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Use of the $CHADS_2$ risk score to guide antithrombotic treatment in patients with atrial fibrillation – room for improvement

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Summary

Background: Antithrombotic treatment (AT) is recommended for patients with atrial fibrillation (AF), except for those with lone AF or contraindications.

Aim: The aim of our study was to determine contemporary AT in AF patients and to ascertain reasons for withholding oral anticoagulant treatment (OAC) in eligible patients.

Design: Prospective observational study.

Methods: Consecutive patients were screened for non-valvular paroxysmal or permanent AF. Subjects with newly diagnosed AF or with an indication for AT other than AF were excluded. According to the $CHADS_2$ risk score patients were divided into a low- ($CHADS_2 = 0$), an intermediate ($CHADS_2 = 1$) and a high risk group ($CHADS_2 \geq 2$). AT on hospital admission was correlated to current guidelines.

Results: 389 patients were screened and 84 (22%) excluded (71 new onset AF, 13 other indications for OAC). Of the remaining 305 patients (80 ± 10 yrs) 43% had paroxysmal and 57% permanent AF. Eleven patients (4%) were classified as low risk, 61 (20%) as intermediate risk, and 233 (76%) as high risk. In patients at low risk OAC was prescribed in 63%, whereas one third of those at high risk were not on anticoagulant therapy. The main reasons why OAC was withheld in high risk patients were presumed risk of fall in 21 patients (27%), while the grounds were a history of major bleeding and presumed drug non-compliance in 13 (17%), respectively.

Conclusion: In this survey of AF-patients, AT was not tailored to the thromboembolic risk.

Key words: atrial fibrillation; antithrombotic therapy; anticoagulation treatment; $CHADS_2$ risk score; stroke

Introduction

Atrial fibrillation (AF) is an independent risk factor for thromboembolic events with a fivefold greater risk of stroke compared to sinus rhythm [1]. Antithrombotic treatment with vitamin K antagonists is highly effective in reducing stroke incidence in high risk patients, and is superior to aspirin or a dual antiplatelet therapy with aspirin and clopidogrel [2, 3], though associated with a greater risk of major bleeding [4]. It has been shown that with strict application of guidelines the estimated preventable rate of stroke is up to 5%/year [5]. Assessment of individual stroke risk is therefore mandatory in guiding antithrombotic treatment. An easy score to estimate the risk of stroke has been proposed [6]. The $CHADS_2$ risk score is based on a points system in which 1 point each is assigned for age >75 years, a history of hypertension, diabetes and recent heart failure. Two points are given for a previous stroke or transient ischaemic attack, a history of a cerebrovascular event being recognised as the most powerful predictor of recurrent stroke. According to guidelines [7], aspirin (75–325 mg) is recommended in low-risk patients with a $CHADS_2$ score of 0. In high risk patients with a $CHADS_2$ score ≥2, only oral anticoagulant therapy (OAC) is recommended. In intermediate risk patients with a $CHADS_2$ score of 1, physicians can choose between aspirin and OAC depending on the individual patient. However, despite the fact that guidelines advise on the antithrombotic treatment strategy, many patients do not receive optimal treatment. The Euro Heart Survey on AF [8] described AF management in numerous European countries from 2003 to 2004 and reported an OAC rate of 60% irrespective of the underlying $CHADS_2$ risk score. It is unknown whether antithrombotic treatment of AF patients has improved since the publication of the $CHADS_2$

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risk score and the Euro Heart survey trial eight and three years ago respectively. The aim of our study was to determine contemporary antithrombotic management and reasons for withholding OAC in eligible AF patients admitted to a Swiss university hospital.

Patients and methods

During a period of 11 months (July 2008 to May 2009) all patients admitted to the emergency department of the University Hospital of Basel, Switzerland, for any reason were screened for the presence of paroxysmal or permanent AF. Patients were enrolled if AF was mentioned in medical charts, and if an ECG documenting AF within the past 12 months was available. Risk factors for stroke according to the $CHADS_2$ score, history of falls, and risk factors for major bleeding, e.g. a history of major bleeding or malignancy, were recorded on the basis of a thorough review of medical charts. Patients in whom AF was not known before admission and those with an indication for OAC other than AF were excluded from subsequent analysis. Patients were stratified into three risk categories according to the $CHADS_2$ risk score and recommended antithrombotic treatment was analysed with reference to current guidelines [7].

