Priory Medical Group
Anticoagulation Protocol

Responsible clinician: Dr Emma Olandj
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1. Introduction and Background

The monitoring of anticoagulation for patients taking oral anticoagulants has traditionally been performed in hospital anticoagulation clinics. There has been a trend over the last few years for this activity to be transferred into primary care and many practices are setting up practice based anticoagulation clinics. The rationale behind this move involves:

- Improved patient safety
- Reduced amount of time
- Reduced potential for errors in dosing
- Improved patient convenience
- Improved efficiency in the use of doctor/nurse/staff time
- Improved efficiency in the use of resources

It has been shown that anticoagulation control achieved by practice-based anticoagulation clinics is at least as good as that in hospital clinics and that patient convenience is much improved. The use of near patient testing (NPT) techniques and computerised decision support systems (CDSS) improves the efficiency and quality of anticoagulation control attained. The NPT machine that Priory Medical Group will be using in their Anticoagulation clinics is the Siemens’s machine and the CDSS is INRstar.

The likelihood of dosing errors or mistakes in transmitting results of INR tests to patients is greatly reduced by running an in-practice clinic where patients are given printed dosing instructions at the time of their INR test.

2. Aims and Benefits of the NPT Clinic

To provide on an equitable basis, a safe and effective initiation, stabilisation, monitoring, dosing and prescribing for a ‘one stop shop’ anticoagulation service. The aim of the service is to offer therapeutic warfarin management to patients who are receiving warfarin therapy. The service will reduce the number of patients attending secondary care for monitoring, and General Practice will be the first line treatment service for anticoagulation therapy. Initiating anticoagulation can be provided in primary care using protocols.

The objectives of the service are to:

- Monitor and dose anticoagulant therapy in a community setting.
- Produce standardised, safe and clinically effective anticoagulation management to patients receiving warfarin therapy whilst minimising risks associated with anticoagulation.
- Initiate warfarin for suitable patients.
3. PMG Anticoagulation Service Specification

Priory Medical Group shall:

- **Produce and maintain an up-to-date register** of all anticoagulation monitoring service patients. This shall include:
  - Patients name
  - Date of birth
  - The indication for and duration of treatment
  - Dose of anticoagulant
  - Target INR
  - Relevant clinical history, examination findings and test results
  - Date of next appointment / Follow up arrangements
  - Information from the prescriber (where appropriate)
  - Details of the Computerised Decision Support Software (CDSS) used

- Be in line with NSPA actions and take account of NICE guidance for Commissioning Anticoagulation Therapy (2013)

- Produce optimal management of INR control.

- Provide education to patients to optimize anticoagulation treatment.

- Provide a service that is convenient to the patient.

- Review the need for continuation of anticoagulant therapy is regularly.

- Provide a high-quality service in line with applicable local, national and professional standards.

- Initiate anticoagulation therapy when indicated for all low risk patients

- Inform patients of the advised dose and date of follow-up blood test and record this information in the patient’s notes. The INR frequency should be determined by following guidelines or INRstar.

- Have a DNA system in place for identifying patients failing to attend their follow up appointments within the recommended timescales to ensure warfarin is not prescribed unmaintained (see below).

- Retain patients in treatment up to the end of the indicated treatment duration (including life-long treatment) and have a robust process of documentation including reasons for discharging patients from the service.

- Work together with other professionals when appropriate. Any health professional involved in the care of patients should be appropriately trained.

- Where appropriate, refer patients promptly to other necessary services and relevant support agencies using locally agreed guidelines and referral policies where they exist.
• Ensure that all newly diagnosed anticoagulant patients (and/or their carers and support staff where appropriate) receive appropriate information regarding management of and how to prevent secondary complications of their condition including the provision of patient-held booklets

• Provide all patients on warfarin with an individual management plan which will include the diagnosis, planned duration and therapeutic range to be obtained (e.g. the yellow anticoagulant book). At each clinic attendance, this plan must be updated to include clear daily dosing information and date of next follow up appointment.

• At initial diagnosis, and at least annually, complete an appropriate review of the patient’s health including checks for potential complications and, as necessary, a review of the patient’s own monitoring records. Also, a review of the patients understanding of the information given to them on initiation.

• Ensure that all clinical information is recorded in the patient’s lifelong medical record.

• Prescribing of warfarin including the clinical indication for it and this information is flagged in the patient’s active major/significant problem list.

• To maintain adequate records of the performance and result of the service provided, incorporating appropriate known information. This may include the number of bleeding episodes requiring hospital admission and deaths caused by anti-coagulants.

• Carry out clinical audit of the care of patients against the above criteria, including untoward incidents. The success of the provider in maintaining its patients within the time treatment is in range (TTR) will form part of the audit and quality assurance process.

• Ensure all appropriate licences for INRstar are in place

• Ensure the Siemens meters used should meet the agreed standard for medical devices and arrangements are in place for internal and external quality assurance

• Ensure that all staff involved in providing any aspect of care under this scheme have the necessary training and skills

• Have a named clinical lead that has overall responsibility for ensuring the service is delivered in accordance with the service specification and relevant clinical guidelines.

Facilities:

Priory Medical Group shall:

• Ensure that the anticoagulation monitoring takes place in an appropriate clinical room in an environment fit for purpose.

• Supply all adequate and appropriate equipment including test strips and control strips.
Infection Control
Priory Medical Group:

- Ensure appropriate arrangements are in place for infection control and there are written infection prevention and control policies that are compliant with national and local guidelines and are adhered to.

4. The Siemens Stride device

See attached PDF that can be printed off

5. Training of Clinicians and Staff Involved

PMG Anticoagulation Team:

<table>
<thead>
<tr>
<th>Overall INR Clinical Lead:</th>
<th>Dr Emma Olandj</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMG INR level 3 Operational Lead:</td>
<td>Emma Harris</td>
</tr>
<tr>
<td>PMG INR level 3 Clinical Lead:</td>
<td>Dr Abbie Brooks</td>
</tr>
<tr>
<td>PMG INR level 2 Clinical Lead:</td>
<td>Julie Cole</td>
</tr>
<tr>
<td>PMG Anticoagulation Appointment Lead:</td>
<td>Lisa Dawson</td>
</tr>
</tbody>
</table>

Only designated, trained staff will run and monitor the INR Clinics

Overseeing clinicians are the first point of contact for queries during NPT clinics. The following clinicians have received the appropriate training to act as a level 3 clinician for this service:

Dr Emma Olandj
Emma Harris
Dr Abbie Brooks
Dr Richard Thompson
Dr Emma Dickinson

All clinicians involved with prescribing, dose alteration and monitoring must undertake the BMJ e-learning modules on anticoagulation. Newly employed locums/partners etc. will not be able to become involved in INR monitoring until such certification is obtained.

BMJ Learning (www.bmjlearning.com):

Mandatory for all clinicians who are going to dose/prescribe anticoagulants. www.bmjlearning.com

Two modules to undertake and complete:
1. “Starting patients on anticoagulants: how to do it”,
2. “Maintaining patients on anticoagulants: how to do it” for GPs, practice nurses and other healthcare professionals.

For clinicians who wish to further develop their knowledge regarding anticoagulation, the CPPE workbook designed for Pharmacists is challenging but contains a lot of useful information on anticoagulants. It can be found at: https://www.cppe.ac.uk/programmes/l/anticoag-d-03Anticoagulation: managing patients, prescribing and problems” for Pharmacists

Staff Involved in running INR clinics:

HCAs involved are:

Julie Cole
Carol Hare
Sandra Brady
Lesley Beckwith
Wendy Lawrence

In-house training on use of INRStar:

SCSL to provide training to Priory Medical Group on the use of INR star and Williams Medical on the use of the Siemens near patient testing device.

Use “Getting started with INR Star N3 Release 52” document appended to use as a reference for the use of the INR star software.

Training will be carried out under the supervision of Dr Emma Olandj, Clinical Lead and will incorporate the following points (depending on the Level achieved)

- Basic theory of anticoagulation.
- Clinic aspects of warfarin: side effects, contraindications, interactions, dosing schemes.
- Detailed training on the use of the coagulometer apparatus in use at the practice.
- Detailed training on the use of INRStar CDSS in use.
- Practice-based protocol for the clinic (e.g. who to ask if there is a problem with the equipment, who to ask if an INR is out of range etc).
- Health and Safety procedures.
- Quality control procedures.
- Record keeping and audit.
The taking and testing of blood samples and the use of chemical reagents are activities with Health and Safety at Work implications and need to be evaluated and documented.

