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DEVELOPMENT

Prevalence and management of atrial fibrillation in primary care: a case study

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Aim: Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and a major predisposing risk factor for stroke. Current UK guidelines propose stroke-risk stratification of AF patients. Anticoagulation with warfarin is recommended for high risk patients, whereas treatment with aspirin alone is advised for those at low risk. The aim of this audit was to review practice at our institution and ascertain if guidelines on AF treatment were being followed. **Methods:** A retrospective review of all patients diagnosed with non-valvular AF in June 2010 was undertaken. Patient records were reviewed to collect demographic and co-morbidity data relevant to stroke risk stratification. This was subsequently used to stratify patients according to stroke-risk using the CHADS2 scoring system. The use of anticoagulation and anti-platelet medication as well as any documented reasons for the omission of anticoagulation in high risk patients was noted. **Results:** The prevalence of non-valvular AF in our practice population was 1.5% (151/10,155); 70% (105/151) of AF patients were found to be at high risk of stroke; 36% (38/105) of high risk patients were not on anticoagulation and the majority (58%) of these patients had no clear reason documented for the omission of warfarin. Of the 15 patients at low risk of stroke, 12 (80%) were on warfarin. Seven (4.4%) of the 151 AF patients were on both warfarin and aspirin and six (4%) were on neither medication. The commonest documented reasons for omission of warfarin in the high risk group were dementia and a history of gastrointestinal bleeding. **Discussion:** The lack of documentation on withholding a proven beneficial treatment in high risk patients could potentially leave physicians open to medico-legal scrutiny. Maintaining low risk patients on anticoagulation may expose them to unnecessary risk. We recommend the use of automated audit tools designed to improve compliance with national guidelines.

Key words: anticoagulation; anti-thrombotic therapy; arrhythmia; atrial fibrillation; CHADS2 Score; primary care

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Introduction

The most serious risk associated with atrial fibrillation (AF) is the development of stroke in terms of the increased short-term morbidity and mortality as well as the additional burden of disability it produces. The prevalence of AF and the incidence of stroke increases with advancing age (Bamford *et al.*, 1990; Feinberg *et al.*, 1995). Uncomplicated AF is diagnosed and managed by general practitioners (GP) in the United Kingdom as this enables cost-effective opportunistic screening and follow-up at the primary care level. With an ageing population, AF and its complications in the United Kingdom are likely to increase substantially over the coming years.

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The efficacy of dose-adjusted warfarin over aspirin for stroke prevention in high risk patients with AF has already been established by multiple studies (Hart *et al.*, 2007; Mant *et al.*, 2007). Current guidelines advocate stratification of AF patients according to their stroke risk (NICE, 2006a). Anticoagulation with warfarin is advised for those at moderate and high risk of stroke, whereas antiplatelet therapy with aspirin is recommended for AF patients at low risk of stroke (Singer *et al.*, 2004; Lip and Boos, 2006). Aspirin may be used in a select group of patients at moderate or high risk who have a contraindication or refuse warfarin based on an informed choice. It is critical, however, for healthcare professionals to document clear reasons for omission of warfarin in these patients.

The medical treatment of AF absorbs 1% of the annual UK National Health Service budget (Stewart *et al.*, 2004). With over 12 500 strokes directly attributable to AF annually, the estimated £383 spent per patient to treat AF appears trivial in comparison to the average £11 700 spent on every stroke due to AF (NICE, 2006b). Moreover, AF-related stroke has a thirty-day and one-year mortality in excess of 25% and 50%, respectively (Lin *et al.*, 1996). It is therefore important to assess whether clinicians adequately assess stroke risk of AF patients and if therapy is in line with published guidelines.

The aim of this study was to review current practice at our institution in order to ascertain if national guidelines on AF treatment were being met and patients were on appropriate treatment depending on their risk of stroke. Secondary objectives were to determine (i) the prevalence of AF in our practice population, (ii) the reasons for omission of warfarin in high risk patients and (iii) the proportion of high risk patients who did not have a clear reason documented for omission of anticoagulation.