Reasons for withholding recommended OAC in high risk patients as mentioned in medical records were documented or, if no reason was given, the family physician was consulted.

Statistical analysis

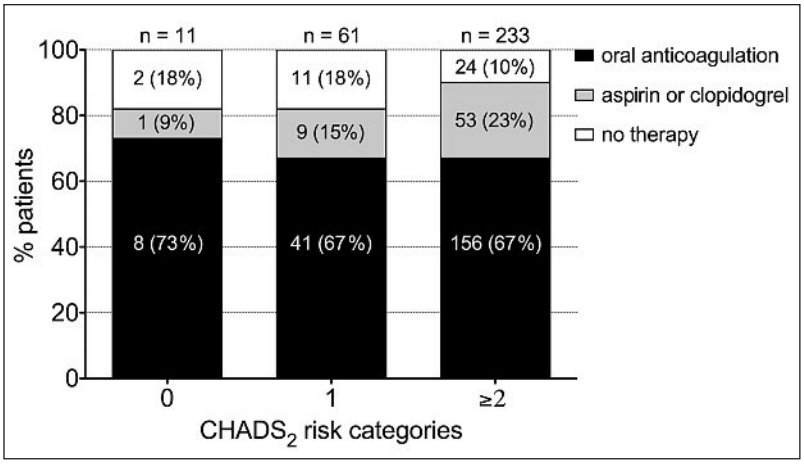
Categorical data are presented as numbers (percentages) and continuous data are expressed as mean values ± one standard deviation or median values with interquartile ranges (IQR) as appropriate. The presence of any difference of OAC treatment in the three groups was tested with Chi-square statistic. Whether there was an association between prescription of OAC and stroke risk profile or bleeding risk factors was tested in patients at high risk by means of χ^2 for trend. Fisher's exact test was used to compare categorical variables, and Mann-Whitney *U* tests were used to compare continuous data. A p-value of <0.05 was considered to indicate statistical significance. Analyses were performed using Prism software package version 5.0 (Graph Pad Software for Mac OS X, Inc.).

Results

A total of 389 patients were screened. We excluded 84 patients (22%) in whom AF was not known before admission (n = 71), who had a prosthetic heart valve (n = 8) or another indication for OAC treatment (n = 5). Mean age of the remaining 305 patients was 80 ± 10 years; 45% were male. Permanent AF was more prevalent than paroxysmal AF (173 [57%] vs 132 [43%]). In patients who were treated with vitamin K antagonists (n = 200), median INR value was 2.5 (interquartile ranges: 2.0–3.1) with 105 (52.5%) patients being in the target range (INR 2.0–3.0), and 53 (26.5%) and 42 patients (21%) above and under the target range respectively.

Figure 1

Antithrombotic treatment in different stroke risk categories on admission. Although guidelines recommend thromboembolic prevention with aspirin in low risk patients ($CHADS_2 = 0$) the majority were treated by oral anticoagulation, whereas one third of eligible patients did not receive recommended OAC. The rate of OAC prescription was similar in the three risk categories (p = 0.92).



According to the $CHADS_2$ risk categories, 11 patients (4%) were at low, 61 (20%) at intermediate and 233 (76%) at high risk for stroke respectively. Distributions of $CHADS_2$ risk factors, history of falls, bleeding risk factors and reasons for hospital admission are presented in detail in table 1.

Antithrombotic treatment in the three risk categories is presented in figure 1. The rate of OAC prescription did not differ between the three risk categories (low vs intermediate vs high risk: 8/11 vs 41/61 vs 156/233; p = 0.92). Overall 207 patients (68%) were treated according to guideline recommendations (fig. 2), 1/11 (9%) in the low, 50/61 (82%) in the intermediate and 156/233 (67%) in the high risk group respectively. Table 2 shows the characteristics of patients with a $CHADS_2 \geq 2$ as between those without and those with guideline-adherent antithrombotic treatment. In patients at risk, younger age and a history of a cerebrovascular event were associated with anticoagulant treatment prescription.