The main implications for this clinic are included in Priory Medical Group’s Health and Safety Protocol:

- Safe venesection / finger-prick blood tests
- Glove/eye protection policy
- Pipetting / transfer of samples from specimen bottles to test cards (if applicable to your testing machine)
- Sharps disposal
- Spillages
- Needle-stick injury procedure
- Hepatitis vaccination and antibody testing
- Safe use of any reagents (manufacturer will advise)
- Disposal of unused reagent/test cards etc.

Training is to be undertaken on a rolling cycle and documented for each individual. When the required minimum areas are achieved, individual clinicians can undertake NPT to the Level indicated.
6. Quality Control and Assurance Protocol

External Quality Control (EQC):

Each Siemens Stride machine in use will be registered with NEQAS. Each quarter an external quality check will be carried out using samples supplied by NEQAS and according to their protocol.

Results will be monitored, inputted into INRstar and action taken as appropriate. If any abnormal results are obtained then Williams should be contacted who will arrange a follow up EQC test to be done by NEQAS. Until the repeat test results are available, and if the IQC tests are within range, then the machine can be used until second EQC results are available. If the second successive EQC result is also abnormal then the Siemen’s device is to be discontinued until the manufacturer investigates repairs and re-certifies the device.

Internal Quality Control (IQC) – Every 25 tests:

Every time a new vial of test strips is opened, i.e. every 25 tests, the following checks will be undertaken:

1. QC using the solution and test strip provided.

2. If the test result fails the expected value, carry out a second test after 5 minutes. Record the result on the IQC log on the INR Star programme. This provides an audit trail for quality assurance purposes.

3. If the device fails a second quality control test its use is to be discontinued until the manufacturer investigates repairs and re-certifies the device.

4. Where the device passes the weekly internal quality control test it is ready for use.

5. Where the device fails quality control checks, the unit will be sent for check/repair/recalibration by Williams.

6. Recombinant test strips are to be stored in a refrigerator (vaccine fridge) and expiry dates checked prior to use. Detailed instructions are supplied with each batch of strips

Note: Every new vial opened will have a sticker put on its lid so that all members of staff are aware which vial of strips is currently in use. Only one vial of strips can be used at one time per machine.

Daily (Clinic) Test

1. Ensure the device to be used is clean and free from contamination.

2. Check the batch of patient test strips have been stored correctly with lid sealed, in a dry environment free from frost and humidity and are in-date. Discard any incorrectly stored or out-of-date test strips
3. Check the test strip identifier chip matches the identifier number of the carton and insert the strip into the device, ready for use.

7. Responsibilities of Site Team leaders prior to clinic

- To ensure checklist with all equipment/reagents required for the Anticoagulation clinic has been ticked off and any equipment that is low in numbers is ordered in plenty of time.
- To ensure all room equipment, including the label printer, is in working order with adequate labels in place for label printer and any concerns highlighted to Priory Medical Group IT Department prior to clinic.
- To clearly document on System One, in first block on clinic, who is responsible overseeing clinician.
- To provide the HCA with an initial appointment block to setup and do IQC test
- To ensure that appropriate number of embargoed slots, as outlined by Anticoagulation Appointment Lead, are in place for every clinic
- To ensure that responsible clinician as the appropriate agreed number of blocks in their routine clinic to be able to oversee the HCA run clinic.
- To block the Practice Nurse a monthly appointment, as per other emergency drugs, to do the checks on the Vitamin K/Fragmin, to ensure not expiring soon.
- To ensure that there is a Practice Nurse on site at the same time as the HCA run Anticoagulation Clinic and that this nurse has one block designated for Vitamin K/Fragmin administration.
- To communicate, via tasks, with the Anticoagulation Team any concerns regarding appointment availability for specific patients

8. Responsibilities of Health Care Assistant prior to clinic

- Check the INRStar software is loaded/functioning and the Clinical program is operating effectively. Any problems with this please contact IT Department at PMG prior to clinic.
- Ensure computer appropriately linked to the printer under their log in at the site that they will be running the clinic. Any problems with this please contact IT Department at PMG.
- Highlight any concerns regarding appointment availability to site Team Leader or Lisa Dawson, the PMG Anticoagulation Appointment Lead.
- Ensure receptionists present that day aware of any new patients that need their yellow warfarin books handing in at their appointment for the attention of the overseeing clinician.
- Check in with overseeing clinician prior to clinic starting and highlight any concerns regarding any patients being seen that morning.
• Ensure all required Quality Assurance Checks have been made.
• Check Safe-T-Pro lancets and consumables (cotton wool/adhesive dressings etc.) are available.

9. Responsibilities of overseeing clinician prior to clinic

• Fill out the Anticoagulation Clinical Template on System One, including ticking the box that will code, within Major Problem list, that they are being monitored in primary care.
• Check letters from specialist to ensure no special instructions regarding dosing. These then need to be documented in the Anticoagulation Clinical Template.
• Set up treatment plan on INRstar for all new patients in the clinic:
  o Use COVENTRY choice setting on INR star for maintenance dosing.
  o Use SLOW OATES choice setting for all new patients (low risk patients ONLY – see section 21 for further information). Check that these new patients have a 30-minute appointment in the clinic.
  o Set INRstar to use all tablet types including 0.5mg strengths
  o Ensure all mechanical valves have a maximum recall period of 42 days, all other diagnoses to set to 70 days
• Any new treatment plans done amend appointment screen from ‘New Patient’ to ‘Rx Plan Done’.
• Add 0.5mg warfarin to the repeat medication list
• De-activate any deceased patients or patients who have decided to return to the hospital Anticoagulation Clinic - these will appear as overdue tests and notes will need to be checked. Reason for de-activation to be logged on INRstar.
• Task receptionists to contact each patient genuinely overdue for their INR test and document outcome in New Journal.
• Check for any messages that day from the York Anticoagulation Team that may need actioning on the HOME screen on INRstar.
• Action any tasks to the Anticoagulation Team
10. System One Anticoagulation Template

Clinician responsible for overseeing this template and modifying as needed: Dr Richard Thompson

A summary of the over-anticoagulation and under-anticoagulation guidelines summarised from this protocol are available on this template for easy access for overseeing clinician, including prescription links for all Fragmin/vitamin K prescribed and administered.

Links on template for overseeing clinician to produce DISP prescriptions for all Fragmin/Vitamin K administered.

11. New patients to the PMG clinic (transferring care from the YDH Anticoagulation Service to the PMG Anticoagulation Service):

- Any new patients to our service should be marked as such on the appointment details on System One (i.e. those who are moving from the YDH Anticoagulation Service to the PMG Anticoagulation Service).
- A Treatment Plan will be setup by a trained overseeing clinician in INRstar prior to their arrival.
- At their first appointment, overseeing clinician will check their diagnosis and INR range in their INRstar Treatment Plan is identical to diagnosis and INR range in their yellow book. If there are any queries regarding this range then this is to be discussed with responsible Secondary Care specialist.
- Overseeing clinician will add their last two INR values, and average daily INR dose taken at the time, to INRstar. The last two INRs need to have been at least 7 days apart.
- All our new patients will be informed of how our booked service differs from the drop-in service at the hospital.
- Every Friday, all our new patients from that week should be emailed across to YDH Anticoagulation Clinic to advise them of their discharge from the hospital clinic. The patients will then be taken off the DAWN system. The responsibility for overseeing this lies with Lisa Dawson, our Anticoagulation Appointments Lead, in her absence she will designate this role to another Team Leader
- Apply sticker onto front of yellow book: ‘This patient has their warfarin monitored in primary care, please do not do routine venous sample for INR.’
12. Follow up protocol for appointments where patient Did Not Attend (DNA)s:

Immediate follow-up is required for those patients who DNA their anticoagulant clinic appointment. This is to ensure that their treatment is appropriately monitored and they are not at risk of adverse events related to their anticoagulant therapy.

At the end of each anticoagulation clinic, the clinician overseeing the clinic will:

- Review the appointment list for the clinic and note the names of those patients who did not attend.