Methods

Data source

The study was undertaken at a large teaching general practice serving ~10 000 patients in the East Hull area of the United Kingdom. It comprises a multi-partner practice augmented by two junior doctors in training posts and is typical of most British GP practices in that it is responsible for the medical care and tertiary referral of all patients who choose to register with it. Formal approval for undertaking the study was obtained from the clinical governance department of the relevant primary care trust. A retrospective review of all patients registered with our practice was undertaken using the electronic care records management system, SystmOne™ (The Phoenix Partnership, UK), to identify those who were in AF by running searches using READ codes for AF. All patients with a diagnosis of non-valvular AF who were registered with the practice in June 2009 were included. We excluded any patients with valvular or rheumatic AF, those in whom AF had resolved after treatment, and those with AF who were on warfarin because of a different medical condition (eg, a previous history of pulmonary embolism, deep venous thromboembolism or artificial heart valves).

Table 1 Components of the CHADS2 score

	Risk factor	Score
C	Congestive heart failure	1
H	Hypertension	1
A	Age ⩾75 years	1
D	Diabetes mellitus	1
S_2	Prior stroke or TIA	2

TIA = transient ischaemic attack.

Case notes of all AF patients were reviewed to collect data on age, gender, co-morbidities relevant to stroke risk stratification and the use of warfarin or aspirin. Data on relevant co-morbidities was subsequently used to risk stratify patients using the previously validated CHADS2 scoring system developed by the University of Washington in 2001 (Gage *et al.*, 2001). The CHADS2 scoring system is shown in Table 1. Patients with a CHADS2 score of 0 are classified as having low risk (1.9% annual stroke rate), those with a score of 1 as having moderate risk (2.8% annual stroke rate), and those with a score of ⩾2 as having a high risk of stroke (4%–18.2% annual stroke rate). Any documented reasons for the omission of warfarin in high risk patients were noted.

Statistical analysis

We calculated descriptive statistics of median and inter-quartile range (IQR) for age and percentage proportions for gender. The χ^2-test was used to determine differences in the age and

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gender distribution of patients with and without AF at our practice. A *P*-value of <0.05 was considered significant. All statistical analyses were performed using XLSTAT (Version 7.0; Addinsoft, New York, NY, USA).

Results

A total of 10 155 patients (4689 men, 5286 women) were registered with the practice at the time of this study. We identified 164 patients with a diagnosis of AF entered on SystmOne™. Thirteen patients were excluded (three patients had valvular or rheumatic AF, six patients had a resolution of their AF following treatment and four patients were on warfarin because of a different medical problem). A final cohort of 151 patients was therefore included in the analysis.

The median age of patients with AF was 81 years (IQR 50–97). The age and gender distribution of patients with AF at our practice is given in Table 2. No significant difference was found in the prevalence of AF in men compared with women (1.4% and 1.6%, respectively, $P=0.47$). The prevalence of AF was noted to increase with advancing age; 0.2% (11/6107) in those under the age of 65 years, 1% (30/2146) in patients between 65 and 74 years of age and 12.2% (110/902) in those over the age of 75 years. These differences were statistically significant ($P<0.001$). Overall, 8.9% (902/10155) of the practice population was 75 years of age or older.

In our cohort of 151 patients with non-valvular AF, 105 (70%) had a CHADS2 score of ⩾2. The distribution of stroke risk by CHADS2 scores in our cohort of patients is shown in Figure 1. The most common factors contributing to the CHADS2 score were age ⩾75 years in 110 (73%) patients, a previous history of hypertension in 95 (63%) patients and previous stroke or transient ischaemic attack (TIA) in 47 (31%) patients. The frequency of individual risk factors contributing to the CHADS2 score is shown in Figure 2.

Figure 3 shows the use of warfarin and aspirin in the low, moderate and high risk groups. Our results show that contrary to guidelines for the management of AF, 42 (40%) patients in the high risk group were not on appropriate anti-thrombotic therapy (35 patients were on an antiplatelet drug only, four patients were on both warfarin and an antiplatelet agent, whereas three patients were on no anti-thrombotic agent). Similarly, 13 (87%) patients in the low risk group were not on appropriate anti-thrombotic therapy (10 patients were on warfarin; two patients were on both warfarin and an antiplatelet agent and one patient was on no anti-thrombotic therapy).

