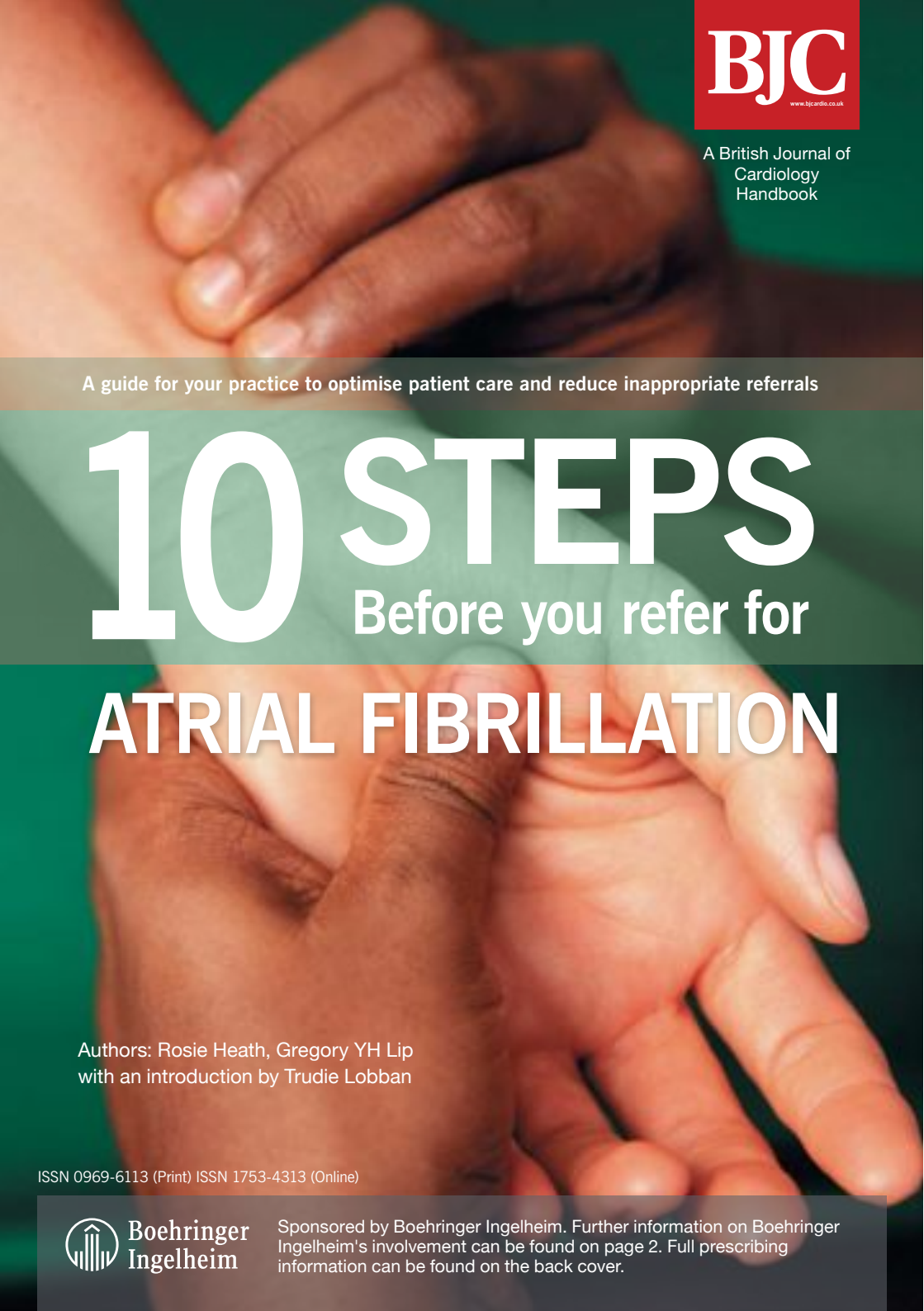


BJC
www.bjcardio.co.uk
A British Journal of Cardiology Handbook

A guide for your practice to optimise patient care and reduce inappropriate referrals

10 STEPS Before you refer for ATRIAL FIBRILLATION

Authors: Rosie Heath, Gregory YH Lip
with an introduction by Trudie Lobban

ISSN 0969-6113 (Print) ISSN 1753-4313 (Online)

10 STEPS

Before you refer for: ATRIAL FIBRILLATION

Rosie Heath, Gregory Y H Lip with an introduction by Trudie Lobban

Authors

Rosie Heath
MB, BS, MRCGP, DCH, DRCOG
(rosie.heath@nhs.net)

GPWSI and the Vascular lead for NHS Plymouth
Church View Surgery, 30 Holland Road, Plymstock, Plymouth, PL9 9BN

Gregory Y H Lip
MD, FRCP, FACC, FESC
(g.y.h.lip@bham.ac.uk)

Professor of Cardiovascular Medicine

University of Birmingham Centre for Cardiovascular Sciences, City Hospital, Birmingham, B18 7QH

Front cover: ©istockphoto.com

Conflict of interest

Rosie Heath has received honoraria and travel bursaries from Bristol-Myers Squibb, Boehringer-Ingelheim and Sanofi-Aventis. Gregory Lip has served as a consultant for Bayer, Astellas, Merck, AstraZeneca, Sanofi, BMS/Pfizer, Biotronik, Portola and Boehringer Ingelheim and has been on the speakers bureau for Bayer, BMS/Pfizer, Boehringer Ingelheim, and Sanofi-Aventis. The Atrial Fibrillation Association (AFA), for which Trudie Lobban is CEO, has received funding support from Boehringer Ingelheim and other industry partners for a series of regional AF clinical update meetings for healthcare professionals, as well as patient education programmes.

Sponsorship statement

This article first appeared as part of the 10 steps series in the *British Journal of Cardiology* (*Br J Cardiol* 2008;**15**:302–05). The text has been revised, updated and developed for this handbook by the *British Journal of Cardiology* who approached Boehringer Ingelheim about the project. Costs for the revision and its distribution to readers of the *British Journal of Cardiology* were underwritten by Boehringer Ingelheim through an educational grant. Boehringer Ingelheim reviewed the text for medical accuracy only. Full editorial control of the article rested with the authors and the journal.

DBG 2908 October 2011

BJC

www.bjcardio.co.uk

Editors
Kim Fox
Terry McCormack
Henry Purcell

Associate Editor
Katharine White

10 Steps Editor
Terry McCormack

ISBN: 0969-6113
A catalogue record for this handbook is available from The British Library

Publisher
Medinews (Cardiology) Ltd, 9 Langton Street, London, SW10 0JL (office@bjcardio.co.uk)

Design by
Consultants in Design

Printed by
Caric Press in association with S&G Magazines

The 10 steps before you refer for atrial fibrillation

Step 1. Diagnose AF (page 7)

Opportunistically screen for AF whenever possible (e.g. clinic visits) as the condition is often undetected

Confirm diagnosis with an ECG

Step 2. Establish duration and type of AF (page 8)

Is the AF of recent onset, paroxysmal, persistent or permanent type?

The correct classification helps guide treatment and management

Step 3. Assess symptom severity (page 9)

Determine EHRA score in the clinical evaluation of patient

Consider whether a rhythm or rate control strategy is most appropriate

Step 4. Establish the cause (page 10)

Take a careful history to identify any possible precipitant causes of AF

Step 5. Enquire about relevant comorbidities (page 11)

These will be relevant to the use of anticoagulation therapy

Assess bleeding risk using the HASBLED score

Step 6. Undertake a physical examination of the patient (page 12)

Step 7. Undertake the following tests (page 12)

FBC and clotting screen, U&Es, LFTs, TFTs, glucose, cholesterol

Echocardiography can be helpful in some cases

Raised BNP results should be interpreted with care

Step 8. Reduce symptoms by prescribing a rate-controlling medication (page 13)

For patients symptomatic on presentation, start a rate control medication before referral

It is important to take a patient-centred approach to AF management and treatment looking at patient symptoms and lifestyle

Step 9. Start the patient on appropriate anticoagulation (page 14)

Start appropriate antithrombotic therapy without delay discussing carefully the risks and benefits to the patient.