- Task the reception at the relevant site to contact the patient by phone to ascertain the reason for non-attendance. Where possible, a new appointment should be booked at this time to ensure the patient is followed up.

- Add a note to the patients Systm One record that they did not attend their appointment and that reception are contacting the patient to rearrange.

Three attempts should be made to contact the patient by phone. If the patient cannot be contacted by phone, a DNA letter should be sent to the home address. A note should be added to the patient’s home screen advising of the date of the DNA’ed appointment.

Patients who have DNA’d on 3 or more occasions will be invited to make an appointment with a clinician to review their anticoagulant therapy.
13. Anticoagulation Appointment protocol

Priory Medical Group Appointment Lead: Lisa Dawson

Any concerns regarding lack of appointments or too many unused Anticoagulation Clinic appointments need to be communicated to Lisa Dawson, our Anticoagulation Appointment Lead. In her absence, Emma Harris, the Anticoagulation Operational Lead will act on her behalf and communicate with Practice nurse managers and appropriate site leads.

- For routine monitoring, the patient can attend a clinic 48 hours before or after the next appointment is due.
- If no appointments are available within the 48-hour timeframe described above, then offer patient use of appointments at one of the different PMG sites that have anticoagulation clinics available: Lavender Grove Surgery, Rawcliffe Surgery, Fulford Surgery and Victoria Way Surgery.
- If patient unwilling/unable to travel to a different site for appointment or no appointments available at other sites please task Anticoagulation Group on System one asking them for advice. One of the anticoagulation team will action this task on the same day received and offer advice to be communicated to patient regarding whether appointment can be postponed to a different day or how they can be fitted in where needed.
- Anticoagulation appointments are available Monday, Tuesday, Wednesday and Thursday mornings. There are a few urgent slots available on a Friday morning at Rawcliffe surgery and Fulford surgery, overseeing clinician responsible for these appointments are Emma Harris, and in her absence, Richard Thompson. If both these clinicians are away, a replacement will be highlighted on the rota.

During appointment:

- Prepare Siemens device and complete internal quality control procedure. Document control result, batch numbers of strips and controls, user ID.
- For NEW patients being started on warfarin go through the new patient counselling check list found in the Shared drive, in the Anticoagulation folder (there is 30 minutes allocated to do this).
- Counsel patient regarding clinic process and check for:
  1. Bleeding or thrombotic events.
  2. Tablet compliance and change of medication.
  3. Lifestyle changes e.g. alcohol binges.
  4. Any upcoming dental or hospital procedures.
- Perform blood test using capillary blood. Venous samples taken for reasons outlined in this protocol only (see Section 31)
• Perform INR test using Siemens device and enter results into INRstar.
• Follow suggestions given by INRstar for dosing and recall dates unless clinically inappropriate e.g. patient known to be non-compliant with therapy.
• Print off label with INR, Warfarin dosage and recall date and stick in patient’s notes (Yellow Book). Yellow anticoagulant books are available at every site, if more needed Lisa Dawson, Anticoagulation Appointments Lead, will order more of these for you.
• Check all information in-putted into INRstar has been linked across into the patient’s System One record.
• Apply sticker onto front of yellow book: ‘This patient has their warfarin monitored in primary care, please do not do routine venous sample for INR.’

14. Test Protocol

• Patients are to be seated throughout the INR procedure.
• A new lancet and a new test strip are to be used for each patient.
• Enter the patient identification into INRstar and confirm current warfarin dose and other medication is as expected. Where this differs, note the patient’s regime within INRstar.
• Insert a new test strip and ensure the device is operating (hour glass displayed).
• When the strip is ready and the device beeps a 120 second countdown begins. Blood must be loaded to the test strip during this timeframe.
• Use the lancet to produce a sample of capillary blood from the fourth or fifth finger (either hand). If necessary the finger can be milked to ensure a sufficient droplet of blood is available. Ensure the finger is generally clean but DO NOT USE AN ALCOHOL WIPE as this may affect the result.
• Load the test strip with blood either from the side or the top. The device will beep when sufficient blood is present (approx 10 uml).
• Check the device is testing the blood (hour glass displayed).
• Using cotton wool (ask patient to) apply pressure to the finger to stop any blood flow. When blood flow has stopped apply an adhesive dressing (patient preference)
• The device beeps when the result is displayed with date and time. If an error is reported the test procedure must be re-started with a new test strip.
• Print off diary using the label printer and put label in to the patient’s yellow booklet.
• Wipe down Siemens’s machine between every INR test
15. INR Result Protocol – In Range

TARGET INR 2.0  In-Range result from 1.5 – 2.5
TARGET INR 2.5  In-Range result from 2.0 – 3.0
TARGET INR 3.0  In-Range result from 2.5 – 3.5
TARGET INR 3.5  In-Range result from 3.0 – 4.0

Using INRstar For Dose and Recall - In-Range Results

1) Where the calculated INR result falls within the therapeutic range, INRstar can be used to advise the patient of dose and re-test interval

2) Check any time limit on Warfarin treatment has not been reached

3) Enter the new INR result into INRstar.

4) Check the patient has sufficient quantity of warfarin for the suggested dose – if necessary request a repeat prescription from the clinician overseeing the clinic.

Where this is not the case, manually alter the tablet combination on the printout for the first two days (e.g: recommended 5mg could be 2 x 1mg + 1 x 3mg) and request a prescription for the recommended strength tablets – to be collected the next day by the patient

5) Print the DIARY as a label and stick it in the patient’s yellow book

Explain to patient the result, dose change (if any) and re-test period. Split tablets are not used. Multiple tablets (0.5mg, 1mg, 3mg and 5mg) are generally used and the system indicates both daily quantity in mg and tablet description regime for the patient to follow. The diary starts on the current day of the test so the patient begins any new dose immediately. If INRstar suggests the inclusion of a 0.5mg tablet, then this will be used. 5mg tablets are reserved for exceptional cases and the CDSS does not routinely suggest 5 mg tablets until Warfarin dose is above 8mg daily.

NB. Patients would never be asked to split tablets.

6) Remind patient that he/she should present their yellow book to the pharmacy when collecting their warfarin prescriptions.

7) For Prosthetic valve patients the maximum recall period is 6 weeks (42 days). Where the system recall is in excess of 6 weeks following two INRs within therapeutic range, the recall date should be altered accordingly before the diary is printed.

8) Save the results in INRstar and ensure all information has been saved in System One.
9) Book the patient’s next appointment to the **nearest** INR clinic to that suggested – if necessary, alter the printed diary date. For routine monitoring, the patient can attend a clinic 48 hours before or after the next appointment is due. If urgent monitoring is required, embargoed slots at Rawcliffe Surgery are available on Friday mornings if needed. If any patients are unable to get an appointment they require then task to be sent to the Anticoagulation Team so that a clinical member of that team can check if their appointment can be delayed or if an urgent appointment is required.
16. INR Result Protocol – Out of Range

Using INRStar For Dose and Recall - Out-Of-Range

1) Where the calculated result falls outside the therapeutic range the INRstar cannot be used to calculate the dose or re-test period by the HCA and the result must be referred to the doctor or pharmacist responsible for that clinic.

2) Check any time limit on Warfarin treatment has not been reached

3) Enter the new INR result into INRstar.

4) Ask the patient about any recent changes in lifestyle / medication / diet etc and enter these comments into INRstar.

5) Use the ‘REFER’ option to store the results/comments

6) **Keep the patient in the clinic and refer immediately to the responsible clinician**

7) The responsible clinician will review the results and record dose and re-test interval in the CDSS – either by accepting INRstar’s suggestions or by manually overriding the dose/recall period

8) The HCA can then take over again, checking that the patient has sufficient quantity of warfarin for the suggested dose – if necessary advise to request a repeat prescription from Reception on the way out

9) Explain to patient the result, dose change (if any) and re-test period. Split tablets are not used. Multiple tablets (0.5mg, 1mg, 3mg, 5mg) are used and the system indicates both daily quantity in mg and tablet description regime for the patient to follow. The diary starts on the current day of the test so the patient begins any new dose immediately.