A total of 38 (36%) patients were not on warfarin in the high risk group. Of these, 22 (58%) had no clear reason documented in their case notes for omission of warfarin. The reasons documented in care records for omission of warfarin in the high risk group are shown in Figure 4.

Patients whose anti-thrombotic therapy was not found to be in line with current recommendations for AF treatment were flagged up at the end of the study and formally discussed with all primary care physicians at our practice. Follow-up visits were arranged to ensure compliance with guidelines and confirmed that, although anticoagulation had been discussed with each of the 22 high risk patients following risk assessment, this had not been

Table 2 Age and gender distribution of patients with and without AF

	With AF ($n=151$)	Without AF ($n=10155$)	*P*-value
Gender			
Men	68 (1.4%)	4801 (98.6%)	0.47[a]
Women	83 (1.6%)	5203 (98.4%)	
Age			
<65 years	11 (0.2%)	6096 (99.7%)	<0.001[a,b]
65–74 years	30 (1%)	3116 (99%)	
⩾75 years	110 (12.2%)	792 (87.8%)	

[a] χ^2-test.
[b] Significant.

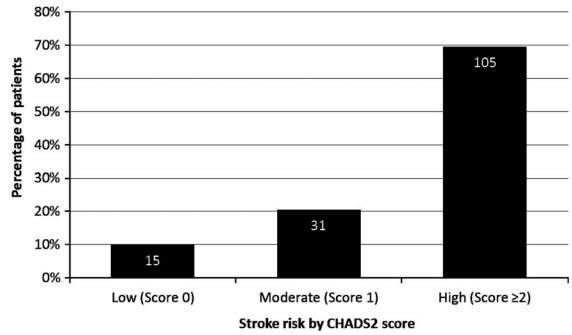

Figure 1 CHADS2 scores of AF patients. AF = atrial fibrillation.

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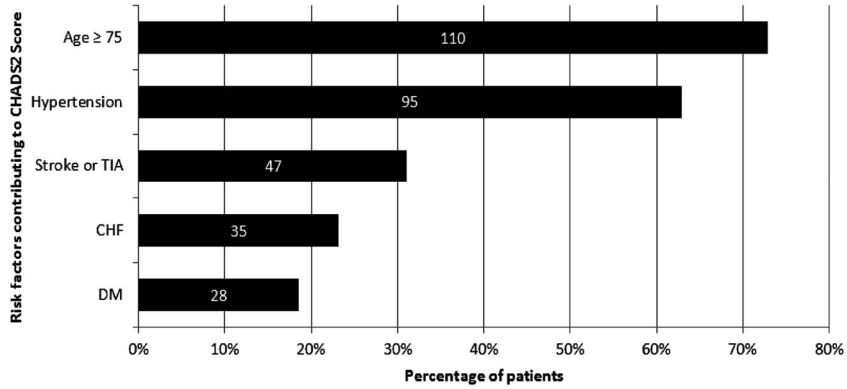

Figure 2 Frequency of risk factors contributing to CHADS2 scores of AF patients. AF = atrial fibrillation.

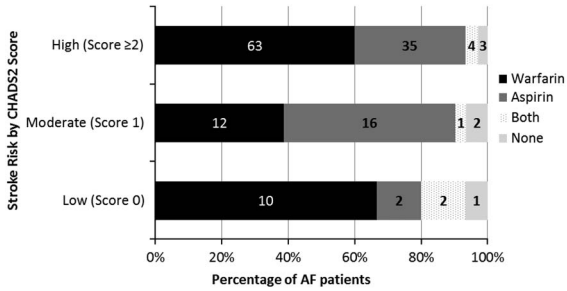

Figure 3 Use of warfarin and aspirin in the low, moderate and high risk groups.

formally documented. Sixteen of the 22 patients had contraindications to anticoagulation, whereas the remaining six had refused therapy with warfarin.

Discussion

The Quality and Outcomes Framework (QOF) was introduced in the United Kingdom in 2004 as part of the new General Medical Services contract. It provides financial reward for the provision of 'quality care' by GPs and standardises improvements in the delivery of care (NHS, 2013). The QOF for AF is annually reviewed and currently uses four indicators: (i) the establishment and maintenance of a register of all AF patients, (ii) the percentage risk-assessed using the CHADS2 score and (iii) the percentage of patients anticoagulated in the moderate risk group and (iv) in the high risk group. The rationale behind using the CHADS2 score is that it is validated, easy to use and particularly sensitive at identifying high risk patients.

