This Network guidance is to inform prescribers and other healthcare professionals about the appropriate use of the novel oral anticoagulants (NOACs: dabigatran (Pradaxa®), rivaroxaban (Xarelto®) and apixaban (Eliquis®)) as options for the prevention of stroke and systemic embolism in people with non-valvular atrial fibrillation (AF). This is a new area of prescribing and this guidance sets out the main considerations and patient groups where these alternatives to warfarin may be useful.

NICE Guidance for dabigatran and rivaroxaban was issued in 2012 and has been worded almost identically, whilst keeping to the text of their licences. NICE Guidance for apixaban was published in February 2013, and the text is very similar. Note that the age limits mentioned in the guidance are risk factors rather than thresholds for treatment.

**Dabigatran** (NICE Guidance TA249 issued March 2012)

Dabigatran etexilate is recommended as an option for the prevention of stroke and systemic embolism within its licensed indication, that is, in people with nonvalvular atrial fibrillation with one or more of the following risk factors:

- previous stroke, transient ischaemic attack or systemic embolism; left ventricular ejection fraction below 40%; symptomatic heart failure (NYHA Class 2 or more); age 75 or older; OR age 65 or older with one of the following: diabetes mellitus, coronary artery disease or hypertension.

The decision about whether to start treatment with dabigatran should be made after an informed discussion between the clinician and the person about the risks and benefits of dabigatran compared with warfarin. For people who are taking warfarin, the potential risks and benefits of switching to dabigatran should be considered in the light of their level of INR control.

**Rivaroxaban** (NICE Guidance TA256 issued May 2012)

Rivaroxaban is recommended as an option for preventing stroke and systemic embolism within its licensed indication, that is, in people with nonvalvular atrial fibrillation with one or more risk factors such as:

- congestive heart failure; hypertension; age 75 or older; diabetes mellitus; prior stroke or transient ischaemic attack

The decision about whether to start treatment with rivaroxaban should be made after an informed discussion between the clinician and the person about the risks and benefits of rivaroxaban compared with warfarin. For people who are taking warfarin, the potential risks and benefits of switching to rivaroxaban should be considered in the light of their level of INR control.

**Apixaban** (NICE Guidance TA275 issued February 2013)

Apixaban is recommended as an option for preventing stroke and systemic embolism within its marketing authorisation, that is, in people with nonvalvular atrial fibrillation with 1 or more risk factors such as:

- prior stroke or transient ischaemic attack; age 75 or older; hypertension; diabetes mellitus; symptomatic heart failure.

The decision about whether to start treatment with apixaban should be made after an informed discussion between the clinician and the person about the risks and benefits of apixaban compared with warfarin, dabigatran etexilate and rivaroxaban. For people who are taking warfarin, the potential risks and benefits of switching to apixaban should be considered in light of their level of INR control.

Key considerations when choosing between the available oral anticoagulant options

1. **Renal Function.**
   - **Dabigatran** is contraindicated in severe renal impairment (creatinine clearance [CrCl, or the surrogate of eGFR] <30 ml/min), and a lower dose is used in moderate renal impairment and for patients aged over 80 (110 mg BD).
   - **Rivaroxaban** is contraindicated in people with CrCl / eGFR <15 ml/min, and the dose should be reduced to 15 mg OD for people with CrCl / eGFR 15-49 ml/min.
   - **Apixaban** is contraindicated for people with CrCl / eGFR <15 ml/min, and the dose should be reduced to 2.5 mg BD for people with CrCl / eGFR 15-29 ml/min, and for people aged ≥80 with serum creatinine >133 µmol/L or weight <60 kg.

   **With all the NOACs drug accumulation can occur with impaired renal function.** Renal function should be checked prior to initiation and monitored when necessary, such as when other drugs with renal effects are introduced or altered, or with dehydration/vomiting/diarrhoea. Renal function should be monitored at least annually in patients older than 75 years and in those with renal impairment. Liver function should be checked prior to initiating apixaban. As clinical experience accumulates, these monitoring requirements may be eased.
2. The efficacy and safety of the NOACs in people unable or unwilling (for whatever reason) to take warfarin, or in whom warfarin is relatively or absolutely contraindicated, has not been conclusively established. All patients in the principal published studies (n = 50,000) were eligible to be randomized to warfarin. In a comparison of apixaban with aspirin in 5599 patients considered to be unsuitable for warfarin treatment for a variety of reasons (the AVERROES trial), 932 patients who had previously used warfarin were included because the INR could not be maintained in the therapeutic range. 815 (15%) patients were included solely for refusal to take warfarin, and 178 patients with previous serious bleeding or other adverse event whilst taking warfarin were given apixaban.

3. There is limited experience in the use of NOACs in patients for whom warfarin is considered too risky. The lower rate of major bleeding with dabigatran 110 mg BD should not be interpreted as a general indication to prefer dabigatran to warfarin for patients with a higher than average bleeding risk. Using stroke risk scores such as CHADS$_2$ or CHA$_2$DS$_2$-VASc and the bleeding risk score HAS-BLED is recommended when making individualised assessments of the risks and benefits of anticoagulation, as a prelude to considering which anticoagulant to use.