Assess stroke risk using $CHADS_2$ and CHA_2DS_2-VASc scoring to help determine the 'truly low-risk' patient with AF

Step 10. Carefully consider the reason for referral (page 18)

Is the referral still necessary once above protocol has been followed?

Some patients can be managed in primary care. Others will need referral to a cardiologist or electrophysiologist

This is a schematic representation of the 10 steps outlined in this handbook. Physicians are advised to read the steps in full

Foreword

Given that 45%[1] of embolic strokes are both a direct result of atrial fibrillation (AF), and largely preventable, it is quite simply a matter of life and death that we improve the detection, diagnosis and management of AF.

The challenge we face is both substantial and growing. Prevalence estimates vary, but a consistency emerges – with each new investigation, previous estimates are found to have been too low. Currently, the UK prevalence of AF is estimated to be between 1–2%.[2,3] Where practices have adopted the GRASP-AF tool, prevalence is often found to be higher, in excess of national figures. Prevalence data from the US predicts a doubling of the incidence of AF to 4% by 2050.[4]

Since AF is often asymptomatic, prevalence data under-report its true incidence. Recent data report that as many as one in four of us will develop AF.[5] Once diagnosed, we know that many patients with AF are suboptimally treated.[6,7]

The Atrial Fibrillation Association (AFA), a member of the Arrhythmia Alliance, is a patient advocacy group, committed to improving patient and physician awareness of AF, and of how detection and management can be improved. The increasing prevalence, new guidelines and the advent of new anticoagulants will lead to AF becoming an ever-increasing focus in primary care. We are currently engaged in campaigning efforts to ensure that healthcare professionals, and the patients in their care, are equipped with the knowledge and tools necessary to ensure that this focus results in greater detection, improved

symptomatic control and a dramatic reduction in embolic stroke and its consequences.

The AFA points to four areas, covered in this subsequent 10 steps handbook, where a current lack can easily be remedied with the promise of tangible results:

1. Routine opportunistic screening

We strongly endorse adoption of routine pulse and ECG checks among patients with risk factors for stroke, as well as ready access to ambulatory monitoring.

2. Patient engagement and empowerment

Physicians have been found to underestimate their patients understanding of the benefits of AF treatments and to overestimate patients' knowledge about treatment complications.[8] Consequently, half of documented chronic AF patients are unaware of why they take warfarin, and 40% are unaware they have AF.[9] The provision of clear, printed patient information for use at, and beyond, diagnosis is vital if patients are to become engaged in their treatment and care decisions.

3. The importance of symptomatic control

Research also suggests that too little regard is given by physicians to the impact of AF symptoms on their patients' lives.[10] The remedy of this will result in earlier detection, improved outcomes and a vast improvement in patients' quality of life.

4. The value of appropriate early referral

Strong evidence has emerged that new interventions in symptomatic patients dramatically increase the success of ablative

procedures.[11] With the potential that such interventions might also impact stroke risk, it becomes vital that, upon detection, AF is rapidly evaluated and managed before anatomical consequences render useless all but antithrombotic therapies.

This booklet contains an excellent distillation of what needs to be considered when seeking to detect, confirm and manage AF. We sincerely hope that it is found to be useful by those charged with the care of AF patients in primary care.

Trudie Lobban MBE
Founder and Director
Atrial Fibrillation Association
PO Box 1219, Chew Magna, Bristol, BS40 8WB
(trudie@atrialfibrillation.org.uk)

References

1. Yamanouchi H, Tomonaga M, Shimada H, Matsushita S, Kuramoto K, Toyokura Y. Nonvalvular atrial fibrillation as a cause of fatal massive cerebral infarction in the elderly. *Stroke* 1989;**20**:1653–6.

2. Banach M, Mariscalco G, Urgulan M *et al*. The significance of preoperative atrial fibrillation in patients undergoing cardiac surgery: preoperative atrial fibrillation – still underestimated opponent. *Europace* 2009;**10**:1266–70. doi:10.1093/europace/eun273

3. 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 (ESC). *Eur Heart J* 2010;**31**:2369–429. doi: 10.1093/eurheartj/ehq278

4. Miyasaka Y, Barnes ME, Gersh BJ *et al*. Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation* 2006;**114**:119–25. doi:10.1161/CIRCULATIONAHA.105.595140

5. Lloyd-Jones DM, Wang TJ, Leip EP *et al*. Lifetime risk for development of atrial fibrillation: the Framingham Heart Study. *Circulation* 2004;**110**:1042–6. doi:10.1161/01.CIR.0000140263.20897.42

6. Nieuwlaat R, Capucci A, Camm AJ *et al* on behalf of the Euro Heart Survey Investigators. Atrial fibrillation management: a prospective survey in ESC member countries. *Eur Heart J* 2005;**26**:2422–34. doi:10.1093/eurheartj/ehi505

7. DeWilde S, Carey IM, Emmas C, Richards N, Cook DG. Trends in the prevalence of diagnosed atrial fibrillation, its treatment with anticoagulation and predictors of such treatment in UK primary care. *Heart* 2006;**92**:1064–70. doi:10.1136/hrt.2005.069492

8. Aliot E, Breithardt G, Brugada J *et al*. An international survey of physician and patient understanding, perception, and attitudes to atrial fibrillation and its contribution to cardiovascular disease morbidity and mortality. *Europace* 2010;**12**:626–33. doi: 10.1093/europace/euq109

9. Lip GYH, Kamath S, Jafriet M *et al*. Ethnic differences in patient perceptions of atrial fibrillation and anticoagulation therapy. *Stroke* 2002;**33**:238–44. doi:10.1161/hs0102.101817

10. McCabe PJ, Schumacher K, Barnason SA. Living with atrial fibrillation: a qualitative study. *J Cardiovasc Nurs* 2011 (Jul–Aug);**26**:336–44.

11. Lee R, Kruse J, McCarthy PM. Surgery for atrial fibrillation. *Nat Rev Cardiol* 2009;**6**:505–13. doi:10.1038/nrcardio.2009.106

Organisations offering information and support to patients and professionals

Arrhythmia Alliance
Promoting better understanding, diagnosis, treatment and quality of life for individuals with cardiac arrhythmias
www.heartrhythmcharity.org.uk

Atrial Fibrillation Association
Providing information, support and access to established, new and innovative treatments for atrial fibrillation
www.atrialfibrillation.org.uk

STARS
Working together with individuals, families and medical professionals to offer support and information on Syncope and Reflex Anoxic Seizures
www.stars.org.uk

Anticoagulation Europe
Supporting patients, their families, carers and healthcare professionals on all aspects of anticoagulation therapy
www.anticoagulationeurope.org

Heart Rhythm UK
Dedicated to improving all aspects of cardiac arrhythmia care and electrical device based therapies
www.hruk.org.uk

Introduction

Atrial fibrillation (AF) is a relatively common condition. The national prevalence for England on the latest Quality and Outcomes Framework data is 1.2%[1] but as about one third of cases are asymptomatic and easily go undetected, the actual prevalence may be nearer 2.0%. The prevalence of AF rises with age and as many as 10% of patients over 80 may have AF.[2] On average, subjects aged >40 years have a one in four lifetime risk of developing AF.[3]

An average GP will have 20–25 cases on their personal list and can expect to diagnose at least three new cases per annum. AF is an important condition to diagnose and manage correctly, as not only do symptomatic AF patients have a diminished quality of life, but they also have a two-fold increase in mortality.[4] The most important consequence of developing AF is the five-fold increase in stroke risk[5] and the National Stroke Strategy[6] has placed great emphasis on stroke prevention in AF. AF is responsible for 45% of embolic strokes[7] and strokes caused by AF are more likely to be larger and therefore either fatal or severely disabling.[8] Warfarin is highly effective in stroke prevention with a NNT of 37 but, despite this, 40-50% of patients who should be on warfarin are not.[1] It has been calculated that if all AF patients at moderately increased risk of stroke were treated adequately with warfarin, then there would be 6,000 fewer strokes and 4,000 fewer deaths per annum.