Reasons given for withholding OAC in patients at high risk (n = 77) are presented in figure 3. The main reasons were presumed risk of fall in 21 patients (27%), a history of major bleeding or presumed drug non-compliance in 13 (17%), patient's choice in seven (9%) and presumed freedom from AF recurrence in 6 patients (8%) respectively.

A prior bleeding event or active malignant disease on admission was present in 17 (6%) and 32 patients (11%) respectively. Of those the majority were treated with OAC (65% with a prior bleeding; 63% with active malignant disease).

Discussion

In this prospective observational study we investigated antithrombotic treatment in consecutive patients with paroxysmal and permanent nonvalvular AF in a Swiss urban setting. A high rate of patients at low risk for a thromboembolic event were treated by oral anticoagulation, although guidelines recommend thromboembolic prevention with aspirin in this risk category. However, it must be emphasised that guidelines clearly indicate OAC in all patients in whom cardioversion (by DC or by drugs) had been performed within the previous 4 weeks or is being planned, irrespective of the $CHADS_2$ score. In one low risk patient restoration of sinus rhythm with ibutilide had been performed 8 days before admission to our hospital. Thus, in this patient antithrombotic treatment adhered to guidelines, whereas the remaining patients should have been treated with low dose aspirin. In contrast, and despite evidence of effective stroke prevention with an acceptable bleeding risk with vitamin K antagonist therapy, a substantial number of eligible patients do not receive this therapy. Thus antithrombotic treatment was poorly tailored to the thromboembolic risk as assessed by the $CHADS_2$ risk score. This finding is in accordance with the observation made in the Euro Heart Survey on AF. The latter survey was published three years ago, and hence it seems that even today stroke risk stratification scoring systems are still remarkably underused, which is astonishing considering that an easy risk stratification scoring system is proposed. Education should therefore focus on its use and on the importance of selecting antithrombotic therapy according to the patient's risk profile [9].

Table 1

Baseline characteristics, n = 305.

Demographics	
Age (yrs)	80 ± 10
Male	137 (45)
AF type,	
Paroxysmal	132 (43)
Permanent	173 (57)
$CHADS_2$ risk score	
0	11 (4)
1	61 (20)
≥2	233 (76)
$CHADS_2$ risk factors	
Heart failure	52 (17)
Hypertension	224 (73)
Age >75 years	238 (78)
Diabetes	61 (20)
History of stroke / transient ischaemic attack	60 (20)
Stroke risk factor other than $CHADS_2$	
Coronary or peripheral artherosclerotic disease	85 (28)
Bleeding risk factors (multiple reasons were possible)	108 (35)
Prior bleeding	17
Gastrointestinal	8
Intracranial	9
Epistaxis	1
Chronic renal failure	77
Malignancy	32
History of falls	31
Falls associated with injury	18
Reasons for admission	
Symptomatic atrial fibrillation	17 (6)
Ischaemic stroke/TIA	41 (13)
Bleeding disorder	34 (11)
Gastrointestinal	22
Cerebral	4
Muscle/joint	3
Epistaxis	2
Pulmonary	1
Urogenital	1
Unknown	1
Orthopaedic	44 (14)
Other	213 (70)

