An overview of atrial fibrillation

Section1:

Atrial fibrillation (AF) is a condition when the heart does not beat to its normal speeds or rhythm, often it beats faster than it should. This irregularity leads to an increased risk of stroke and death. The pump function of the heart deteriorates as a result of the un-coordination (due to uncoordinated excitation of muscles). The net result of impaired pump action is the upper chambers of the heart contract randomly and at times too quick for the heart to relax before it can contract again effectively.

At the junction of the pulmonary veins in the left atrial musculature, abnormal impulses fire which override the heart natural pace maker.

There are 3 major classifications for AF:

- Paroxysmal AF- lasts from 30 seconds to 7days
- Persistent AF- longer the 7days
- Permanent AF- AF that fails to terminate using cardioversion, or is terminated but relapses within 24hours.

If there are no obvious cause and all investigations are normal, this is known as lone AF. Lone AF tends to occur in Paroxysmal cases.

Otherwise the most common causes are

- ischaemic heart disease
- hypertension
- mitral stenosis
- hyperthyroidism

Other causes which aren’t as common are can be classified into 3 sub catagories;

1. Cardiac: Rheumatic heart disease, Sick sinus syndrome, Pre-excitation syndromes (such as Wolff-Parkinson-White syndrome) and heart failure. Less commonly, congenital heart disease, atrial myxoma , atrial septal defect, pericardial disease, and cardiomyopathy.
2. Non-cardiac: Drugs (e. g. bronchodilators/thyroxine), Electrolyte depletion infection, Pulmonary embolism, Lung cancer & Diabetes.
3. Lifestyle: Obesity, high caffeine or alcohol intake1.

A fast pulse (often > 140bpm) which may or may not be irregular is the most common symptom of AF however it is also accompanied by tiredness, breathlessness, dizziness, angina1, syncope, reduced exercise tolerance, or polyuria2. The decreased efficacy of the pumping of the heart may result in the reduction of blood pressure.

AF is diagnosed by the use of an ECG and is characterised by the absence of consistent P waves and presence of fibrillation.

The method of management of suffers of AF has two main strategies, either by the control the arrhythmia aspect of the condition or by the tachycardia side of the condition. Rhythm controlling drugs include flecainide (and other similar drugs), beta-blockers (particularly sotalol), and amiodarone. Rate controlling drugs such as beta-blockers bisoprolol & atenolol or the calcium channel blockers verapamil ordiltiazem.

Thrombolytic and antiplatelet drugs are also used to manage the thromboembolic risk. There are non pharmacological ways to manage AF, the most common being cardioversion.

Aspirin inhibits cycloxygenase from producing thromboxane A2 which is responsible for platelet activation and thus aggregation

Diltiazem of use in AF for its affects on calcium channels on the heart. The blocking of calcium channels reduces excitability of cardiac muscle and hence decreasing fibrillations it also decreases the force of contraction

Atenolol is a beta receptor blocker(a classII), it decreases the effects of the sympathetic drive to the heart, such that the neurotransmitters adrenaline and noradrenaline are competitively blocked. Thus the levels of cAMP decrease. cAMP mediates many events in the heart: decreases stability in resting potentials (phase 4) of nodal tissue(AVN conduction & SAN firing). In nodal tissue(myocytes) a decrease in cAMP reduces Ca2+ entry thus action potentials take longer, it also causes repolarisation to longer i. e. increasing the refractory period

Amiodarone has all four classes of activity (of Vaughan Williams system MAKE APPENDIX) however its main method of action is its class III mechanism. By the blocking potassium channels the potassium efflux in an action potential is blocked, thus action potentials duration is a prolonged refractory period (causing a region of unidirectional block remain refractory for longer effectively having a bi directional block)3

Verapamil a non selective calcium channel blocker (classIV), by reducing the Ca2+ into the cell through L-type channels in the nodal tissue (SAN &AVN) depolarization takes longer as does the refractory period causing slower AVN conduction. Reduces tachycardic impulse from AVN to the ventricles and also AVN re-entrant rhythms. Phase 2 is limited in nodal tissue (myocytes and purkinje fibres) reduces triggered automaticity4.