The incidence of AF is set to double in the next 40 years.[9] This is partly due to an increasingly ageing population living with ischaemic heart disease and heart failure. AF incidence, however, is also rising in younger patients because of its association with alcohol, obesity and diabetes. Evidence of these trends is already apparent in the USA where there has been a 66% increase in hospital admissions with AF in the last 20 years.[10]

As many cases of AF go undiagnosed, there is increasing interest in opportunistic screening for AF, which is practical and cost-effective. Chapter 8 of the *National Service Framework for Coronary Heart Disease* (NSF-CHD)[11] emphasises the importance of good management of cardiac arrhythmias and full patient involvement in selecting treatment strategies. AF is included in the Quality and Outcomes Framework and newer more stringent markers have been proposed for 2012/13. Both the National Institute for Health and Clinical Excellence (NICE)[12] and, more recently, the European Society for Cardiology[13] have published well-researched guidelines on the management of AF.

For all these reasons it is important for GPs to have an adequate knowledge base to diagnose, treat and refer AF patients correctly. Recently, new drugs have been licensed for rhythm control and thromboprophylaxis in AF, so best practice is set to change.

Atrial fibrillation increases the risk of stroke five-fold

1. Diagnose AF

Many patients with AF are asymptomatic and remain undetected. AF is usually suspected when a patient is found to have an irregular pulse. At fast or slow rates, the irregularity can be hard to detect.

Confirmation of a diagnosis of AF must be obtained by undertaking an electrocardiogram (ECG).[12] Automatic reporting software is not very accurate at diagnosing AF and can over diagnose when the baseline is indistinct or, alternatively, may miss cases. The characteristic ECG findings are irregularly irregular QRS complexes and the absence of consistent P waves. Paroxysmal AF is the most common cause of intermittent tachycardia in the elderly and, if suspected, then screening with 24-hour Holter monitor or seven-day event monitor should be performed.

Practice nurses and GPs should take advantage of scenarios for opportunistic AF screening e.g. at blood pressure (BP) checks or possibly flu clinics. Patients attending clinics for ischaemic heart disease, stroke, heart failure or diabetes should be systematically screened, as these conditions are commonly associated with AF. Opportunistic AF screening should also be undertaken as part of the National Vascular Checks Programme, or when reviewing any patient at significantly raised risk of vascular events.

2. Establish duration and type of AF

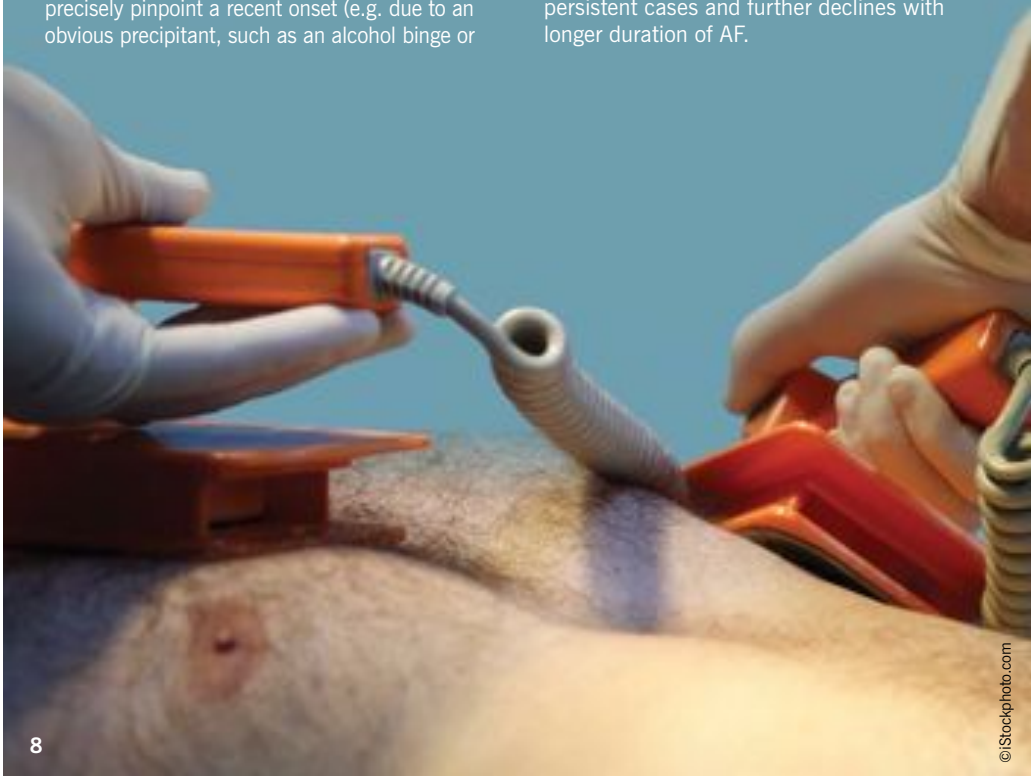
Based on a temporal classification, AF can be:

- recent onset (within 48 hours)
- paroxysmal
- persistent (i.e. duration of seven days or more, and continuing until terminated by drugs or cardioversion)
- or permanent (duration greater than one year or refractory to cardioversion attempts).

This classification offers a simple approach and may help guide treatment objectives and management strategies. Obviously, a first bout of AF may be either a paroxysm, persistent or permanent, and only further investigation will establish this.

If the AF is symptomatic and the patient can precisely pinpoint a recent onset (e.g. due to an obvious precipitant, such as an alcohol binge or chest infection), then cardioversion is more likely to be effective, if no other adverse features are present. In many cases, however, the AF is asymptomatic and duration may be impossible to ascertain accurately. The longer the duration of AF, the less likely it is that cardioversion will be successful in restoring and maintaining sinus rhythm. AF of duration greater than 12 months is unlikely to remit successfully with cardioversion. The overall success of DC cardioversion at one year is approximately 50%.[12,14]

As there is a natural progression from intermittent bouts of AF to more persistent and permanent states, it is helpful to diagnose AF early in its natural history. Paroxysmal AF has an 80–90% cure rate with laser ablation, but the success of this technique is less in persistent cases and further declines with longer duration of AF.



©iStockphoto.com

3. Assess symptom severity

This can vary from patients in fast AF who are acutely breathless, dizzy and with rate-related chest discomfort who will need urgent hospital admission, to patients who appear to be asymptomatic. Some patients will report decreased exercise tolerance and generalised fatigability, but some elderly sedentary patients may even tolerate rates of more than 100 bpm at rest with no reported symptoms, especially if the AF is of long standing.

European Society of Cardiology (ESC) guidelines[13] recommend the use of a simple symptom score, the European Heart Rhythm Association (EHRA) score as part of clinical evaluation in AF patients (see **table 1**).

Assessing the impact of AF on the patient's quality of life whilst taking account of other co-morbidities contributing to fatigue and dyspnoea will help in choosing a rate control versus a rhythm control strategy. The sedentary elderly will often do well with a rate control strategy, but younger, more active patients may well have better functional status and improved quality of life with a rhythm-control strategy. Mortality and long-term outcomes have been established to be no different between these strategies, for most patients.[15,16] A rhythm control strategy is also preferable in those with lone AF or AF triggered by external factors. Patients with more severe heart failure will often deteriorate significantly with the onset of AF and may also benefit from a rhythm control strategy with decreased mortality.