4. There is no specific antidote for patients taking NOACs who present with haemorrhage requiring emergency treatment. Advice on the management of haemorrhage or suspected overdose is included on Page 4.

5. As relatively new drugs, all the NOACs carry a ‘black triangle’. There are no long term safety or effectiveness data for these drugs beyond the approximate 2 year average in the published trials. Warfarin has over 50 years of accumulated clinical experience.

6. Dabigatran and apixaban are taken twice daily. Rivaroxaban or warfarin are taken once daily.

7. Dabigatran is not suitable for use with a compliance aid (e.g. blister pack) as the capsules are moisture sensitive and should not be stored outside their packaging.

There are four categories of people in which the new oral anticoagulants may be a useful option:

1. **People with AF not taking warfarin because of allergy or intolerance, or in circumstances where routine INR monitoring may be impractical (provided that monitoring of renal and/or liver function is still practicable).**

2. **People with AF currently taking warfarin who, despite evidence of good compliance with medication and monitoring, have poor anticoagulant control or other practical difficulties with the treatment such that stopping warfarin is being considered for safety reasons or concern regarding lack of efficacy.**

This group represents a significant proportion of patients with AF, most of whom are at a high risk of stroke without anticoagulation. Patients should be reviewed on an individual basis to decide whether a NOAC would be an appropriate treatment option taking into consideration the patient’s time in the therapeutic range (TTR) on warfarin. Measures proven to improve TTR for a significant proportion of people (such as self-testing or self-management, using a point-of-care device such as CoaguChek®) may be the preferred option rather than a switch to another agent. Published data from the RE-LY trial indicate that the clinical advantage of dabigatran was greatly diminished in centres in the trial with a TTR >72% (the UK average centre-specific TTR was 72%). In the ROCKET-AF trial comparing rivaroxaban with warfarin, the TTR in the warfarin arm was an average of 55% worldwide.

3. **People with AF at risk of drug interactions.**

A NOAC may be useful in patients where concomitant medication increases the risk of significant interactions with warfarin. NOACs should not be used with ketoconazole, itraconazole, carbamazepine, phenytoin, phenobarbital, St John’s Wort or rifampicin. Dabigatran should also not be used with clarithromycin, ciclosporin or tacrolimus, and the dose should be reduced when used with amiodarone, dronedarone, verapamil or quinidine. Rivaroxaban and apixaban should not be used with voriconazole, posaconazole or HIV protease inhibitors, and rivaroxaban should not be used with dronedarone.

4. **People with AF who have never taken warfarin.**

NICE guidance states that it is not reasonable to expect all patients to be tried on warfarin before a NOAC is considered. Patients are not obliged to have a trial of warfarin but prescribers may feel in consultation with their patient that a well established drug with which they have substantial experience may be a more appropriate choice.

Some people with AF have previously been recommended to take aspirin instead of warfarin based either on their risk assessment for stroke (using CHADS$_2$ or similar) or their risk of bleeding. For the former category, recent expert guidelines recommend that anticoagulation is appropriate for all people with AF over the age of 65, or those under the age of 65 with a CHA$_2$DS$_2$-VASc score of 1 or more*. For the latter category, there may be modifiable risk factors for bleeding that can be addressed (identified using the HAS-BLED score) such that anticoagulation can then be safely introduced.

Recent guidelines no longer recommend the use of aspirin to prevent thromboembolic events in people with AF, and people taking aspirin solely for this indication should be reviewed as a matter of priority.

*unless the score of 1 arises purely from female sex.
Person with AF (paroxysmal, persistent or permanent)

Moderate-high risk of stroke:
- Aged over 65
- OR
- Aged under 65 with 
  CHA\textsubscript{2}DS\textsubscript{2}-VASc score ≥1

Yes

Assess risk of bleeding

Assess relative contraindications and cautions with anticoagulation using HAS-BLED score (0-9)

HAS-BLED <3
- Address any modifiable factors e.g alcohol and/or BP reduction, concomitant medications etc.

Recommend anticoagulation (with warfarin, dabigatran, rivaroxaban or apixaban)

HAS-BLED ≥3
- Note that at almost any level of HAS-BLED score, the benefits of anticoagulation outweigh the risks

Unmodifiable high bleeding risk: No antithrombotic treatment

CH\textsubscript{A2}DS\textsubscript{2}-VASc stroke risk score
- C Congestive Heart Failure/ LV dysfuction 1
- H Hypertension 1
- A Age ≥75 years 2
- D Diabetes mellitus 1
- S Stroke/TIA/previous embolism 2
- V Vascular disease (MI, PVD) 1
- A Age 65-74 years 1
- Sc Sex category: female 1

Maximum 9 points

'Truly low risk': No antithrombotic treatment

Absolute contraindication to anticoagulation: No antithrombotic treatment

HAS-BLED bleeding risk score
- H Hypertension (SBP>160) 1
- A Abnormal renal or liver function (1 point each) 1 or 2
- S Previous Stroke 1
- B Bleeding history 1
- L Labile INRs (TTR <60%) 1
- E Elderly (aged >65) 1
- D Drugs (aspirin, NSAIDs) or alcohol abuse (1 point each) 1 or 2

