke in the setting of AF. The CHA$_2$DS$_2$-VASc score (outlined below) was developed to incorporate additionally recognized risk factors while attempting to maintain the simplicity of CHADS$_2$. The CHA$_2$DS$_2$-VASc score has been validated in multiple cohorts.

It has become apparent that the traditional viewpoint of artificially classifying patients into high, intermediate, and low risk of stroke has led to a large proportion of patients in the intermediate category. In this large cohort of patients (60% using the CHADS$_2$ score, 15% using the CHA$_2$DS$_2$-VASc score), the benefits of oral anticoagulation are less clear. The CHA$_2$DS$_2$-VASc score has been shown to perform similarly to the CHADS$_2$ score for identification of high-risk patients, but provides better discrimination of truly low-risk individuals. The risk of stroke in AF is not homogenous and, in the presence of multiple risk factors, is a continuum. It has become clear that the majority of patients with AF would derive a net clinical benefit from oral anticoagulation for stroke prevention in AF and that we withhold anticoagulation from more patients than we should (due to improper stroke risk stratification, concern for bleeding risk, inconvenience in monitoring INR, and labile INRs, among other reasons). Thus, appropriately identifying patients who have a truly low risk of stroke allows practitioners to identify those in whom anticoagulation may be safely withheld and in whom anticoagulation may confer a greater risk of harm than benefit.

CHADS$_2$

	CONDITION	POINTS
C	Congestive heart failure	1
H	Hypertension (HTN)	1
A	Age ≥75	1
D	Diabetes mellitus	1
S$_2$	Prior stroke or transient ischemic attack (TIA)	2
	Maximum Score	**6**

CHA$_2$DS$_2$-VASc

	CONDITION	POINTS
C	Congestive heart failure	1
H	HTN	1
A$_2$	Age 65-74	1
	Age ≥75	2
D	Diabetes mellitus	1
S$_2$	Prior stroke or TIA	2
VA	Vascular disease (previous myocardial infarction, arterial disease, or aortic plaque)	1
Sc	Sex category—female sex	1
	Maximum Score	**9**

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Stroke or Thromboembolism (TE)/100 Years at Risk in Relation to $CHADS_2$ and CHA_2DS_2-VASc Scores[1]

$CHADS_2$	STROKE OR TE/100 PERSON-YEARS	
	Ischemic Stroke	Stroke/TIA/TE
0	0.6	0.9
1	3	4.3
2	4.2	6.1
3	7.1	9.9
4	11.1	14.9
5	12.5	16.7
6	13	17.2
CHA_2DS_2-VASc		
0	0.2	0.3
1	0.6	0.9
2	2.2	2.9
3	3.2	4.6
4	4.8	6.7
5	7.2	10.0
6	9.7	13.6
7	11.2	15.7
8	10.8	15.2
9	12.23	17.4

Net Benefit

Net clinical benefit of oral anticoagulation in stroke prophylaxis was traditionally determined to be present at a $CHADS_2$ score of 2 or greater. The net clinical benefit is used to identify when the benefits of using oral anticoagulation for stroke prophylaxis outweigh the risk of bleeding from being on oral anticoagulation. Traditionally, the risk of intracranial hemorrhage on oral anticoagulation was found to be twofold, though more recent studies have found the risk of bleeding with warfarin to be similar to aspirin in the elderly.[2] A very large recent retrospective cohort study found that there is a net clinical benefit for the use of warfarin for stroke prophylaxis in AF for all individuals with a CHA_2DS_2-VASc score of 1 or greater, regardless of bleeding risk defined using the HAS-BLED score.[3] Current European Society of Cardiology (ESC) guidelines for the management of AF recommend oral anticoagulation for all patients with nonvalvular AF who have a CHA_2DS_2-VASc score of 1 or greater.[4]

Cases

The following vignettes are designed to demonstrate how CHA_2DS_2-VASc provides improved discrimination of stroke risk in AF compared with the $CHADS_2$ score.

1. Mrs. Washington is a 68-year-old woman with history of persistent AF currently managed with rhythm control on flecainide who has comorbid HTN.
   a. $CHADS_2$ score=1 (HTN)
   b. CHA_2DS_2-VASc score=3 (age >65, HTN, gender)

2. Mr. Jefferson is a 76-year-old male with paroxysmal AF that is rate-controlled on metoprolol who has no other comorbid conditions.
   a. $CHADS_2$ score=1 (age >75)
   b. CHA_2DS_2-VASc score=2 (age >75)

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3. Mrs. Franklin is a 55-year-old woman with normal left ventricular function who has paroxysmal AF that is being managed with rhythm control on dronedarone.
   a. CHADS$_2$ score=0
   b. CHA$_2$DS$_2$-VASc score=1 (gender, see note below)
      - Of note, being female as a risk factor for stroke has been found in some studies to have a risk ratio (RR) of 1.5, but young females <65 with lone AF (structurally normal heart with no risk factors for stroke) would be considered low risk and should not be considered for oral anticoagulation for stroke prophylaxis

4. Mrs. Jones is a 67-year-old woman with long-standing persistent AF being managed with rhythm control on dofetilide who has comorbid type 2 diabetes mellitus (T2DM), HTN, and prior myocardial infarction and is on aspirin 81 mg.
   a. CHADS$_2$ score=2 (HTN, T2DM)
   b. CHA$_2$DS$_2$-VASc score=5 (age >65, female, HTN, T2DM, coronary artery disease [CAD])

Communication With Patients

The decision regarding use of oral anticoagulation should always involve careful consideration of the risks and benefits, and the patient should be involved in that decision. It is suggested to calculate both a patient's risk of stroke and risk of bleeding and use these data to communicate your reasons for suggesting your recommended therapy.

For example:

"Mrs. Jones, having paroxysmal AF with your current risk factors for stroke puts you at a 6.7% risk of stroke per year. At this risk, you would benefit from oral anticoagulation (warfarin, dabigatran, rivaroxaban), which would reduce your risk of stroke by approximately 66% or decrease your risk from 6.7% to approximately 2.2% per year. Your risk of major bleeding (intracranial hemorrhage, hospitalization for bleeding, drop in hemoglobin by 2 g/dL, or requiring a blood transfusion) while on oral anticoagulation is 5.8%, which is lower than your risk of stroke without treatment. We generally recommend oral anticoagulation when an individual's risk of stroke exceeds the risk of bleeding."

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