Many AF patients fall between the categories of fit–young and sedentary–old; the best treatment strategy for them will have to be individually determined, taking account of patient preference after a discussion of the pros and cons of each method. Patients are often initially tempted to pursue a rhythm control strategy as they perceive that this will resolve their stroke risk. They need to be reminded that even when sinus rhythm is successfully restored, the majority of patients will need to continue on thromboprophylaxis. Patients also need to understand the likely long-term outcomes from DC cardioversion.

Rhythm control can be hard to achieve and maintain. The recent introduction of dronedarone for use in non-permanent AF, which has shown some early promise in decreasing cardiovascular hospitalisations and mortality may necessitate some re-evaluation of this position.[17]

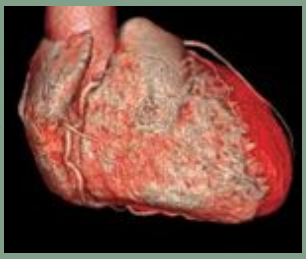
Table 1. Classification of AF-related symptoms (EHRA score)

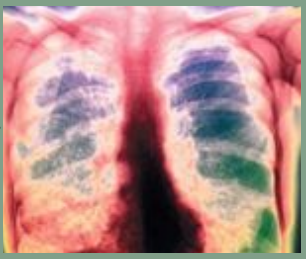
EHRA class	Explanation
EHRA I	'No symptoms'
EHRA II	'Mild symptoms'; normal daily activity not affected
EHRA III	'Severe symptoms'; normal daily activity affected
EHRA IV	'Disabling symptoms'; normal daily activity discontinued

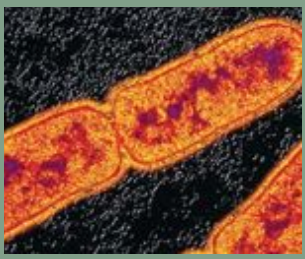
Reproduced from: ESC Guidelines[13] by permission of Oxford University Press on behalf of the ESC
Key: AF = atrial fibrillation; EHRA = European Heart Rhythm Association

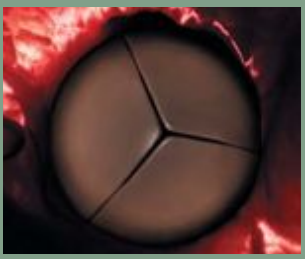
4. Establish the cause


©iStockphoto.com


©Science Photo Library


©Science Photo Library


©Science Photo Library


©Science Photo Library


©iStockphoto.com

Table 2. Common causes of atrial fibrillation

Ischaemic heart disease
Hypertension
Rheumatic heart disease
Cardiomyopathy
Sick sinus syndrome
Pre-excitation (Wolff-Parkinson-White syndrome)
Atrial septal defect
Acute infection
Thyrotoxicosis
Electrolyte imbalance
Lung cancer
Alcohol
Obstructive sleep apnoea

Common causes of AF (**table 2**) include ischaemic heart disease, hypertension, valvular heart disease (present in one third of cases), alcohol excess, cardiomyopathy, obstructive sleep apnoea and thyrotoxicosis. AF can be precipitated by many non-cardiac factors (e.g. infections – especially chest infections, electrolyte imbalance, pulmonary embolism, alcohol binges or post-surgery). History taking should include specific questioning to identify possible precipitants of AF as such patients may do well with DC cardioversion. Significant numbers of patients with apparent lone AF may have alcohol problems or symptoms of obstructive sleep apnoea if a careful history is taken.

5. Enquire about relevant co-morbidities

Any history of stroke, transient ischaemic attack (TIA) or amaurosis fugax will be highly relevant to decision making around anticoagulation therapy. It is also important to establish whether the patient has diabetes mellitus, coronary artery disease, congestive heart failure or peripheral vascular disease, as these disorders increase the stroke risk with AF. Any history of gastrointestinal bleeding, ulceration or undiagnosed dyspepsia, will be highly relevant to the use of anticoagulation therapy, as will any history of bleeding tendencies or falls.

It has been calculated that a patient will need to fall repeatedly (295 times) before the risks of intracranial haemorrhage are offset by the benefits of stroke reduction by warfarin. An assessment of cognitive functioning is very important to assess potential compliance with medication.

Bleeding risk is multifactorial, and a new simple scoring system called the HAS-BLED score[18] has been devised to help estimate patients at significant bleeding risk (see **table 3**), and this score is now recommended in the ESC and Canadian guidelines.[19]

A HAS-BLED score of three or more underlines a higher risk of bleeding necessitating more careful supervision and monitoring of the patient, as well as attention to common risk factors for bleeding that can be avoided or corrected, for example, better control of blood pressure, avoiding concomitant aspirin or NSAID use, etc.

Table 3. The HAS-BLED scoring system

Letter	Clinical characteristic*	Points awarded
H	Hypertension	1
A	Abnormal renal and liver function (1 point each)	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INRs	1
E	Elderly (e.g. age >65 years)	1
D	Drugs or alcohol (1 point each)	1 or 2
	Maximum points	9

Reproduced from: ESC Guidelines[13] by permission of Oxford University Press on behalf of the ESC

Key: INR=international normalised ratio. *Hypertension' is defined as systolic blood pressure >160 mmHg. 'Abnormal kidney function' is defined as the presence of chronic dialysis or renal transplantation or serum creatinine ≥200 μmol/L. 'Abnormal liver function' is defined as chronic hepatic disease (e.g. cirrhosis) or biochemical evidence of significant hepatic derangement (e.g. bilirubin >2x upper limit of normal, in association with aspartate aminotransferase/alanine aminotransferase/alkaline phosphatase >3 x upper limit normal, etc). 'Bleeding' refers to previous bleeding history and/or predisposition to bleeding, e.g. bleeding diathesis, anaemia, etc. 'Labile INRs' refers to unstable/high INRs or poor time in therapeutic range (eg. <60%). Drugs/alcohol use refers to concomitant use of drugs, such as antiplatelet agents, non-steroidal anti-inflammatory drugs, or alcohol abuse, etc.

6. Undertake a physical examination of the patient

Record the pulse rate measured at the apex, and also measure the BP manually, since automated measurement of BP in AF patients may be inaccurate. Examination should include auscultation for cardiac murmurs, and examination for signs of heart failure or thyrotoxicosis.

7. Undertake the following tests

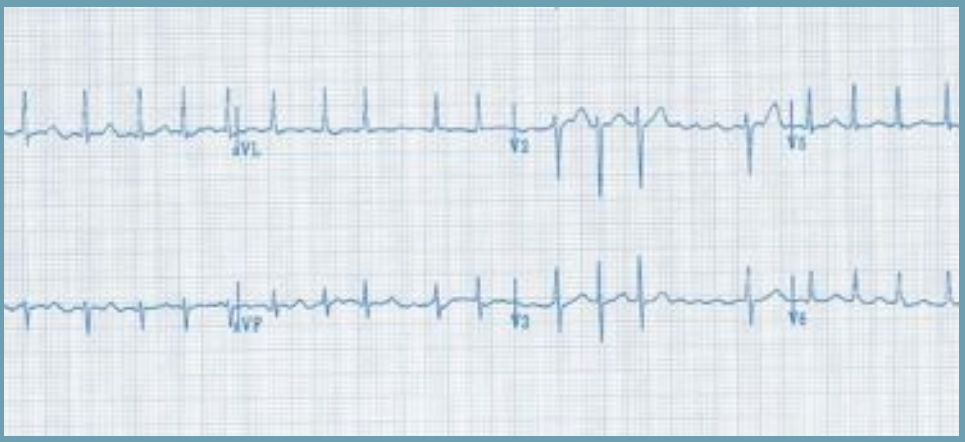
Check the full blood count and clotting screen, urea and electrolytes, liver function tests, thyroid function tests, glucose and cholesterol levels. Enclose a copy of the ECG with the referral.