10) Confirm patient has the required tablet strengths for recommended doses. Where this is not the case, either manually alter the tablet combination on INRstar or prepare a prescription for the recommended strength tablets

11) Print off diary on a label and stick in to yellow book. Talk through regimen with patient and highlight follow up date on the printed label. When possible advise patient to book follow up appointment on their way out.

12) Save the results in INRstar and check details saved in System One.

13) Book the patient’s next appointment to the nearest blood taking clinic to that suggested – if necessary, alter the printed diary date
Out-Of-Range Results- guidance without using INRStar to dose

The following guide is to be used to supplement INRStar by the responsible clinician. It is provided for information only for HCAs and nurses.

Warfarin Dose Adjustments

It is recommended that computer dosing decision software be used for dosing. If dosing is performed manually, and a dose adjustment is required, then it will be based on: Adjustments to patient’s weekly dose should be +/- 10% of total weekly dose

If INR is low, boosting ("one off") doses should be approximately 50% greater than the patient’s regular maintenance dose e.g. if daily dose is 6mg, boosting dose should be 9mg. Again, consideration should be given to patient’s previous pattern of response

A. Guidance for patients who are under-anticoagulated (INR below range):

- ‘Point of Care’ testing machines may have a variance of ~ 0.5 and therefore in the first instance immediate repeat of INR is recommended with borderline low INR results if it will alter management of the patient.
- Review reason for sub-therapeutic anticoagulation and increase Warfarin accordingly.

Reason for anticoagulation - Atrial Fibrillation (target INR 2.5 – Range 2.0-3.0):

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 - 1.9</td>
<td>Increase dose if consistently low</td>
<td>2-4 weeks</td>
</tr>
<tr>
<td>1.6 - 1.8</td>
<td>Increase dose</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>&lt; 1.6</td>
<td>Consider boosting dose(s) and increase dose</td>
<td>1 week</td>
</tr>
</tbody>
</table>

until INR > 2.0. The INR needs to be retested in 3 days (after altering warfarin dosage, it
takes ~ 48 hrs for the INR to change).

**Reason for anticoagulation: On-X Bileaflet Aortic Valves (target INR 2.0 – Range 1.5-2.5):**

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1.5 (patient in sinus rhythm)</td>
<td>Consider boosting dose(s) and increase dose. Only administer LMWH if within 3 months of valve insertion.</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>&lt; 2.0 (patient also has Atrial Fibrillation)</td>
<td>Administer LMWH for patients with bileaflet aortic mechanical valve that also have atrial fibrillation.</td>
<td>Within 1 week</td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days

**Reason for anticoagulation: Mechanical valves (apart from On-X valves):**

*For target INR 2.5 (Range 2.0-3.0)*

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2.0</td>
<td>Increase dose and administer LMWH</td>
<td>Within 1 week</td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days

*For target INR 3.0 (Range 2.5-3.5)*

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 - 2.4</td>
<td>Increase dose if consistently low</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>&lt;2.0</td>
<td>Consider boosting dose(s), increase dose and administer LMWH</td>
<td>Within 1 week</td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days (after
altering warfarin dosage, it takes ~ 48 hrs for the INR to change).

For target INR 3.5 (Range 3.0- 4.0)

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5- 2.9</td>
<td>Continue as before</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>2.0 - 2.5</td>
<td>Consider boosting dose + increase dose</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>&lt; 2.0</td>
<td>Consider boosting dose and increase dose.</td>
<td>1 week</td>
</tr>
<tr>
<td></td>
<td>Treat with LMWH</td>
<td></td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days (after altering warfarin dosage, it takes ~ 48 hrs for the INR to change).

Reason for anticoagulation: VTE (target INR 2.5 – Range 2.0-3.0):

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 - 1.9</td>
<td>Increase dose if consistently low Treat with LMWH if VTE occurred within the last 4 weeks or previous VTE whilst on warfarin</td>
<td>2 weeks</td>
</tr>
<tr>
<td>1.6 - 1.8</td>
<td>Increase dose Treat with LMWH if VTE occurred within the last 4 weeks or previous VTE whilst on warfarin</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>&lt; 1.6</td>
<td>Consider boosting dose(s) and increase dose. Treat with LMWH if VTE occurred within the last 4 weeks or previous VTE whilst on warfarin</td>
<td>1 week</td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days (after altering warfarin dosage, it takes ~ 48 hrs for the INR to change).
Reason for anticoagulation: Arterial Thrombosis (target INR 2.5 – Range 2.0-3.0)

<table>
<thead>
<tr>
<th>INR</th>
<th>Dose adjustment/LMWH</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8 - 1.9</td>
<td>Increase dose&lt;br&gt;Treat with LMWH if thrombosis occurred within the last 4 weeks</td>
<td>2 weeks</td>
</tr>
<tr>
<td>1.6 - 1.8</td>
<td>Increase dose&lt;br&gt;Treat with LMWH if thrombosis occurred within the last 4 weeks</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>&lt; 1.6</td>
<td>Consider boosting dose(s) and increase dose.&lt;br&gt;Treat with LMWH if thrombosis occurred within the last 4 weeks</td>
<td>1 week</td>
</tr>
</tbody>
</table>

Continue to administer LMWH until INR > 2.0. The INR needs to be retested in 3 days (after altering warfarin dosage, it takes ~ 48 hrs for the INR to change).
B. **Low molecular weight heparin (LMWH)**

Low molecular weight heparin (LMWH) is relatively contraindicated, as it accumulates, in cases of severe renal failure (eGFR ≤ 30 mL/min/1.73 m²). Contact Haematology for advice in these patients.

A once daily dosing of LMWH is acceptable.

Subcutaneous LMWH - Dalteparin 200 units/kg until the INR is >2 or enoxaparin as outlined below.

The INR needs to be retested in 3 days, in order to guide warfarin dosage (after altering warfarin dosage, it takes ~ 48 hrs for the INR to change) until therapeutic.

The Dalteparin is to be checked on a monthly basis on Intradoc by the Practice Nurse responsible for checking expiry dates of all emergency drugs. This is check is logged on Intradoc.

Overseeing clinician to DISP all LMWH administered.

**Dalteparin (Fragmin®):**

<table>
<thead>
<tr>
<th>Patient Weight</th>
<th>Once daily dose Dalteparin</th>
<th>Dalteparin syringe</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;46 kg</td>
<td>7500 units</td>
<td>0.3mL</td>
</tr>
<tr>
<td>46-56 kg</td>
<td>10,000 units</td>
<td>0.4mL</td>
</tr>
<tr>
<td>57-68 kg</td>
<td>12,500 units</td>
<td>0.5mL</td>
</tr>
<tr>
<td>69 – 82 kg</td>
<td>15,000 units</td>
<td>0.6mL</td>
</tr>
<tr>
<td>&gt;83 kg</td>
<td>18,000 units</td>
<td>0.72mL</td>
</tr>
</tbody>
</table>

**Enoxaparin: use if GFR < 30ml**

Administered subcutaneously at a dose of:

- 1.0 mg/kg daily (if target INR 2.5 or 3.0)
C. Protocol for HCA for Over Anticoagulation when using INRstar (INR higher than target range)

INR BETWEEN 2.5 and 6.0 (Target of 2.0)

INR BETWEEN 3.0 and 6.0 (Target of 2.5)

INR BETWEEN 3.5 and 6.0 (Target of 3.0)

INR BETWEEN 4.0 and 6.0 (Target of 3.5)

- Query patient for recent medication/lifestyle changes or events which may have occurred, record these in INRstar's comments box
- Ensure compliance with drug regime
- Assess for signs of bleeding
- **Doctor/pharmacist to review and either accept or over-ride INRstar** – including adding comments - for communicating to patient during their appointment. After review, the HCA prints the Diary for each patient reviewed to be passed to the patient.

**INR BETWEEN 6.0 and 8.0 (All Patients)**

Repeat test- if still out of range:

- Assess for clinical signs of bleeding – *if apparent refer for immediate advice* from the Doctor
- Where no bleeding is apparent query if patient has had recent medication/lifestyle/dietary changes or events which may have occurred and record these in INRstar comments box.
- Keep the patient in the clinic and refer immediately to the Doctor/Pharmacist
- Overseeing clinician **NOT** to use INRstar for dose and recall period.
- Doctor/pharmacist to review and communicate plan for dosing to patient.
- During the GP/pharmacist managed phase INRstar is still updated – but no dose/recall recommendations are given to the patient until the duty doctor / pharmacist has reviewed.
**MAJOR BLEED (all patients) and/or INR GREATER THAN 8.0**

Keep the patient in the clinic and refer immediately to the Duty Doctor. Consider 999 ambulance to be called if bleeding.