Some of the stated reasons for not prescribing OAC in eligible patients are at least partly debatable. Predisposition to falls was the main reason for withholding OAC in eligible patients. Falls are common in elderly people, in both hospital or outpatient settings, but modification of fall risk factor, such as behavioural instructions, exercise programmes or adjustment of prescribed medication significantly reduces the risk of falling [10, 11]. In addition, the benefit of OAC treatment outweighs the bleeding risk in patients at risk for a thromboembolic event, even in patients who might fall [12]. In a large cohort of AF patients who were prone to fall, those with a $CHADS_2$ score of ≥2 points who were treated with OAC had a 25% relative risk reduction of death, cardiovascular events (stroke, myocardial infarction) and haemorrhage, whereas OAC treatment in those at low or intermediate risk was not associated with a risk reduction [13]. Major complications related to falls have been shown to be low. In a retrospective analysis of 2635 falls in 1861 elderly inhospital patients (mean age 71 years) with 29% recurrent fallers, the rates of fall-related haemorrhagic injuries in those taking and not taking antithrombotic treatment were compared. The rate of fall-related injuries was 11% and only one subdural haematoma occurred in a person treated with OAC and low dose aspirin. Major haemorrhagic injuries occurred even more often in patients not under antithrombotic treatment [14]. Thus it seems that the fall risk is overestimated as a reason for withholding OAC, and efforts should be made to minimise the risk of falls.

Table 2

Characteristics of patients at high thromboembolic risk between those without and those with guideline-adherent antithrombotic treatment (GAT).

	CHADS2 ≥2			
	Overall	No GAT	GAT	p
Number	233	77 (33)	156 (67)	
Age (yrs)	81 ± 9	85 ± 7	81± 9	0.0017
Male	108 (46)	36 (47)	72 (46)	1.00
Paroxysmal AF	93 (40)	36 (47)	57 (37)	0.16
CAD/PAVD	74 (32)	24 (31)	50 (32)	1.00
Active malignancy	22 (9)	8 (10)	14 (9)	0.81
Renal failure	70 (30)	25 (32)	45 (29)	0.65
History of major bleeding	15 (6)	7 (9)	8 (5)	0.26
Heart failure	45 (19)	17 (22)	28 (18)	0.48
Hypertension	205 (89)	67 (87)	138 (89)	0.83
Diabetes	58 (25)	18 (23)	40 (26)	0.75
History of stroke/TIA	60 (26)	12 (16)	48 (31)	0.02

AF: atrial fibrillation; CAD: coronary artery disease; PAD: peripheral artery disease; TIA: transient ischaemic attack

Figure 2

Number of patients treated according to guideline recommendations.

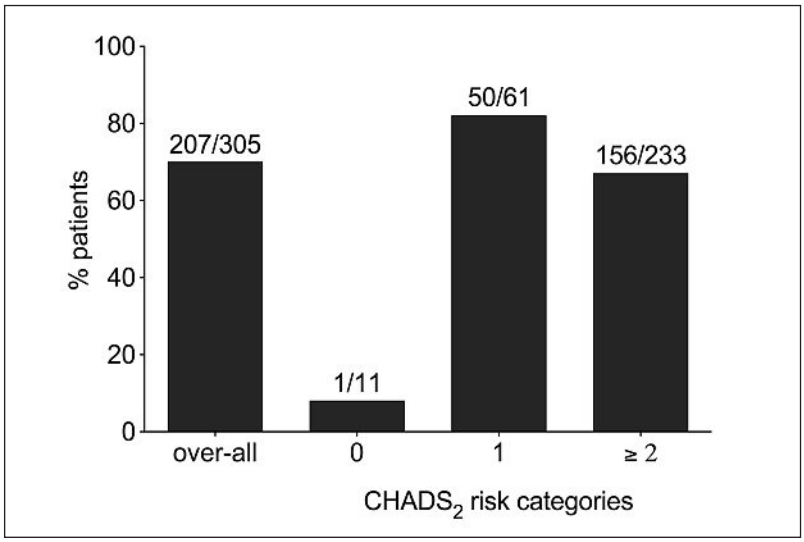
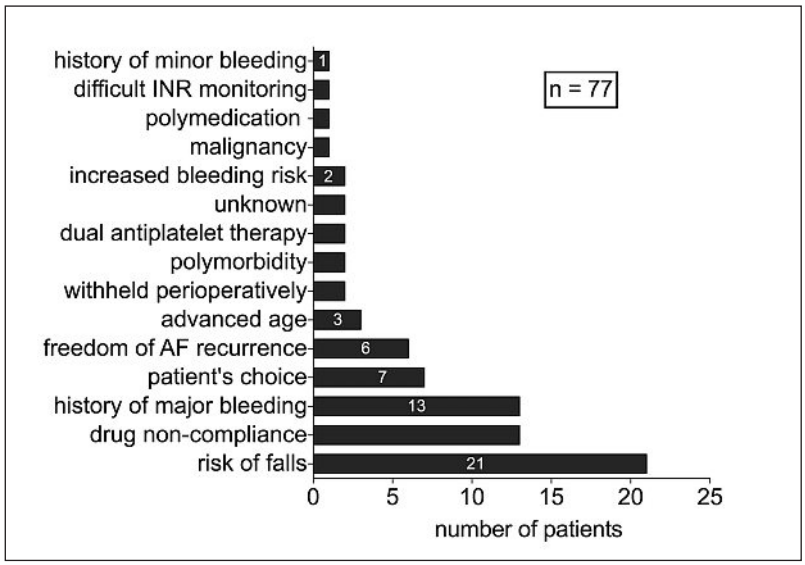