Echocardiography is helpful in the management of AF to diagnose structural heart disease or left ventricular systolic dysfunction, but is not indicated for all cases as it may have little effect on management. According to local access arrangements, it may be helpful to undertake echocardiography prior to referral in selected cases, as this may speed up treatment decisions, for example, around cardioversion. Echocardiography can aid in refinement of stroke risk stratification and help predict the likelihood of successful cardioversion.

With increasing access to BNP for the evaluation of breathless patients in primary care, it should be emphasised that in AF patients who are breathless because of rapid ventricular response, the atrial enlargement often consequent on AF can cause elevation of BNP levels making a raised BNP unhelpful in evaluating possible co-existing heart failure.

Twenty-four-hour tapes are very useful at assessing the adequacy of rate control, as patients with seemingly good rate control sitting in surgery may experience significant and symptomatic rate rises on modest exertion and need further modification of their drug regime to gain good symptom relief.

8. Reduce symptoms by prescribing rate-controlling medication



For patients who are symptomatic at presentation, rate-control medication should be started before any decision about referral. For most, a beta blocker or rate-limiting calcium channel blocker (e.g. diltiazem or verapamil), will offer good rate-control options, or if needed, in combination with digoxin. Calcium channel blockers are better at decreasing ventricular rate on exercise.

Careful clinical review concentrating on patient's symptoms, more than achieved heart rate, will aid in the correct selection of agent(s) for rate control. For the sedentary elderly subject, digoxin alone, which decreases the resting heart rate more effectively than the heart rate on exercise, can be effective, starting with a loading dose of 250–500 μg (or lower if renal function is impaired) and continuing with a maintenance dose of 125 μg.

When initiating a beta blocker, start with a low dose and titrate up to control the apical rate at <90 bpm (110 bpm if recent onset) at rest and 200 minus patient's age on mild-to-moderate exertion. In assessing rate control, the rate should always be assessed by auscultation at the apex rather than palpation of the radial pulse. Rate control on exertion can easily be assessed by asking the patient to walk 100–200 yards around the surgery.

Ultimately, the approach is very much patient-centred and is dependent upon symptoms. A recent study comparing lenient rate control (defined as resting heart rate <110 bpm) versus strict control (with resting heart rate of <80 bpm and exercise heart rate of <110 bpm) showed no difference in cardiovascular morbidity, mortality, hospitalisation or quality of life.[20] Target heart rates should be individually tailored to take account of patient's symptoms and lifestyle. If a patient is still symptomatic on the lenient rate control strategy, then it should be more stringent, to control resting heart rate to <80 bpm and exercise rate to <120 bpm. Nonetheless, persistently uncontrolled high heart rates can cause tachycardia-induced cardiomyopathy, and failure to achieve adequate rate control is a clear indication for referral. Often more than one drug may need to be used to obtain optimum rate control tailored to the individual patient. Effective rate control prior to referral also helps in the acquisition of good quality images if the patient undergoes echocardiography.

9. Start the patient on appropriate anticoagulation

Appropriate antithrombotic therapy should be started without delay regardless of the type of AF or whether a rate or rhythm strategy is ultimately to be applied. The risk of thromboembolic events is high immediately after the onset of AF. With a good holistic knowledge of the patient, the GP is best placed to help the patient make decisions about thromboprophylaxis. The GP should give a full explanation of the risks and benefits of anticoagulation to the patient in terms that are easily understood and be able to simply quantify the benefit and risks of thromboprophylaxis for an individual patient.

In 2006, NICE (National Institute for Health and Clinical Excellence) produced a detailed algorithm for deciding on appropriate antithrombotic therapy.[12] But stroke risk scoring using the $CHADS_2$ score[21] (see **table 4**) is a simple and easy way to initially assess stroke risk.

The $CHADS_2$ score does not include many common stroke risk factors (e.g. age 65-74 years, female gender, vascular disease), and the focus more recently has been directed to be more inclusive rather than exclusive of such risk factors, and to improve our identification of 'truly low-risk' patients with AF.

Such low-risk patients do not even need any antithrombotic therapy, whilst those with ≥1 stroke risk factors should be considered for oral anticoagulation. Thus, a risk factor based approach is advocated in the ESC guidelines, which defines 'major risk factors' and 'clinically relevant non-major' stroke risk factors. These are formulated into a new algorithm, CHA_2DS_2-VASc (see **table 5**).

The 2010 ESC guidelines[13] suggest that the $CHADS_2$ score should still be used initially, and when the $CHADS_2$ score is ≥2, the patients clearly need oral anticoagulation. When patients have a score of 0–1, other common

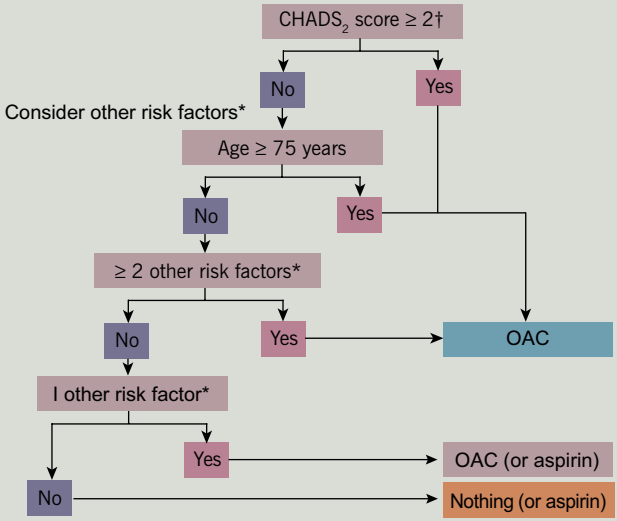

©Science Photo Library

stroke risk factors should be considered, as part of the CHA_2DS_2-VASc score (see **table 5**), which more accurately identifies 'truly low risk' patients with AF.

If patients have a CHA_2DS_2-VASc score of ≥2, oral anticoagulation is recommended, where the CHA_2DS_2-VASc score=1, OAC is preferred, and if CHA_2DS_2-VASc score=0, no antithrombotic therapy is preferred (**figure 1** and **table 6**).

To help improve anticoagulation, a GRASP-AF (Guidance on Risk Assessment and Stroke Prevention for Atrial Fibrillation) tool has been developed for primary care.[22] The on-line tool is easy to use and systematically interrogates a practice's patient record system, identifying patients with a diagnosis of AF, calculating their $CHADS_2$ score, and highlighting those individuals with a score of 2 or more that are not receiving warfarin. NHS Improvement is supporting a national roll-out of GRASP-AF, as well as its continued development to incorporate the CHA_2DS_2-VASc score.[22]

Figure 1. Algorithm for the use of oral anticoagulation for stroke prevention in AF



Reproduced from: ESC Guidelines[13] by permission of Oxford University Press on behalf of the ESC

Key: AF = atrial fibrillation; OAC = oral anticoagulant
†Congestive heart failure, hypertension, age ≥ 75 years, diabetes, stroke/TIA/thromboembolism (doubled)
*Other clinically relevant non-major risk factors: age 65–74 years, female sex, vascular disease

When compared to control, oral anticoagulation (essentially warfarin) significantly reduces stroke by 64% *and* all-cause mortality by 26%; in contrast, the risk reduction with aspirin is a modest (and not statistically significant) 19%, which was driven by one single positive trial (SPAF-I), which used aspirin 325 mg/day and had inconsistency for the aspirin effect within the trial subgroups.[24]

In the BAFTA study,[25] aspirin was no safer than warfarin at causing major haemorrhage (or intracranial haemorrhage) in patients ≥75 years. The risk reduction with aspirin is likely to be the effect of aspirin on vascular disease or

Table 4. The $CHADS_2$ scoring system

	Points
Congestive HF	1
Hypertension	1
Age >75 years	1
Diabetes	1
Stroke	2

Data from Gage BF[21]