- Little or no bleeding apparent with INR > 8:
  - Take venous sample – send task to add details of treatment/plan to Adastra
  - Treat with Vitamin K (2mg by mouth)
  - Omit warfarin
  - Repeat INR in 24hrs
  - Restart warfarin when INR < 5 at a reduced maintenance dose
  - Investigate cause of raised INR
  - Overseeing clinician to chase venous sample result and enter as an EQC sample

- **Duty Doctor to consider giving Vitamin K (5mg by mouth) in all patients with Major bleeding.**

- **Where there is major bleeding Duty Doctor will admit with 999 ambulance.**
D. **Guidance for clinicians dealing with Over-Anticoagulated INR:**
(and no acute bleeding)

**For target INR 2.0:**

<table>
<thead>
<tr>
<th></th>
<th>Dose adjustment</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight</td>
<td>2.5 – 2.8 Decrease dose if consistently high.</td>
<td>3-4 weeks</td>
</tr>
<tr>
<td>Moderate</td>
<td>2.9 - 3.4 Decrease dose.</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Significant</td>
<td>3.5 - 4.4 Omit dose for 1 day, decrease dose.</td>
<td>max. 1 week</td>
</tr>
<tr>
<td>Severe</td>
<td>4.5 - 5.4 Omit doses for 2 days, decrease dose.</td>
<td>max. 1 week</td>
</tr>
<tr>
<td></td>
<td>Consider Vitamin K in high risk patients*</td>
<td>If Vit K given to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>review next day.</td>
</tr>
<tr>
<td>Very</td>
<td>5.5 - 8.0 Stop warfarin.</td>
<td>Next day</td>
</tr>
<tr>
<td>Severe</td>
<td>Restart when INR &lt;5.0 at reduced dose. Consider Vitamin K in high risk patients*</td>
<td></td>
</tr>
<tr>
<td>Life</td>
<td>&gt;8.0</td>
<td>Next day</td>
</tr>
<tr>
<td>threatening</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*High risk patients: Age>70; hypertension; diabetes; renal failure; previous myocardial infarction, stroke or gastrointestinal bleed.*

**For target INR 2.5:**

<table>
<thead>
<tr>
<th></th>
<th>Dose adjustment</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight</td>
<td>3.0 - 3.3 Decrease dose if consistently high.</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Moderate</td>
<td>3.4 - 3.9 Decrease dose.</td>
<td>1-2 weeks</td>
</tr>
<tr>
<td>Significant</td>
<td>4.0 - 4.9 Omit dose for 1 day, decrease dose.</td>
<td>max. 1 week</td>
</tr>
<tr>
<td>Severe</td>
<td>5.0 - 5.9 Omit doses for 2 days, decrease dose.</td>
<td>max. 1 week.</td>
</tr>
<tr>
<td></td>
<td>Consider Vitamin K in high risk patients*</td>
<td>If Vit K given to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>review next day.</td>
</tr>
<tr>
<td>Very</td>
<td>6.0 - 8.0 Stop warfarin.</td>
<td>Next day</td>
</tr>
<tr>
<td>Severe</td>
<td>Consider Vitamin K in high risk patients*. Restart when INR &lt;5.0 at reduced dose.</td>
<td></td>
</tr>
<tr>
<td>Life</td>
<td>&gt;8.0</td>
<td>Next day</td>
</tr>
<tr>
<td>threatening</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### For target INR 3.0:

<table>
<thead>
<tr>
<th></th>
<th>Dose adjustment</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight 3.5 - 3.8</td>
<td>Decrease dose if consistently high.</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>Moderate 3.9 – 4.4</td>
<td>Decrease dose.</td>
<td>1 week</td>
</tr>
<tr>
<td>Significant 4.5 – 5.4</td>
<td>Omit dose for 1 day, decrease dose.</td>
<td>max. 1 week</td>
</tr>
<tr>
<td>Severe 5.5 – 6.4</td>
<td>Omit doses for 2 days, decrease dose. Consider Vitamin K in high risk patients*</td>
<td>max. 1 week If Vit K given to review next day.</td>
</tr>
<tr>
<td>Very Severe 6.5 - 8.0</td>
<td>Stop warfarin. Restart when INR &lt;5.0 at reduced dose. Consider Vitamin K in high risk patients*</td>
<td>Next day</td>
</tr>
<tr>
<td>Life threatening &gt;8.0</td>
<td>Stop warfarin Send venous sample Give Vitamin K Restart when INR &lt;5.0 at reduced dose.</td>
<td>Next day</td>
</tr>
</tbody>
</table>

*High risk patients: Age>70; hypertension; diabetes; renal failure; previous myocardial infarction, stroke or gastrointestinal bleed.

### For target INR 3.5:

<table>
<thead>
<tr>
<th></th>
<th>Dose adjustment</th>
<th>Next Appointment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight 4.0 - 4.9</td>
<td>Decrease dose if consistently high.</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Moderate 5.0 - 5.9</td>
<td>Omit dose for 1 day + reduce dose.</td>
<td>1 week</td>
</tr>
<tr>
<td>Significant 6.0 - 6.9</td>
<td>Omit for 2 days and reduce dose Consider Vitamin K in high risk patients*</td>
<td>1 week If Vit K given to review next day.</td>
</tr>
<tr>
<td>Severe 7.0 - 8.0</td>
<td>Stop warfarin Restart when INR &lt;5.0. Consider Vitamin K in high risk patients*</td>
<td>Next day</td>
</tr>
<tr>
<td>Life threatening &gt;8.0</td>
<td>Stop warfarin Send venous sample Give Vitamin K Restart when INR &lt;5.0 at reduced dose.</td>
<td>Next day</td>
</tr>
</tbody>
</table>

*High risk patients: Age>70; hypertension; diabetes; renal failure; previous myocardial infarction, stroke or gastrointestinal bleed.
E. Vitamin K Administration

Konakion MM Paediatric™ (phytomenadione 2mg in 0.2ml) 0.2ml ampoules should be used to manage high INRs in the community. Although this product is licensed for several routes of administration this protocol refers to oral use, which is off licence.

Significant correction of the INR is seen within 6–8 h after intravenous vitamin K use, so patient should be booked for repeat INR in 24hrs.

How to administer Vitamin K (Konakion MM Paediatric™ 2mg in 0.2ml) orally:

- Check expiry date of ampoule and ensure the product is in date before use
- Break ampoule
- Using the oral dispenser withdraw the solution to the appropriate mark (1mg = 0.1ml or 2mg = 0.2ml);
- Hold dispenser in patient’s mouth (at the back of the tongue) and press plunger
- Offer patient a glass of water as the solution has a very bitter taste

Clinical governance

The Konakion MM Paediatric™ is checked on a monthly basis on Intradoc by the Practice Nurse responsible for checking expiry dates of all emergency drugs. This check is logged on Intradoc.

Any near misses or adverse incidents should be recorded.

When two ampoules remain or the product is out of date stock should be re-ordered via Priory Pharmacy.

Overseeing clinician should produce a DISP prescription for all Vitamin K administered.