Figure 3

Reasons for withholding oral anticoagulant treatment in high risk patients with a CHADS$_2$ score ≥2.



Another often-mentioned argument for withholding OAC in our study population was drug non-compliance, which has been previously reported as a reason for not prescribing OAC [15] although solid data regarding this issue are lacking. In contrast, there is strong evidence that doctors overestimate the risk of severe bleeding in anticoagulated patients [16, 17] and underestimate the risk of stroke, as well as underestimating the risk reduction achieved with OAC treatment [18].

A history of major bleeding was the reason for not prescribing OAC in 13 patients (4%), all of whom were classified as being at high risk. However, a further 17 patients (6%) had had a prior major bleeding noted in their medical chart. Interestingly, 11 (61%) of these, and notably all the patients with a history of intracranial bleeding, had OAC treatment.

Even though we investigated an elderly population, advanced age was the major reason for withholding OAC in only 3/77 patients, but elderly patients were significantly less often treated with OAC (table 2). In randomised trials higher age was not an independent predictor for haemorrhage [19, 20], and in one study the relative risk was marginally elevated [21]. However, published rates of haemorrhage derived from younger cohorts may not reflect the bleeding risk in the elderly. Enhanced risk of bleeding has been reported in elderly patients while starting oral anticoagulant therapy and in patients with a CHADS$_2$ ≥3 [22], a condition unfortunately more prevalent in the elderly.

Regarding a history of gastric ulcer-related bleeding, which is also a common bleeding site, it has been shown that reinitiating OAC after appropriate treatment is safe, the rate of rebleeding being equal in those patients in whom OAC was withheld and those in whom it was given [23]. Overall bleeding risk is associated with the range of the international normalised ratio (INR) and represents a significant risk factor for major bleeding events [24, 25].

Supposed freedom from AF in patients with paroxysmal atrial fibrillation was mentioned in 7/77 (9%) patients as a reason for not prescribing OAC. This finding has been reported by the Euro Heart Survey, in which patients with paroxysmal AF had less chance of receiving OAC. One reason could be that the risk of stroke is thought to be less associated with short-lasting and infrequent AF episodes and antithrombotic treatment is therefore considered less necessary [8]. However, the Euro Heart Survey patients with paroxysmal AF had a similar risk of embolic events compared to those with long-lasting AF [26]. Unfortunately, little evidence exists regarding the frequency and duration of AF episodes and the occurrence of stroke.

Anticoagulant treatment is unfortunately associated with an increased bleeding risk, and several risk factors for bleeding have been identified [27]. Quantifying the risk of haemorrhage in AF

patients using a bleeding risk score could improve the use of antithrombotic treatment. A bleeding risk stratification scheme of this kind has been investigated in the same population as that in whom the $CHADS_2$ score has been developed [28]. However, this score is more sophisticated than the easy-to-use $CHADS_2$ risk score and thus may not be appropriate in clinical practice.

Conclusions

Our data show that antithrombotic management of patients with AF is still poorly tailored to the individual stroke risk, even though guidelines published eight years ago propose an easy-to-use stroke risk stratification scoring system. Hence intensive education on stroke prevention and identification of patients at risk is still warranted.

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