Warfarin inhibits the effective synthesis of biologically active forms of the vitamin K-dependent clotting factors: II, VII, IX and X, as well as some regulatory proteins.

Flecainide a class1c sodium channel blocker. There is decreased diastolic excitability and Phase 0 (depolarization) takes longer as does the refractory period together causing slower conductions4.

Propafenone is a class1c sodium channel blocker. There is decreased diastolic excitability and Phase 0 (depolarization) takes longer as does the refractory period together causing slower conductions4.

Digoxin is a K+/Na+ ATPase inhibitor which leads to an increase in the intracellular concentration of sodium this stimulates of sodium-calcium exchange as a result there is an increase in the intracellular concentration of calcium causing stronger less frequent contractions.

Cardioversion may be tried in some people with AF. The heart is given a controlled electric shock to try to restore a normal rhythm1.

Catheter ablation is a procedure that very carefully destroysthe diseased area of your heart and interrupts abnormal electrical circuits. It is an option if medication has not been effective or tolerated1.

A pacemaker may be fitted alternatively to drug treatment when it is not appropriate of failing1.

Section 2:

AF is the most common rhytm disorder of the heart with up to 500, 000 sufferes in the UK1. In the UK over 46, 000new cases of AF are diagnosed each year5. The incidences increase with age, with a higher incidence in men, when data is adjusted for age6. AF is uncommon in the young unless there is an existing heart disorder. At 50-59years of age, the prevalence is around 0. 5%. At 80-89years of age, the prevalence is around 9%.

Section 3:

AF is a significantly increases the chance of stroke and emboli. The decision to use antithrombotic therapy involves a complex balancing of risks, benefits, and costs. The probabilities of stroke, bleeding complications, and death; the associated costs of all treatment options and outcomes; and the quality of life associated with treatment and disability. These have shown that warfarin therapy is generally cost-effective and often cost-saving. However, the economic value of antithrombotic therapy in terms of cost-effectiveness is most strongly influenced by 2 factors: stroke risk and perceived quality of life.

The cost-effectiveness models indicate that warfarin can be cost-effective or, indeed, cost-saving for a wide variety of patients with AF, provided that it is prescribed appropriately based upon stroke risks7

In patients at high risk of stroke, anticoagulation is most cost effective, but not for those at low risk of stroke8.

Aspirin 75mgx28 £1. 66, Aspirin 300mgx28 £0. 55, Warfarin 1mgx28 £1. 10, Warfarin 3mgx28 £1. 15, Warfarin 5mgx28 £1. 21, Atenolol 25mgx28 £0. 82, Diltiazem MR 60 mgx84 £3. 52, Diltiazem MR 60 mgx56 (or over 70yrs), verapamil 40mgx80 £1. 55.

Section 4:

Symptoms should be monitored; often AF has no symptoms, however you should look for the common presenting symptoms (stated in section 1).

Tests:

- Heart Rate- Should be done when treating with rate lowering drugs
- Electrocardiography- every 12months
- blood electrolytes, urea and creatinine- 1-2 weeks after initiation, and 1-2 weeks after reaching the maintenance dose, then every 6 months. For Beta-blockers, digoxin, amiodarone
- Monitor blood pressure
- Liver function tests- every 6months for amiodarone
- Thyroid function test- when using amiodarone
- eye examinations- annual eye examinations.

- Plasma levels- for digoxin, shortly after initiation or after a dose increaee. 0. 7and 2. 0nanograms per millilitre

Drugs to reduce the risk of thromboembolism (warfarin, aspirin and clopidogrel)

The target INR for oral anti coagulants is 2-3 usually 2. 5. Patients should be considered for warfarin use if risk is perceived to be medium or high according to nice (see appendix)9. It is important that INR be measured daily or alternate days at initiation of treatment. Then at longer intervals depending on dose response up to 12 weeks10. Note the importance of increased monitoring as drugs are added to the regimen, pre-adjustment to warfrin are sometimes necessary e. g. decreasing dose by one or two thirds before initiation of amiodarone1.