Using this guidance to administer Vitamin K to manage a high INR should trigger the practitioner to consider whether a Significant Event Analysis needs to be undertaken.
### F. High INR Summary Response

**PDF available to print off**

<table>
<thead>
<tr>
<th>INR &gt; 8.0 with no bleeding manifestation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All patients</strong></td>
</tr>
<tr>
<td>If using near patient testing, send a venous sample to the central laboratory for testing to obtain INR estimation.</td>
</tr>
<tr>
<td>Omit warfarin</td>
</tr>
<tr>
<td>Give oral Vitamin K 1 to 5mg (Konakion MM Paediatric™ 2mg in 0.2ml)</td>
</tr>
<tr>
<td>Repeat INR test following day.</td>
</tr>
<tr>
<td><em>If this falls on a weekend or bank holiday it is the responsibility of the prescribing GP to ensure the test is done and the results acted upon.</em></td>
</tr>
<tr>
<td>Restart Warfarin when INR &lt;5.0</td>
</tr>
<tr>
<td>Reduce maintenance dose and investigate cause of high INR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INR 4.5 – 7.9 (with no bleeding or minor bleeding, e.g. epistaxis)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High risk patients</strong></td>
</tr>
<tr>
<td>Omit warfarin</td>
</tr>
<tr>
<td>Consider oral Vitamin K 1mg (Konakion MM Paediatric™ 2mg in 0.2ml)</td>
</tr>
<tr>
<td>Repeat INR test following day.</td>
</tr>
<tr>
<td>Restart Warfarin when INR &lt;5.0</td>
</tr>
<tr>
<td>Reduce maintenance dose and investigate cause of high INR</td>
</tr>
<tr>
<td><strong>Low risk patients</strong></td>
</tr>
<tr>
<td>Omit warfarin</td>
</tr>
<tr>
<td>Restart warfarin when INR &lt;5.0</td>
</tr>
<tr>
<td>Reduce maintenance dose and investigate cause of high INR</td>
</tr>
</tbody>
</table>

1 High risk: age > 75 years; diabetes; renal failure; stroke; previous gastro-intestinal haemorrhage. The GP will use his or her own judgement in managing the risk for an older person living alone.

### References


17. Dosing Venous Samples

All patients having their warfarin monitored in primary care need to attend PMG Anticoagulation Clinics for monitoring of their warfarin. They should be discouraged from having routine venous samples done.

Venous samples should not routinely be done in our Anticoagulation clinics. The only time these should be done include:

- When INR > 8
- Two failed Internal Quality Control tests at beginning of clinic
- As part of an External Quality Control test
- Unable to get a capillary sample

If a venous sample is being done for INR monitoring for any of the above reasons then the following must be done:

- HCA to send Task to overseeing clinician that a venous sample is being done and reason why.
- Ensure clear reason on Blood form for venous sample being done, state whether INR has been actioned already
- Act on the INR from Siemens machine rather than waiting for INR result to come back from lab
- Ensure INR result is chased, it is the responsibility of the overseeing clinician to chase this INR, add to INRstar and inform patient of their warfarin dose and complete their Task on System One.
- A task needs to be sent to Secretaries by overseeing clinician asking them to add to Adastra any information needed for Out of Hours doctors/pharmacist; e.g. 'high INR has been actioned already'

Any venous blood results called through need the following actions:

- Ensure at least one trained Anticoagulation Clinician is available that day at PMG (see above for list of trained overseeing clinicians). If they are in that day, task them the results and mark as urgent. In the unlikely event that none of these members of staff are available, contact the Urgent Care Doctor that day, who will dose result, inform patient of what dose of warfarin to take that day and task the PMG Anticoagulation Team with an outline of what was done so that INRstar can be updated and patient offered a follow up appointment.
- Overseeing clinician to investigate why venous result has been done. If not for any of the reasons above then further investigation needed; this may involve
contacting patient to advise them not to have venous bloods done but to attend Anticoagulation clinics only. These should not routinely happen due to sticker advising being monitored in primary care on the front of patient’s yellow book (‘This patient has their warfarin monitored in primary care, please do not do routine venous sample for INR.’)

18. Housebound patients

All our housebound patients currently rely on the District nurses to take a venous blood sample to have their warfarin dosed.

Until the District Nurses have been fully trained on the use of the INR machines to get an immediate INR result all PMG patients who are housebound should be under the care of the YDH Anticoagulation Clinic. Once the District Nurses are able to provide us with immediate INR levels we can amend this protocol to incorporate housebound patients into our Anticoagulation Service.

19. Communication with Out of Hours

If venous sample being sent for any of the reasons outlined in Section 17 above, please ensure a task is sent to Secretaries asking them to add to Adastra any information needed for Out of Hours doctors/pharmacist; e.g. ‘high INR has been actioned already’.

Other times in which communication with Out of Hours may be necessary include high INRs that need monitoring over the weekend with or without District Nurses administering Fragmin.
20. Guidance for warfarin patients having dental or hospital procedures:

The peri- and post-operative management of patients on oral anticoagulation involves consideration of the following factors:

- Procedure to be undertaken
- Risk of thrombosis
- Indication for anticoagulant therapy
- Risk reduction by use of bridging therapy with LMWH
- Risk and consequences of excess bleeding

If in doubt, seek advice from the specialist team treating the patient.

Recommendations according to the BCSG guideline:

- Pre-operative bridging carries a low risk of bleeding but the use of post-operative bridging requires careful consideration due to the high risk of bleeding. We recommend that post-operative bridging should not be started until at least 48 h after high bleeding risk surgery.
- Patients with VTE more than 3 months earlier can be given prophylactic dose LMWH rather than bridging therapy.
- Patients with low risk AF (no prior stroke or TIA) do not require bridging therapy.
- Patients with a bileaflet aortic MHV with no other risk factors do not require bridging.
- Patients with a VTE within the previous 3 months, patients with AF and previous stroke or TIA or multiple other risk factors, and patients with a mitral MHV should be considered for bridging therapy.

Minimal risk procedures for which warfarin does not need to be stopped:

- Joint injections
- Cataract operations
- Endoscopic procedures (inc. mucosal biopsy)
- Dental procedures (extraction of up to 3 teeth)

For patients undergoing cardioversion, the INR needs to be >2 for 2 consecutive tests prior to the cardioversion procedure.
21. Warfarin Slow Induction Protocol - Atrial Fibrillation

This warfarin induction regimen should be used for all our new, low risk patients (see Indications below) being started on warfarin. All high-risk patients, such as those with venous thromboembolic disease, are currently being initiated on treatment by the YDH Anticoagulation Clinic.

*Use ‘OATS' 2mg tablet choice on INR Star initiation protocol*

*Prior to starting warfarin, the following should be checked:*
- FBC, U&E, LFT, GGT, coagulation screen including INR
- Patient education check list

Any clinician wishing to refer new, low risk, patients to the Primary Care Anticoagulation Service at Priory Medical Group needs to:
- fully counsel the patient on their anticoagulation options
- check warfarin not contraindicated with no drug interactions
- arrange bloods FBC, U+E, LFT, GGT and coag screen (including INR)
- task the Anticoagulation Team on System One about the new patient
- patient/reception to **book a double appointment (30mins)** in the anticoagulation clinic which are currently held at Victoria Way Surgery, Fulford Surgery, Rawcliffe Surgery and Lavender Grove Surgery.

Patients not requiring rapid anticoagulation can be safely managed using a slow loading regimen which results in therapeutic anticoagulation within 3 to 4 weeks in the majority of patients. This appears to avoid over-anticoagulation and bleeding associated with rapid loading. There is no need to cover with heparin as no pro-coagulant state occurs when slow loading the patient. This regimen allows for induction of anticoagulation therapy requiring only weekly monitoring.

**Indications:**
For use in patients for whom immediate anticoagulation is **not** required. These include:
- chronic or paroxysmal atrial fibrillation;
- selected patients with left ventricular thrombus;
- selected patients with mitral stenosis;
- stroke outpatients in sustained AF who have waited 14 days following the acute event with a CT head scan that has excluded haemorrhage;
- selected patients with pulmonary hypertension.

**Exclusion Criteria:**
Patients requiring immediate anticoagulation.
These include
- deep vein thrombosis and / or pulmonary embolus;
- mechanical prosthetic cardiac valve insertion;
- arterial embolus;
- selected patients with atrial fibrillation, left ventricular thrombus, mitral stenosis;
- pulmonary hypertension associated with venous thromboembolic disease.