Table 5. The CHA_2DS_2-VASc scoring system – risk factors for stroke and thromboembolism in non-valvular AF

'Major' risk factors	'Clinically relevant non-major' risk factors
Previous stroke TIA Systemic embolism Age ≥ 75 years	Heart failure or moderate-to-severe LV systolic dysfunction (e.g. LVEF ≤ 40%) Hypertension Diabetes mellitus Female sex Age 65–74 years Vascular disease*

– risk factors-based approach expressed as a point based scoring system, with the acronym CHA_2DS_2-VASc
(Note: maximum score is 9 since age may contribute 0, 1, or 2 points)

Risk factor	Score
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75 years	2
Diabetes mellitus	1
Stroke/TIA/thromboembolism	2
Vascular disease*	1
Age 65–74 years	1
Sex category (i.e. female sex)	1
Maximum score	9

Reproduced from: ESC Guidelines[13] by permission of Oxford University Press on behalf of the ESC

Key: LVEF = left ventricular ejection fraction, TIA = transient ischaemic attack, *Prior myocardial infarction, peripheral vascular disease, aortic plaque. Actual rate of stroke in contemporary cohorts may vary from these estimates

cardiovascular risk factors, rather than the effect related to AF *per se*. The use of aspirin-clopidogrel combination therapy offers a modest incremental benefit of stroke reduction (by 28%) over aspirin alone, but major bleeding rates are 2% per annum, to levels seen with oral anticoagulant use.

Thus, antiplatelet therapy should be considered as an inferior choice when a patient is unable to comply with the variable-dose regimen of warfarin and the need for monitoring.

If anticoagulation is contraindicated as a result of an unacceptable risk of haemorrhage, or declined by the patient despite discussion about their benefits and risks, this should be recorded with the appropriate code for Quality and Outcomes Framework (QOF) purposes.

Table 6. Antithrombotic therapy in atrial fibrillation

Risk category	CHA_2DS_2-VASc score	Recommended antithrombotic therapy
One 'major' risk factor or ≥2 'clinically relevant non-major' risk factors	≥2	OAC
One 'clinically relevant non-major' risk factor	1	Either OAC or aspirin 75–325 mg daily. Preferred: OAC
No risk factors	0	Either aspirin 75–325 mg daily or no antithrombotic therapy antithrombotic therapy. Preferred: no antithrombotic therapy

Reproduced from: ESC Guidelines[13] by permission of Oxford University Press on behalf of the ESC

Key: OAC = oral anticoagulation

The QOF for 2012/13 has changed and this mandates the use of oral anticoagulation rather than antiplatelet therapy for patients with AF at high risk of stroke.[26] The latest 2012 guidelines on AF from the European Society of Cardiology recommend that aspirin is now only to be used in patients who refuse any form of oral anticoagulation.[27] In addition, a 2012 consensus document from the Royal College of Physicians of Edinburgh stated that aspirin should not be used for stroke prevention in AF.[28]

Two new oral anticoagulants (NOACs) – dabigatran, a direct thrombin inhibitor and rivaroxaban, a factor Xa inhibitor – are now licensed for stroke prevention in nonvalvular AF.

Two doses of dabigatran were studied in the RE-LY trial; 150 mg and 110 mg twice daily.[25,29] The higher dose of dabigatran was shown to be superior to warfarin in stroke prevention with a similar risk of major haemorrhage. The lower dose was shown to be noninferior to warfarin in stroke prevention with a significantly lower risk of major haemorrhage. Rates of haemorrhagic stroke were reduced with both doses of dabigatran[25,29] and the higher dose significantly reduced the risk of ischaemic stroke compared to warfarin.[30]

Both doses had significantly less intracranial bleeding compared to warfarin. However, the rate of major gastrointestinal bleeding was significantly higher with dabigatran 150 mg than with warfarin.[25,29] Dabigatran has a half-life of 12-14 hours.

Rivaroxaban 20 mg once daily was studied in the ROCKET-AF trial, where it was shown to be noninferior to warfarin for prevention of stroke or systemic embolism.[31] During treatment in the intention to treat population, the rivaroxaban group had a lower risk of stroke or systemic embolism in patients with nonvalvular AF than the warfarin group, but this difference was not significant.[31]

In an on treatment analysis, there was no significant difference between rivaroxaban and warfarin with respect to rates of major clinically relevant bleeding.[31] Intracranial bleeding was significantly reduced by rivaroxaban compared to warfarin.[31] Major gastrointestinal bleeding was higher with rivaroxaban compared to warfarin.[31] Rivaroxaban is available in two doses, as 20 mg and 15 mg.

Warfarin has been identified as one of the drugs that most frequently causes preventable harm.[32] There are fewer drug interactions with the two NOACs, making them useful in patients on multiple therapies and with changeable drug regimes. Dabigatran and rivaroxaban are administered as a fixed dose regimen with no routine coagulation monitoring requirements, although close clinical surveillance may be required in some patients.[30,33] Patients with very labile INRs who cannot achieve therapeutic control may be candidates for these new agents. All of these drugs have a degree of renal excretion, thus, the ESC guidelines 2012 recommend that assessment of renal function (by creatinine clearance) is mandatory for all NOACs[27] and the dose may need to be adjusted according to the relevant licensed indication.

NICE approved dabigatran and rivaroxaban as options for prevention of stroke and systemic embolism in nonvalvular AF within their licensed indications in 2012.[34,35] Recently, a third new oral anticoagulant – apixaban – gained positive European opinion for use in stroke prevention in AF.[36] Therefore, the choice of agents for doctors and patients has widened considerably with significant benefits in the effectiveness and safety of prescribing oral anticoagulants for stroke prevention in AF.

10. Carefully consider the reason for referral

Having followed the above assessment and management strategy, carefully consider if referral is still necessary.

Elderly mildly symptomatic patients suitable for a rate control strategy can be appropriately managed in primary care. Decisions around anticoagulation are often best left with the GP who will have the most comprehensive knowledge of the patient's medical history and personal circumstances. If referral is still needed, clearly state the reasons for referral in the referral letter.

Reasons for referral include the diagnosis of underlying structural heart disease, difficulties achieving adequate rate control, advice on choice of rhythm control, paroxysmal AF (a difficult condition!), consideration for DC cardioversion or ablation techniques. Most cases of AF are suitable for referral to a general cardiologist.

The expertise of an electrophysiologist is only needed for patients with recurrent atrial flutter, Wolff-Parkinson-White syndrome, and patients with symptomatic AF despite optimal drug therapy, who may be candidates for ablation procedures.

References

1. NHS Improvement. June 2009. Available at http://www.improvement.nhs.uk/heart/Portals/0/documents2009/AF_Commissioning_Guide_v2.pdf

2. Go AS, Hylek EM, Phillips KA *et al*. Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. *JAMA* 2001;**285**:2370–5. doi.org/10.1001/jama.285.18.2370

3. Heeringa J, van der Kuip DA, Hofman A *et al*. Prevalence, incidence and lifetime risk of atrial fibrillation: the Rotterdam study. *Eur Heart J* 2006;**27**:949–53. doi.org/10.1093/eurheartj/ehi825

4. Benjamin EJ, Wolf PA, D'Agostino RB, Silbershatz H, Kannel WB, Levy D. Impact of atrial fibrillation on the risk of death: the Framingham Heart Study. *Circulation* 1998;**98**:946–52. doi: 10.1161/01.CIR.98.10.946

5. Savelieva I, Bajpai A, Camm AJ. Stroke in atrial fibrillation: update on pathophysiology, new antithrombotic therapies, and evolution of procedures and devices. *Ann Med* 2007;**39**:371–91. doi.org/10.1080/07853890701320662

6. Department of Health. National Stroke Strategy 2007; London: Department of Health, 2007:1–83.

7. Yamanouchi H, Tomonaga M, Shimada H, Matsushita S, Kuramoto K, Toyokura Y. Nonvalvular atrial fibrillation as a cause of fatal massive

cerebral infarction in the elderly. *Stroke* 1989;**20**:1653–6. doi.org/10.1161/01.STR.20.12.1653

8. Lin HJ, Wolf PA, Kelly-Hayes M *et al*. Stroke severity in atrial fibrillation: the Framingham study. *Stroke* 1996;**27**:1760–4. doi.org/10.1161/01.STR.27.10.1760

9. Miyasaka Y, Barnes ME, Gershet BJ *et al*. Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation* 2006;**114**;119–25. doi.org/10.1161/CIRCULATIONAHA.105.595140

10. Anter E. Atrial fibrillation and heart failure: treatment considerations for a dual epidemic. *Circulation* 2009;**119**:2516–25. doi.org/10.1161/CIRCULATIONAHA.108.821306

11. Department of Health. National Service Framework for Coronary Heart Disease (chapter 8 arrhythmias and sudden cardiac death). London: Department of Health, 2005.