Section 5:

Although systematic reviews have shown that aspirin reduces the rate of stroke by 25%8 The Atrial Fibrillation, Aspirin Anticoagulation Study demonstrated a reduction of strokes by 64% per year with warfarin (INR 2. 8-4. 2), compared with placebo, a 3. 5% per year reduction. A non-significant reduction in stroke was seen with aspirin 75mg8. Where warfarin is contraindicated or patient requests not to initiate therapy, it has been found that a combination of antiplatelets (aspirin and clopidogrel) was associated with a significant reduction in major vascular events compared with aspirin alone. The number of people that would need to be treated with aspirin plus clopidogrel for 3. 6years to prevent one vascular event was 421.

According to a meta-analysis the combination of both aspirin and warfrin yielded no significant reduction in stroke rates and had increased side effects8.

No mortality difference was found between rhythm control and rate control. Although for people older than 65years of age or those with coronary artery disease, a significant difference was found in favour of rate control in terms of all-cause mortality. Studies showed significantly higher rates of hospitalisation and adverse events in the rhythm control group and no difference in quality of life between the two groupsa. Incidence of ischaemic stroke, bleeding and systemic embolism was similar in the two groups, but certain malignant dysrhythmias were significantly more likely to occur in the rhythm control groupa. No cognitive decline was seen with the use of rhythm controlling drugs. Quality of life scores were similar in both groups. Therefore it is recommended that rate control, is used as it is less costly11.

IA, IC and III drugs are effective in maintaining sinus rhythm but increased adverse effects. Class IA drugs may increase mortality.

Calcium antagonists versus digoxin

Seven studies found no difference in average heart rate between calcium antagonists verapamil or diltiazem and digoxin either at rest or during periods of normal daily activity. Studies have found calcium antagonists resulted in a lower heart rate during exercise, compared with digoxin2.

Beta-blockers versus digoxin

Three studies found no difference in average heart rate between digoxin and beta blockers while at rest or during periods of normal daily activity. However, the beta blockers atenolol and labetalol controlled heart rate during exercise more effectively than digoxin did2.

Beta-blockers versus calcium antagonists

One crossover study found no difference between the calcium antagonist diltiazem and the beta-blocker atenolol in terms of either the mean heart rate over 24 hours or during exercise2.

Beta-blockers with digoxin versus beta-blockers

One crossover study found no statistically significant differences in heart rate during periods of exercise. Some studies found the beta-blocker atenolol used in combination with digoxin to be associated with a lower heart rate over 24 hours than atenolol alone2.

Calcium antagonists with digoxin versus calcium antagonists

Four crossover studies found that calcium antagonists diltiazem or verapamil used in combination with Digoxin to be more effective in controlling heart rate over 24 hours, as well as during periods of exercise, than either diltiazem or verapamil alone2.

Section 6:

Many people whom suffer from AF suffer no symptoms, some have been diagnosed incidentally1. It is in these patients that concordance is a particular issue. Education as to the risks and complications of the condition

are necessary to achieve optimum concordance. It is important that patients are aware the side effects (SE) as well as the dosage regimen. Many of the dugs used in the management of AF have common and serious side effects which patients should be trained to spot.

Interactions and side effects of note. Further information can be derived from the British National Formulary (BNF) and a comprehensive analysis available in the most current Stockley's drug interaction. Classes of drugs have been mentioned although this does not mean that the entire class will interact

Amiodarone Interactions: Anti-arrhythmic (rate and rhythm modulating), Antibiotics, Anti coagulants, Tricyclic antidepressants, mizolastine, thyroid hormones, diuretics and phenytoin10.

it is of note that due to its long half life amiodarone may still interact several months after treatment is stopped particularly relevant in the switching over of treatments.