**Regimen:**

1. Ensure the patient has no contraindications to warfarin. Generally, if a patient is taking aspirin, this should be continued until the INR is therapeutic then stopped.
2. Ensure baseline bloods outlined above are satisfactory.
3. Explain to the patient the indication for warfarin treatment and the risks and benefits of it. Complete risk assessment and counselling checklist.
4. Prescribe 2mg of warfarin daily at 6pm for 1 week.
5. Reduce dose to 1mg if patient has concurrent illness or medication which will increase warfarin’s effectiveness.
6. Repeat INR after a further 7 days of warfarin therapy.
7. Adjust dose as per nomogram or using INRstar.
8. After 2 weeks the Slow Oats regimen ceases and the patient needs to be converted to the Manual dosing regimen, using the table in the Nomogram below for reference.
9. Once two consecutive INR values, with at least 7 days between them, have been within normal range, the patient can be converted to Coventry regimen for maintenance dosing.
**NOMOGRAM FOR WARFARIN SLOW START REGIMEN**

Day 1

- Baseline INR < 2.0
- Start 2mg warfarin/day at 6pm
- Repeat INR in 7 days

Day 8

- INR <2: Continue present dose warfarin. Repeat INR in 7 days.
- INR >2: Warfarin sensitive. Action depends on level of INR

Day 15

- Check INR
- Adjust dose according to table below.
- Predicted maintenance dosage of warfarin based on the sex of the patient and the INR after 2 weeks of warfarin 2mg/day

<table>
<thead>
<tr>
<th>Male INR at week 2</th>
<th>Male Maintenance dose</th>
<th>Female INR at week 2</th>
<th>Female Maintenance dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>6mg/day</td>
<td>1.0-1.1</td>
<td>5mg/day</td>
</tr>
<tr>
<td>1.1-1.2</td>
<td>5mg/day</td>
<td>1.2-1.3</td>
<td>4mg/day</td>
</tr>
<tr>
<td>1.3-1.5</td>
<td>4mg/day</td>
<td>1.4-1.9</td>
<td>3mg/day</td>
</tr>
<tr>
<td>1.6-2.1</td>
<td>3mg/day</td>
<td>2.0-3.0</td>
<td>2mg/day</td>
</tr>
<tr>
<td>2.2-3.0</td>
<td>2mg/day</td>
<td>&gt;3.0</td>
<td>1mg/day</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>1mg/day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If INR >4.0 omit warfarin for 2 days and reduce daily dose by 1mg

Recheck INR after a further week and adjust dose as below

- INR <2: Increase daily Warfarin dose by 1mg. Repeat INR in 7 days. Continue in this fashion until INR >2.0
- INR 2-3: Continue present dose warfarin. Repeat INR in 7 days. Fine tune warfarin dose if INR fluctuates.
- INR >3: Fine tune warfarin dose/ omit doses if necessary.
22. Protocol for RAPID warfarin induction (for patients with acute venous thromboembolic disease, e.g. DVT/PE)

THIS IS NOT CURRENTLY UNDERTAKEN BY PRIORY MEDICAL GROUP. Once these high risk patients have been established by the YDH anticoagulation team on warfarin and had at least 2 consecutive INRs in range they can be transferred to our system for primary care monitoring if they so wish.

<table>
<thead>
<tr>
<th>Day</th>
<th>INR</th>
<th>Warfarin dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;1.4</td>
<td>Risk factors* = 5mg</td>
</tr>
<tr>
<td></td>
<td>&gt;1.4</td>
<td>No risk factors = 10mg</td>
</tr>
<tr>
<td>2</td>
<td>&lt;1.8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1.8 – 2.0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&gt;2.0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>&lt;2.0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2.0 – 2.5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2.6 – 2.9</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3.0 – 3.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3.3 – 3.5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&gt;3.5</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>&lt;1.4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>1.4 – 1.5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>1.6 – 1.7</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1.8 – 1.9</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2.0 – 2.3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2.4 – 3.0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>3.1 – 3.2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3.3 – 3.5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&gt;3.5</td>
<td>0</td>
</tr>
</tbody>
</table>

*Risk factors =
- age > 60 years
- body weight <50kg
- liver disease
- cardiac failure
- serum albumin <35g/L
- known bleeding risk
- taking drugs that enhance the effect of anticoagulants
- previously anticoagulated and maintenance dose <2mg daily
# 23. New patient counselling check list

PDF available to print off

<table>
<thead>
<tr>
<th>Counseling point</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong></td>
<td>Use of the Anticoagulant Therapy Record (yellow book) and alert card</td>
</tr>
<tr>
<td><strong>2.</strong></td>
<td>Standard dispensing labels (<em>i.e. take strictly as directed by the anticoagulant clinic</em>)</td>
</tr>
<tr>
<td><strong>3.</strong></td>
<td>Basic mode of action of warfarin</td>
</tr>
<tr>
<td><strong>4.</strong></td>
<td>Indication for therapy</td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td>Expected duration of therapy</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Tablet identification – colour of the different tablet strengths</td>
</tr>
</tbody>
</table>
| **7.** | Dose:  
Varied dosing  
Time of day to take warfarin  
How to use the different tablets strengths to make up the dose intended  
Action to take if dose missed; NOT to take extra doses |
| **8.** | Compliance and ways of remembering to take the tablets *e.g.* using a calendar |
| **9.** | Monitoring:  
Target INR  
Where to go for monitoring (and importance of attendance) |
| **10.** | Side effects of warfarin and poor control of anticoagulation (and what to do if experienced)  
Signs /symptoms of excess anticoagulation: bleeding or bruising  
Recurrence of thromboembolism |
| **11.** | Potential for drug interactions: aspirin, ibuprofen (paracetamol is the preferred analgesic), antibiotics, herbal remedies etc |
| **12.** | Diet (vitamin K containing foods, importance of avoiding major fluctuations in dietary intake; cranberry juice interaction) |
| **13.** | Alcohol intake |
| **14.** | Contraception, pregnancy and hormone replacement therapy (if relevant) |
| **15.** | Surgical procedures (inc. day surgery/dental treatment & hospital admission) |
| **16.** | Acute illness |
| **17.** | Hobbies and leisure activities (including flying) |
| **18.** | Injections (including immunisation) |
| **19.** | How to obtain further supplies of warfarin |
| **20.** | Who to contact for advice/further information |
Warfarin Counselling Advice Notes

1. Use of the Anticoagulant Therapy Record (yellow book) and alert card. Show the patient the yellow book and go through it with them filling in the details on pages 1 & 2 if available. If unsure of any sections, check with the doctor. Explain that the anticoagulant therapy record is the only record of dosing information available for the patient, since (2) the dispensing labels on the warfarin boxes/bottles will be labelled as “Take strictly as directed by your doctor or anticoagulant clinic”.

2. Therefore it is important to keep the record book up to date at all times and for the patient to understand the dosing instructions.

3. Go through the booklet with the patient, highlighting the information it contains and ensuring that the points below are covered.

4. Basic mode of action of warfarin – “reduces the bloods ability to form clots”

5. Indication for therapy – explain why the patient is taking warfarin. Common examples (list not exhaustive) and patient explanations include:
   a. DVT/PE – “to prevent the clot getting bigger or returning
   b. AF: “when the heart is not beating regularly the blood will not flow smoothly. Therefore there is a risk of getting a clot which may travel through the body and cause damage e.g. a stroke”
   c. Pre & post DC cardioversion for AF
   d. Heart valves – “there is a risk of getting clots around the valve, which may float through the body and cause damage; also to prevent valve damage”

6. Expected duration of therapy (if known) – if unsure, check with Doctor. Do not assume or guess.
   a. DVT/PE- may be a short course (3 – 6 months) or lifelong if recurrent
   b. AF/heart valves – treatment will be lifelong
   c. DC cardioversion – e.g. at least 4 weeks before and 4 weeks after, the latter depending on success of DC cardioversion (may be longer in practice – 8 weeks)
   d. Cancer patient receiving thalidomide in combination with chemotherapy and dexamethasone – until end of treatment

7. Tablet identification
   a. Explain colour of the different tablet strengths and that they will always be the same colour for each strength even if the supplier is different.
   b. White 500 micrograms/Brown 1mg tablets/Blue 3mg tablets/Pink 5mg tablets. It is unusual for patient to get all 4 strengths.

8. Dose
   a. Varied dosing according to blood result/INR
   b. Warfarin should be taken at same time of day, every day (which is often around teatime / (6-7pm). If patient decides to take it in the morning, tell patient to inform hospital staff if (s)he is ever admitted to reduce the risk of getting a double dose (since many hospitals prescribe in-patient warfarin at 6pm)
   c. How to use the different tablets strengths to make up the dose intended
   d. If a dose is missed, OK to take on the same day within 6 hours of when dose was due. NEVER double up on a dose but carry on as normal on next day if dose is missed. Make a note of the date the dose was
missed in the yellow book and let anticoagulant clinic/doctor know. If unsure then it is better to miss the dose rather than risk taking a double dose

9. **Compliance and ways of remembering to take the tablets** e.g. using a calendar to mark off whether a dose as been taken.