In this retrospective study of 151 patients with non-valvular AF, representing 1.5% of our practice population, we found a significant proportion (70%) of patients at high risk of stroke. The prevalence of AF in patients over the age of 75 years was 12.2%. Old age, hypertension and a history of prior stroke or TIA were the most common risk factors contributing to the increased risk of future stroke in our cohort. Suboptimal anticoagulation treatment was identified in 36% of AF patients at high risk of stroke and 87% of patients a t low risk.

The prevalence of AF has been investigated in several countries but figures vary widely (Lake *et al.*, 1989; Furberg *et al.*, 1994; Feinberg *et al.*, 1995; Langenberg *et al.*, 1996; Lip *et al.*, 1997; Nakayama *et al.*, 1997). A common theme noted is that prevalence appears to increase with advancing age. The ATRIA study included over 17 000 patients with AF and found a prevalence of 0.95% (Go *et al.*, 2001). Cowan *et al.* (2013) reported a prevalence of 1.76% in a recent epidemiological study covering over 1800 general practices across England. Our results are comparable when considering an overall prevalence of 1.5% in our practice population.

AF is generally more prevalent in men than in women (Go *et al.*, 2001) but women outnumber men in older age groups as they tend to live longer. Although there was a higher proportion of women in AF (1.6%) compared with men (1.4%) at our practice, this difference was not found to be statistically significant ($P = 0.47$). Our results are in agreement with epidemiological data from four

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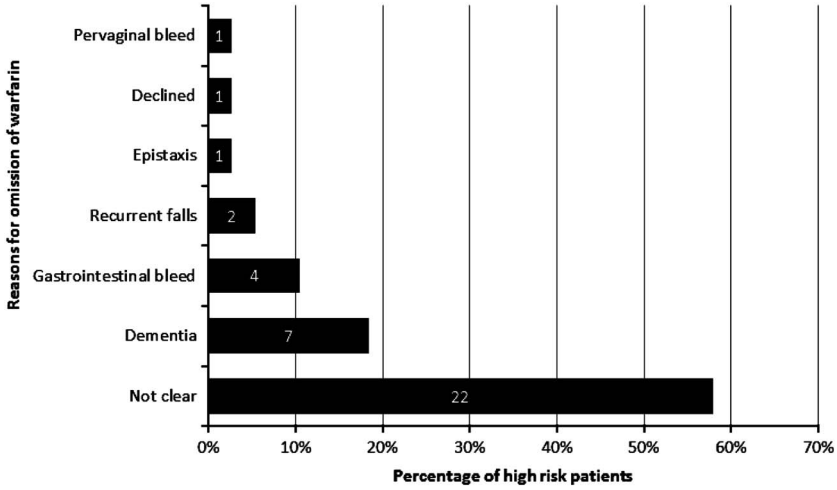

Figure 4 Reasons for omission of warfarin in AF patients at high risk of stroke ($n = 38$). AF = atrial fibrillation.

large population-based surveys in the United States, which showed that the absolute number of women and men with AF is about equal (Feinberg *et al.*, 1995).

The UK National Institute for Health and Clinical Excellence (NICE) has suggested that ~45% of patients who would benefit from warfarin are not receiving it (NICE, 2006b). Seventy per cent (105/151) of patients found to be in AF in our study had a CHADS2 score of ⩾2 placing them at a high risk of stroke. Of these patients, 36% were not receiving anticoagulation with warfarin. In 2008, Gallagher *et al.* found that almost 60% of patients with a CHADS2 score ⩾2 in the United Kingdom did not receive warfarin (Gallagher *et al.*, 2008). Four years later, Holt *et al.* (2012) showed that this figure had reduced to 47.0% and more recently, in one of the largest epidemiological studies of its kind, a further reduction down to 45.3% has been reported (Cowan *et al.*, 2013). Physicians may perhaps be apprehensive about prescribing anticoagulation in elderly patients with AF because of concerns about a higher risk of intracranial haemorrhage (ICH; Antani *et al.*, 1996; Bungard *et al.*, 2000; Albers *et al.*, 2001; Mant *et al.*, 2007). The BAFTA (Birmingham Atrial Fibrillation Treatment of the Aged) study randomised 973 AF patients with a mean age of 81.5 years and showed that anticoagulation with warfarin significantly reduced the risk of stroke compared with aspirin (1.8% versus 3.8%) and did not appear to increase the risk of ICH (1.4% versus 1.6%; Mant *et al.*, 2007). These results have more recently been confirmed with a meta-analysis of 11 RCTs (van Walraven *et al.*, 2009).