Amiodarone reduces the clearance of warfarin, prolonging prothrombin times (PTs) and elevating international normalized ratios (INRs). To avoid bleeding complications, the patient being put on amiodarone must have their current dosage of warfarin reduced by at least one-third and PT and INR closely monitored until they are stabilized15. Although routine eye examinations should occur to asses the ocular effects of amiodarone, if a patient experiences any visual impairment the treatment should be stopped10. Patients should be aware for the signs of thyroid dysfunction (signs and symptoms of which included in appendix 1)

Warfarin interactions: Alcohol, amiodarone, propafenone, analgesics, antibiotics, antidepressants, antiepileptics, thyroid hormones, ulcer healing drugs, lipid regulating drugs, hormones, corticosteroids

Warfarin levels are easily effected by changes in diet, major changes in diet should be done in consultation with healthcare professional, commonly eaten foods that are known to interact with warfarin are cranberry, grapefruit and vitamin K rich foods16. bleed or bruise easily. Also, if you bleed, the bleeding may not stop as quickly as normally. For example, you may have: bleeding gums; nosebleeds; prolonged bleeding from cuts; blood in the urine.

Beta blocker interactions: Antiarrhythmics (rhythm and rate modulating), antibiotics, antidepressants, mizolastine, antipsychotics and diuretics.

Beta blockers should be avoided in people with asthma, or with chronic obstructive pulmonary disease13, Beta-blockers should not be stopped suddenly unless absolutely necessary; there is a risk of rebound in the condition13. Doses are titrated for patients and are gradually increased10.

Digoxin interactions: Antiarrhythmics (rate and rhythm modulating), diuretics, anti biotics and anti epileptics.

Signs and symptoms of digoxin toxicity are important to report promptly. Digoxin toxicity may cause drowsy, dizzy, and affect your vision, disorientation, confusion, headach or disyurbed vision14.

Flecainde interactions: Antiarrhythmics (rate and rhythm modulating), antidepressants, antihistamines, antipsychotics, diuretics and tolterodine

Roughly 1% of the general population and 10% of asthma suffers are allergic to aspirin12. Each drug has the potential for interaction with other medication and even food.

Self help advice

In order to minimise the risk of stroke and heart attacks it is important for patient to receive practical advise on diet as this will impact on blood cholesterol levels, weight management and blood pressure it is of particular importance when the patient is diabetic.

Important components in a healthy diet are low fat and salt intakes, with an emphasis on complex carbohydrates found in vegetables. Advice on the sources of esstential fatty acids should be given (for example nuts and oily fish). Smoking cessation counseling and Nicotine replacement therapy should be offered, discussing the statistical significance smoking alone contributes to the Cardio vascular events.

Section 7:

Pharmacists have contact at various stages along a patients treatment. A specialist PCT pharmacist may manage patients, prescribe, review and monitior. A community pharmacist should attempt medicine use reviews and prepare to make interventions on prescriptions when appropriate. Clinical pharmacists are involved in monitoring and providing guidance on protocols and current evidence.

In the future there will be an increased scope for pharmacists to play a larger role when full patient records become available, full clinical reviews may be

conducted taking into account the persons history (familial, drug, treatment, condition) and make appropriate interventions and recommendations according to the most current evidence.

Section 8:

In order for the condition and the services to run effectively is necessary to run audits regularly. This will ensure the national standards are met. Nice guideline audit criteria:

- All people presenting to primary or secondary care with a hypertension, heart failure, diabetes made or stroke and noted to have an irregular pulse to be offered an ECG and any new diagnosis of AF recorded2.
- All AF patients in whom a rate-control or rhythm-control strategy is initiated to have their involvement in choosing a treatment strategy recorded2.
- All patients who are prescribed digoxin as initial monotherapy for rate control to have the reason for this prescription recorded where it is not obvious (e. g. sedentary patient presence of contraindication to alternative agents)2.
- All patients should be assessed for risk of stroke/thromboembolism and given thromboprophylaxis according to the stroke risk and have this assessment and any antithrombotic therapy recorded2.

It is important for pharmacists to keep uodate and maintaining a high levels of competenacy. Advice should be evidence based and current. There are

regular updates produced by nice NICE and the Guidelines for atrial fibriliation are a good source of information.