Maximum 9 points

Warfarin may be the preferred option for those people with AF:
- Who are currently well controlled on warfarin
- Who have never taken an anticoagulant (after discussing risks and benefits with the patient)
- Who are at risk of drug interactions with a novel oral anticoagulant
- Who have a CrCl (eGFR) <30 ml/min

Dabigatran, rivaroxaban or apixaban may be the preferred option for those people with AF:
- Who are not taking warfarin because of allergy or intolerance, or in circumstances where routine INR monitoring may be impractical (provided that monitoring of renal and liver function is still practicable)
- Who are currently taking warfarin but, despite evidence of good compliance with medication and monitoring, have poor anticoagulant control or other practical difficulties with the treatment
- Who are at risk of drug interactions with warfarin
- Who have never taken an anticoagulant (after discussing risks and benefits with the patient)
What about people with AF who are currently well controlled on warfarin?

Published data from the RE-LY trial indicate that the clinical advantage of dabigatran was greatly diminished in centres in the trial with a TTR >72%, and in the ROCKET-AF trial of rivaroxaban versus warfarin, the worldwide average TTR in the warfarin comparator arm was a relatively poor 55%. Thus people with stable, good INR control (an annual TTR of >72%) are much less likely to gain any clinical benefit by switching to a NOAC. However the NICE guidance states that even people with very good control should not be refused a NOAC as a potential treatment option. Local expert opinion would be that this category would not be a priority for active switching.

Initiating treatment with a novel oral anticoagulant (NOAC)

- The recommended daily dose of dabigatran is one 150 mg capsule twice daily. People aged 80 years or above should be treated with one 110 mg capsule twice daily due to the increased prevalence of renal impairment in this population. People who reach the age of 80 on dabigatran treatment should drop to the lower dose
- The recommended daily dose of rivaroxaban is one 20 mg tablet once daily. For people with CrCl of 15-49 mls/min, 15 mg once daily should be given
- The recommended daily dose of apixaban is one 5 mg tablet twice daily. For people with CrCl of 15-29 mls/min, or those aged ≥ 80 with serum creatinine >133 μmol/L or weight <60 kg, 2.5 mg twice daily should be given
- When switching from warfarin, the drug should be stopped and the new anticoagulant initiated at the appropriate dose when the INR drops below 2.0 for dabigatran and apixaban, or 3.0 for rivaroxaban

Patient education – prevention and management of bleeding

- Patients should be advised to carry an appropriate anticoagulant alert card. The current yellow NPSA Oral Anticoagulant Therapy card may be useful (a patient card is available for each NOAC)
- Patients and carers must have a copy of the relevant patient information leaflet
- Patients should be advised that in the event of haemorrhage or significant acute illness to OMIT their anticoagulant medication and seek urgent medical advice
- Patients need to understand the benefits and risks of the NOACs through fully informed decision making – a copy of this guidance may be appropriate for some patients
- A forgotten dose of dabigatran may still be taken up to 6 hours prior to the next scheduled dose. From 6 hours prior to the next scheduled dose, the missed dose should be omitted. No double doses should be taken
- A forgotten dose of rivaroxaban should be taken immediately and continued as normal the following day. No double doses should be taken
- A forgotten dose of apixaban should be taken immediately and then continued as normal with the next scheduled dose. No double doses should be taken
- Overdose: oral activated charcoal if within 2 hours of ingestion. Dabigatran can be dialysed

Assessment and hospital management of major bleeding (cerebral or GI)

- There is no agent clinically proven to reverse the effect of any NOAC, or to reduce bleeding associated with their use
- Determining the time since last dose of therapy as interruption of treatment may be sufficient. The estimated time for restoration of haemostasis after cessation of therapeutic doses with adequate renal function is usually within 12 hours for dabigatran and apixaban, and 24 hours for rivaroxaban
- Initiate resuscitation with IV fluids, blood transfusion and other supportive measures as necessary
- Check FBC, U&E’s and a coagulation screen (PT, Thrombin Time and APTT). If these tests are within the normal reference range it is likely that only a low level of the anticoagulant is present. However, standard clotting tests cannot be used to estimate the extent of the anticoagulant effect
- If bleeding cannot be controlled by the above measures, tranexamic acid (0.5-1 g 3 times daily IV) should be given if not contraindicated. Administration of prothrombin complex concentrate (PCC) can be considered, but there is very limited experience with the use of these products in patients taking new anticoagulants and this recommendation is based on limited non-clinical data.

Prior to emergency surgery

If possible, wait 12 hours (dabigatran) or 24 hours (rivaroxaban and apixaban) after the last dose

In the event of thrombosis

Wait 12 hours (dabigatran, apixaban) or 24 hours (rivaroxaban) after the last dose before switching to a parenteral anticoagulant. Rivaroxaban is also licensed for the treatment of acute DVT and PE (in a different dose).