Over half (22/38) of high risk patients who were not on warfarin had no clear reason documented in their care records for this omission. Improved documentation is essential for continuity of care, especially in high risk individuals. The lack of documentation behind withholding warfarin treatment could potentially leave healthcare professionals open to medico-legal scrutiny if an adverse event were to occur. Although the need for warfarin was discussed with these patients and a decision made regarding withholding anticoagulation due to an increased bleeding risk, it is critical that a record of any such consultation be made.

We noted 12 patients at low risk of stroke in our study were on warfarin, seven AF patients were on concomitant warfarin and aspirin, whereas six were on neither. These results suggest that patients who would benefit the least from warfarin are perhaps being unnecessarily exposed to the risks associated with anticoagulant therapy, whereas a significant proportion of those who would benefit most are not receiving treatment. Other factors to consider are the unnecessary cost and inconvenience associated with maintaining low risk patients on warfarin and undertaking regular blood tests.

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In patients already on warfarin, NICE does not recommend co-administration of aspirin purely for thromboprophylaxis, as it provides no additional benefit (NICE, 2006a). Furthermore, there is strong evidence to suggest that it may in fact have a detrimental effect in terms of increased bleeding risk (Blackshear *et al.*, 1996; CARS-Investigators, 1997). Physicians prescribing warfarin must therefore scrutinise the relevant medication history in all AF patients and stop aspirin unless there is a good indication for not doing so.

More recently, researchers have validated a refined version of the CHADS2 score known as the CHA_2DS_2-VASc score (Lip *et al.*, 2010). This incorporates three further parameters (age 65–74 years, female sex and vascular disease) into the stroke risk stratification for AF and classifies all patients older than 75 years as having a high stroke risk. Utilising the CHA_2DS_2-VASc score would increase the number of patients eligible for warfarin in our study and decrease the proportion considered to be receiving anticoagulation inappropriately in the low risk group. However, the CHA_2DS_2-VASc is yet to be adopted by NICE and we therefore did not utilise it for the current analysis.

The GRASP-AF Tool (Guidance on Risk Assessment for Stroke Prevention in Atrial Fibrillation) is a simple audit software that can be incorporated into SystmOne™ as an addition module (GRASP-AF, 2012). It automatically calculates the CHADS2 score in AF patients and highlights the need for review if the patient is not already on warfarin. The appropriateness of anticoagulation remains a clinical decision as the GRASP-AF tool does not take contraindications to therapy into consideration. It is readily available to all GP practices and is free to download. The GRASP-AF tool is currently being rolled-out to all general practices in England and aims to identify inconsistencies in AF management, as identified in this study. Based on recommendations from the current study, the GRASP-AF audit tool was incorporated into SystmOne™ at our practice.

Our study is limited by its retrospective design and reliance on administrative/healthcare staff entering the diagnosis of AF and co-morbidity data as READ codes in SystmOne™. It is therefore possible that the prevalence of AF and co-morbidities contributing to the CHADS2 score in our cohort may be underestimated. It should also be noted that our study is confined to a single general practice and we recognise that the processes for recording diagnoses and treatments may vary between practices, affecting the apparent prevalence of AF and the analysis of its management.

This study has reiterated the need for formal stroke risk assessment of patients with AF and areas where definite improvements in care can be made. With the advent of the CHA_2DS_2-VASc score and GRASP-AF tool, steps are being taken to continually improve this situation and we recommend their use in clinical practice. If anticoagulation in AF is withheld because of contraindications or patient preference, this must be clearly documented in patient records and easily accessible. GPs should constantly review their quality of care against best practice guidelines and the use of electronic audit tools might help in this endeavour.

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