12. National Institute for Health and Clinical Excellence. Atrial fibrillation: the management of atrial fibrillation: NICE clinical guideline 36. London: NICE, 2006. (www.nice.org.uk)

13. Camm AJ, Kirchof P, Lip GYH *et al*. Guidelines for management of atrial fibrillation, The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology. *Eur Heart J* 2010;**31**:2369–429. doi: 10.1093/eurheartj/ehq278

14. Lip GY, Tse HF. Management of atrial fibrillation. *Lancet* 2007;**370**:604–18. doi: 10.1016/S0140-6736(07)61300-2

15. Wyse DG, Waldo AL, Di Marco JP *et al*. A comparison of rate versus rhythm control in patients with AF. *N Engl J Med* 2002;**347**:1825–33. doi: 10.1056/NEJMoa021328

16. Testa L, Biondi-Zoccai GG, Dello Russo A, Bellocci F, Andreotti F, Crea F. Rate-control vs. rhythm-control in patients with atrial fibrillation: a meta-analysis. *Eur Heart J* 2005;**26**:2000–6. doi: 10.1093/eurheartj/ehi306

17. Hohnloser SH, Crijns HJ, van Eickels M *et al*.; ATHENA Investigators. Effect of dronedarone on cardiovascular events in atrial fibrillation. *N Engl J Med* 2009;**360**:668–78. doi: 10.1056/NEJMoa0803778

18. 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**:1093-100. doi: 10.1378/chest.10-0134

19. Cairns JA, Connolly S, McMurtry S, Stephenson M, Talajic M; CCS Atrial Fibrillation Guidelines Committee. Canadian Cardiovascular Society atrial fibrillation guidelines 2010: prevention of stroke and systemic thromboembolism in atrial fibrillation and flutter. *Can J Cardiol* 2011;**27**:74–90. doi: 10.1016/j.cjca.2010.11.007

20. Van Gelder IC, Groenveld HF, Crijns HJ *et al*. Lenient versus strict rate control in patients with AF. *N Engl J Med* 2010;**362**:1363–75. doi: 10.1056/NEJMoa1001337

21. Gage BF, Waterman AD, Shannon W *et al*. Validation of clinical classification scheme for predicting stroke–results from the National Registry of AF. *JAMA* 2001;**285**:2864–7. doi: 10.1001/jama.285.22.2864

22. www.improvement.nhs.uk/graspaf/

23. Hart RG, Pearce LA, Aguilar MI. Meta-analysis: antithrombotic therapy to prevent stroke in patients who have nonvalvular atrial fibrillation. *Ann Intern Med* 2007;**146**:857–67.

24. Mant J, Hobbs R, Fletcher K *et al*. Warfarin versus aspirin for stroke prevention in an elderly community population with atrial fibrillation (the Birmingham Atrial Fibrillation Treatment of the Aged Study, BAFTA): a randomised control trial. *Lancet* 2007;**9586;**495-503. doi:10.1016/S0140-6736(07)61233-1

25. Connolly S,Ezekowitz M, Yusuf S *et al*. Dabigatran versus warfarin in patients with atrial fibrillation. *N Engl J Med* 2009;**361**:1139–51. doi: 10.1056/NEJMoa0905561

26. Quality and Outcomes Framework for 2012/13. Available at www.nhsemployers.org/Aboutus/Publications/Documents/QOF_2012-13.pdf (accessed 20 October 2012)

27. Camm JA, Lip GYH, De Caterina R *et al.* 2012 focused update of the ESC Guidelines for the management of atrial fibrillation. *Eur Heart J* 2012;**33**:2719–47. doi:10.1093/eurheartj/ehs253

28. Stott DJ, Dewar RI, Garratt CJ et al. Royal College of Physicians of Edinburgh UK Consensus Conference on "Approaching the comprehensive management of atrial fibrillation: evolution or revolution?" March 2012. Available at www.rcpe.ac.uk/clinical-standards/standards/rcpe-af-consensus-statement-2012.pdf (accessed 20 October 2012)

29. Connolly SJ, Ezekowitz ME, Yusuf S *et al*. Newly identified events in the RE-LY Trial. *N Engl J Med*. 2010;**363**:1875–6 (appendix available at www.nejm.org.doi/full/10.1056/NEJMc1007378 (accessed 26 August 2011)

30. Summary of Product Characteristics Pradaxa® 150 mg hard capsules Available at www.medicines.org.uk/emc/medicine/24839 (accessed 20 October 2012)

31. Patel MR, Mahaffey KW, Garg J *et al.* Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med* 2011;**365**:883–91. doi: 10.1056/NEJMoa1009638

32. NHS National Patient Safety Agency. Anticoagulant therapy: information for GPs. NPSA patient safety alert number 18. Available at: www.nrls.npsa.nhs.uk (accessed 20 October 2012)

33. Summary of Product Characteristics Xarelto® 20 mg film–coated tablets. www.medicines.org.uk/EMC/medicine/25586/SPC/Xarelto+20mg+film-coated+tablets/ (accessed 20 October 2012)

34. National Institute for Health and Clinical Excellence (NICE). NICE technology appraisal guidance 249. Available at http://guidance.nice.org.uk/TA249 (accessed 20 October 2012)

35. National Institute for Health and Clinical Excellence (NICE). NICE technology appraisal guidance 256. Available at http://guidance.nice.org.uk/TA256 (accessed 20 October 2012)

36. European Medicines Agency. Summary of opinion (post authorisation) for Eliquis. Available at http://cardiobrief.files.wordpress.com/2012/09/eliquis-chmpt-pdf-20sept2012.pdf (accessed 20 October 2012)

Prescribing Information (SPAF – UK)
PRADAXA® (dabigatran etexilate)