Section 9:

the National Service Framework for coronary heart disease has a chapter pertains to AF. Arrhythmias are of great importance “ Cardiac arrhythmia affects more than 700, 000 people in England and is consistently in the top ten reasons for hospital admission, using up significant A&E time and bed days. AFis the most common arrhythmia, affects up to 1% of the population (rising to 4% in the over 65s) and absorbs almost 1% of the entire budget of the NHS to the NHS” 16. Of the three quality requirements there are two relevant in AF.

1. Quality requirement one: patient support. People with arrhythmias receive timely and high-quality support and information, based on assessment of their needs16.

Markers of good practice

- People with arrhythmias receive a formal assessment of their support needs and those at significantly increased risk of anxiety, depression or a poor quality of life receive appropriate care16.
- People with long-term conditions receive support in managing their illness from a named arrhythmia care co-ordinator16.
- Good quality, timely information about arrhythmic conditions is given by appropriately trained staff16.

2. Quality requirement two: diagnosis and treatment. People presenting with arrhythmias, in both emergency and elective settings, receive

timely assessment by an appropriate clinician to ensure accurate diagnosis and effective treatment and rehabilitation16.

Markers of Good Practice – Initial Treatment

- All patients receive a hard copy of the ECG documenting their arrhythmia and a copy is placed in their records.
- Patients who survive out-of-hospital cardiac arrest and patients presenting with pre-excited AF are assessed by a heart rhythm specialist prior to hospital discharge.
- The following patients are assessed urgently by a heart rhythm specialist:

1. Patients with syncope or any other symptom(s) suggestive of an arrhythmia and a personal history of structural heart disease or a family history of premature sudden death
2. Patients with recurrent syncope associated with palpitations
3. Patients with syncope and pre-excitation
4. Patients with documented 3rd degree AV block (not associated with acute MI)
5. Patients with recurrent syncope in whom a life-threatening cause has not been excluded
6. Patients with documented ventricular tachycardia

- The following patients are referred to a heart rhythm specialist:

1. Patients with a presumed diagnosis of ventricular tachycardia
2. Patients with Wolff-Parkinson-White (WPW) syndrome or asymptomatic pre-excitation

3. Patients with symptomatic regular recurrent supraventricular tachycardia which is unsuccessfully treated with one type of medication or who would prefer not to take long-term medication
4. Patients with recurrent atrial flutter
5. Patients with symptomatic AF despite optimal medical therapy
6. First degree relatives of victims of sudden cardiac death who died below the age of 40 years
7. Patients with recurrent unexplained falls

Markers of Good Practice – Ongoing Treatment

- Mechanisms are in place for urgent referral of patients with sustained or compromising arrhythmias for prioritisation of appropriate treatment.
- Implantable cardioverter defibrillators (ICDs) are considered in patients presenting with life-threatening ventricular arrhythmias and in those without demonstrable arrhythmia but identified as being at high risk.
- Catheter ablation is considered as the treatment of choice in patients presenting with sustained supraventricular tachycardia (SVT) other than AF, and cardioversion of recent onset AF is considered as early as is clinically safe.
- Where further hospital treatment is not recommended, a care plan is agreed between the patient, GP and the arrhythmia care team, including follow up and support as required.

Management of long term conditions and elderly also have a priority in the governments plans and frameworks for the future.

Section 10:

Emphasis should be on patient centered care, projects such as near patient testing for warfarin have proved to be effective at managing patients and their potential complications.

Primary care workers such as GPs PCT pharmacist should screen at risk patients. They shall be involved in the management of there condition frequently monitor patients. If required a referral can be made on lifestyle issues to manage the risk of stroke, e. g. if lipids are elevated may want to refer to a dietitian. Community pharmacists have a role in conduction medicines use reviews and be prepared to make inventions in prescribing, regimen concordance and side effect management/referral. It is of utmost importance that the specialist (cardiologist) makes clear recommendation and maintains communications with their counterparts in primary care.