Capsules containing 110 mg or 150 mg dabigatran etexilate (as mesilate) **Action**: Direct thrombin inhibitor **Indication**: Prevention of stroke and systemic embolism in adult patients with nonvalvular atrial fibrillation with one or more of the following risk factors: Previous stroke, transient ischaemic attack, or systemic embolism (SEE); Left ventricular ejection fraction < 40 %; Symptomatic heart failure, ≥ New York Heart Association (NYHA) Class 2; Age ≥ 75 years; Age ≥ 65 years associated with one of the following: diabetes mellitus, coronary artery disease, or hypertension **Dose and Administration**: Renal function should be assessed by calculating CrCL prior to initiation to exclude patients with severe renal impairment (CrCL < 30 ml/min). Recommended daily dose 300 mg taken as one 150 mg capsule twice daily. Therapy should be continued long term. In case of intolerability to dabigatran, patients should be instructed to immediately consult their doctor. Elderly: Aged ≥ 80 years 220 mg taken as one 110 mg capsule twice daily; 75 – 80 years consider 220 mg taken as one 110 mg capsule twice daily. As renal impairment may be frequent in the elderly (> 75 years), assess renal function by calculating CrCL prior to initiation to exclude patients with severe renal impairment (CrCL < 30 ml/min). Renal function should also be assessed at least once a year or more frequently as needed in certain clinical situations when it is suspected that the renal function could decline or deteriorate. Patients with an increased risk of bleeding: closely monitor clinically looking for signs of bleeding or anaemia. Dose adjustment should be decided at the discretion of the physician, following assessment of the potential benefit and risk to an individual patient. A coagulation test may help identify increased risk patients. Patients with gastritis, oesophagitis, or gastroesophageal reflux consider 220 mg taken as one 110 mg capsule twice daily due to the elevated risk of major gastro-intestinal bleeding. Renal impairment: contraindicated in severe renal impairment (CrCL < 30 ml/min); patients with renal impairment and a high risk of bleeding consider 220 mg taken as one 110 mg capsule twice daily. Close clinical surveillance is recommended in patients with renal impairment. As above assess renal function prior to initiation to exclude patients with severe renal impairment and assess renal function at least once a year or more frequently as needed. Concomitant verapamil 220 mg taken as one 110 mg capsule twice daily; Pradaxa and verapamil should be taken at the same time. No dose adjustment required but close clinical surveillance in patients < 50 kg. Not recommended if liver enzymes > 2 Upper Limit of Normal (ULN). If switching from Pradaxa to parenteral anticoagulant wait 12 hours after the last dose of Pradaxa; if switching from parenteral anticoagulants to Pradaxa then Pradaxa should be given 0-2 hours prior to the time that the next dose of the alternate therapy would be due, or at the time of discontinuation in case of continuous treatment; if switching from Pradaxa to VKA adjust the starting time of the VKA based on CrCL; if switching from VKA to Pradaxa stop VKA and give Pradaxa once INR <2.0. Cardioversion patients can stay on Pradaxa whilst being cardioverted. Not recommended aged < 18 years. Pradaxa should be swallowed whole with water, with or without food. Patients should be instructed not to open the capsule as this may increase the risk of bleeding. **Contraindications:** Hypersensitivity to any component; severe renal impairment (CrCL < 30 ml/min); active clinically significant bleeding; lesion or condition at significant risk of major bleeding such as current or recent gastrointestinal ulceration, presence of malignant neoplasms at high risk of bleeding, recent brain or spinal injury, recent brain, spinal or ophthalmic surgery, recent intracranial haemorrhage, known or suspected oesophageal varices, arteriovenous malformations, vascular aneurysms or major intraspinal or intracerebral vascular abnormalities; concomitant treatment with any other anticoagulant agent e.g. unfractionated heparin (UFH), low molecular weight heparins (enoxaparin, dalteparin etc), heparin derivatives (fondaparinux etc), oral anticoagulants (warfarin, rivaroxaban, apixaban etc) except under the circumstances of switching therapy to or from Pradaxa or when UFH is given at doses necessary to maintain an open central venous or arterial catheter; hepatic impairment or liver disease expected to have any impact on survival; concomitant systemic ketoconazole, cyclosporine, itraconazole, tacrolimus, dronedarone. **Warnings and Precautions:** Not recommended if liver enzymes > 2 ULN. Haemorrhagic risk: Close clinical surveillance (signs of bleeding or anaemia) is recommended throughout the treatment period, especially when haemorrhagic risk is increased or risk factors combined. Factors which may increase haemorrhagic risk: age ≥ 75 years; moderate renal impairment (CrCL 30 – 50 ml/min); P-glycoprotein inhibitor co-medication; body weight < 50 kg; acetylsalicylic acid (aspirin); NSAID; clopidogrel; selective serotonin re-uptake inhibitors (SSRIs) or selective serotonin norepinephrine re-uptake inhibitors (SNRIs); other drugs which may impair haemostasis; diseases/procedures associated with a risk of bleeding such as coagulation disorders, thrombocytopenia or functional platelet defects, recent biopsy, major trauma, bacterial endocarditis, oesophagitis, gastritis or gastroesophageal reflux. The measurement of dabigatran related anticoagulation may be helpful to avoid excessive high exposure to dabigatran in the presence of additional risk factors. Patients who develop acute renal failure must discontinue Pradaxa. If severe bleeding occurs, discontinue treatment and investigate the source of the bleeding. Avoid or use with caution agents which may increase the risk of haemorrhage. The use of fibrinolytic agents for the treatment of acute ischaemic stroke may be considered if the patient presents with a dTT, ECT or aPTT not exceeding the ULN according to the local reference range. Avoid concomitant administration with P-gp inducers. Patients on dabigatran etexilate who undergo surgery or invasive procedures are at increased risk for bleeding therefore surgical interventions may require the temporary discontinuation of dabigatran etexilate; prescribers should consult the Summary of Product Characteristics for further information. Procedures such as spinal anaesthesia may require complete haemostatic function. The risk of spinal or epidural haematoma may be increased in cases of traumatic or repeated puncture and by the prolonged use of epidural catheters. After removal of a catheter, an interval of at least 2 hours should elapse before the administration of the first dose of dabigatran etexilate; these patients require frequent observation for neurological signs and symptoms of spinal or epidural haematoma. Treat with caution patients at high surgical mortality risk and with intrinsic risk factors for thromboembolic events. Myocardial infarction. The safety and efficacy of Pradaxa has not been studied in patients with prosthetic heart valves. Therefore use of Pradaxa is not recommended in these patients. Contains Sunset Yellow (E110) which may cause allergic reactions. **Interactions**: Anticoagulants and antiplatelet aggregation agents; Strong P-gp inhibitors e.g. amiodarone, quinidine, verapamil, clarithromycin co-administration (close clinical surveillance); verapamil co-administration - reduce Pradaxa dose to 220 mg (see above); not recommended for concomitant treatment posaconazole, protease inhibitors including ritonavir and its combinations with other protease inhibitors; avoid with P-gp inducers e.g. rifampicin, St John's wort, carbamazepine, phenytoin; SSRIs or SNRIs. Dabigatran etexilate and dabigatran are not metabolised by cytochrome CYP450 system, therefore related medicinal product interactions not expected. Pantoprazole and other proton-pump inhibitors (PPI) were co-administered with Pradaxa in clinical trials and concomitant PPI treatment did not appear to reduce the efficacy of Pradaxa. Ranitidine administration together with Pradaxa had no clinically relevant effect on the extent of absorption of dabigatran. **Fertility, pregnancy and lactation**: Avoid pregnancy during treatment. Do not use in pregnancy unless clearly necessary. Discontinue breast-feeding during treatment. **Undesirable effects**: Most commonly reported adverse reactions are bleedings occurring in total in approximately 16.5 % in patients with atrial fibrillation treated for the prevention of stroke and SEE. Common (≥ 1/100, <1/10): anaemia; epistaxis; gastrointestinal haemorrhage; abdominal pain; diarrhoea; dyspepsia; nausea; hepatic function abnormal/liver function test abnormal; genitourological haemorrhage (150 mg). Prescribers should consult the Summary of Product Characteristics for further information on side effects. **Pack sizes and NHS price:** *110 mg* 60 capsules £65.90 *150 mg* 60 capsules £65.90 **Legal category** POM **MA numbers**: *110 mg* EU/1/08/442/007 (60 capsules) *150 mg* EU/1/08/442/011 (60 capsules) **Marketing Authorisation Holder**: Boehringer Ingelheim International GmbH, Binger Str. 173, D-55216 Ingelheim am Rhein, Germany. Prescribers should consult the Summary of Product Characteristics for full prescribing information. **Prepared in** September 2012.

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard. Adverse events should also be reported to Boehringer Ingelheim Drug Safety on 0800 328 1627 (freephone).

UK/CVS-121075 Date of preparation: December 2012