10. **Monitoring**
    a. INR is monitored regularly initially (daily/every few days) and gradually less often once dose and INR settles (monthly or up to 10 weekly)
    b. Outpatient monitoring clinics / GP practice (and importance of attendance)/ District Nurse

11. **Side effects** of warfarin and poor control of anticoagulation (and what to do if experienced)

12. **Recurrence of thromboembolism:** contact GP if original symptoms recur

13. **Signs/symptoms of excess dosing:** severe bleeding or multiple bruising with or without high INR is the most common side effect: contact doctor immediately if unusual or severe

14. **Contact GP if these occur:** bloody stools or urine, nose bleeds (if lasting for >5mins or if pt does not usually suffer from nose bleeds), bloodshot eye, coughing or vomiting blood, excessive vaginal bleeding, cuts that take longer that 5 mins to stop bleeding

15. Bleeding from gums (use a soft toothbrush)

16. Any other side-effects: discuss with GP

17. **Potential for drug interactions:** may be affected by many medicines, therefore:
    a. Patient should always let doctor/dentist/pharmacist know that (s)he is on warfarin
    b. Not to take aspirin unless prescribed by doctor. Care with OTC painkillers (e.g., Ibuprofen/aspirin preparations). Paracetamol is preferred
    c. Caution with antibiotics and always check with pharmacist/anticoagulant clinic before taking herbal remedies
    d. Inform GP/anticoagulant clinic of any drugs stopped started or if doses are changed

18. **Diet:** some foods contain high levels of vitamin K which may interfere with warfarin action (e.g. broccoli, brussels sprouts, cauliflower, cabbage, chickpeas, kale, spinach, turnip greens, beef liver, pork liver + all pork products) Patient may have these foods in moderation but important to avoid major changes in regular diet or crash diets. Report any major changes in diet to anticoagulant clinic. Cranberry juice may raise INR – avoid or limit intake of cranberry juice whilst on warfarin.

19. **Alcohol intake:** check patient’s current alcohol intake. Advice.
24. Dietary advice to patients

*PDF available to print off*

**DIET ADVICE PATIENT LEAFLET**

Warfarin produces a biochemical reaction which changes the time it takes for the blood to form a clot. It is commonly used to increase this time in people who have risk factors associated with stroke or heart problems.

Changes to your diet, when taking warfarin, can have an effect on this clotting process. Some foods and drinks may make your blood clot too quickly and others may have the opposite effect. When you are taking warfarin such foods can interfere with the clinical management of this process.

For your good health it is important that you eat a regular as well as healthy diet and follow the tips below. You will need to arrange for more frequent blood tests, known as INR tests, if you significantly and suddenly change what you eat and drink.

You should try to be consistent in what you eat and drink and avoid a lot of variation every day. If you achieve this, your medication will 'catch up' with your diet and help keep your INR result – and thus your blood clotting time - stable.

The main points to remember are:

- Eat regular meals
- Avoid crash diets and fad diets
- If you drink alcohol, then keep to a small, recommended, amount every day e.g. a glass or two of wine or up to 1 pint of beer or a couple of measures of spirits
- Do not binge on alcohol
- Avoid vitamin supplements containing vitamin K – check with your pharmacist if you are unsure.
- If you take fish oil supplements do not exceed the recommended dose and take on a regular basis.
- Avoid cranberry juice and cranberry supplements
- Avoid grapefruit and grapefruit juice
- Check with your dietician or doctor before taking prescribed sip-feeds – these may contain vitamin K
- If you take any complementary medicines – check with your pharmacist for safety.
- Do not take St John’s Wort

Some foods contain a lot of vitamin K, which works and acts against warfarin because it reduces the time it takes the blood to clot. If you have too much vitamin K you will see your INR levels go too low and increase your risk of thrombosis (blood clot).

If you follow the advice below you are unlikely to eat too much or too little vitamin K.
Top food tips to eat the right amount of vitamin K

- Eat some fruit and vegetables every day
- Most green, leafy vegetables contain a lot of vitamin K - cabbage, broccoli, Brussels sprouts, spinach, lettuce. If you enjoy eating these, it is best to have your normal portion every day. If you don’t, then keep to other vegetables such as green beans, peas, carrots, cauliflower, tomatoes, peppers and parsnips.
- If you want to increase the amount of fruit and vegetables you eat, try not to increase the green leafy vegetables – go for more fruit.

If your INR levels are unstable, check with your nurse or doctor - you can be referred to a dietician for further advice if you think the problem is due to your diet.
25. Yearly reviews & Audit

Yearly Reviews

- All patients on warfarin should have a yearly review by PMG’s Clinical Pharmacist or, in her absence, a GP trained in overseeing warfarin dosing.

- This review needs to be logged on System One and include:
  
  - Any adverse events experienced
  - Medications they may be taking that may be interfering with their INRs
  - Diet/alcohol intake
  - A review of their yellow book
  - A review of patient’s understanding of the information given to them on initiation of treatment.
  - Review of patient’s TTR percentage, aiming for > 65% (excluding their first 6 weeks of treatment).

- Reassess anticoagulation option for patients with any of these:
  
  - 2 INRS > 5 in the last 6 months
  - 1 INR > 8 in the last 6 months
  - 2 INRs < 1.5 in the last 6 months
  - TTR < 65%

- If swapping from warfarin to NOAC please consult Section 26 of this protocol and fill our System One clinical template to ensure a safe transfer of anticoagulation treatment.

Audits

Clinician responsible for overseeing this: Emma Harris

The following should be undertaken on a yearly basis:

- Total number of patients with TTR > 65%
- Audit of any adverse reactions
- Audit of comparison of any simultaneous venous and capillary INRs done as part of EQC
CONVERSION FROM DABIGATRAN TO WARFARIN

- When converting from dabigatran to warfarin, adjust the starting time of warfarin based on creatinine clearance as follows:
  - For CrCl>50mL/min, start warfarin 3 days before discontinuing dabigatran. For CrCl 31-50mL/min, start warfarin 2 days before discontinuing dabigatran.
  - For CrCl 15-30mL/min, start warfarin 1 day before discontinuing dabigatran
  - For CrCl<15mL/min, no recommendations can be made – consult with on call haematologist.

- Because dabigatran can contribute to an elevated INR, the INR will better reflect warfarin’s effect after dabigatran has been stopped for at least 2 days.

CONVERSION FROM RIVAROXABAN TO WARFARIN

- There is a potential for inadequate anticoagulation during the transition from rivaroxaban to warfarin.

- Continuous adequate anticoagulation should be ensured during any transition to an alternate anticoagulant. It should be noted that rivaroxaban can contribute to an elevated INR.

- In patients converting from rivaroxaban to warfarin, warfarin should be given concurrently until the INR is ≥ 2.0. For the first two days of the conversion period, standard initial dosing of warfarin should be used followed by warfarin dosing guided by INR testing. While patients are on both rivaroxaban and warfarin, the INR should not be tested earlier than 24 hours after the previous dose but prior to the next dose of rivaroxaban. Once rivaroxaban is discontinued INR testing may be done reliably at least 24 hours after the last dose.
CONVERSION FROM APIXABAN TO WARFARIN

<table>
<thead>
<tr>
<th>Interacting Drug</th>
<th>Potential problem</th>
<th>Comment</th>
</tr>
</thead>
</table>

- When converting from apixaban to warfarin, continue apixaban for at least 2 days after starting warfarin therapy.

- After 2 days of co-administration of apixaban and warfarin, obtain an INR prior to the next scheduled dose of apixaban.

- Continue co-administration of apixaban and warfarin until the INR is 2 or more

26. Guideline for conversion from the use of warfarin to NOACs

CONVERSION FROM WARFARIN TO DABIGATRAN

- Discontinue warfarin and initiate dabigatran when INR is < 2.0

CONVERSION FROM WARFARIN TO RIVAROXABAN

- Discontinue warfarin and initiate rivaroxaban when INR is < 3.0

CONVERSION FROM WARFARIN TO APIXABAN

- Discontinue warfarin and initiate apixaban when INR is < 2.0
<table>
<thead>
<tr>
<th>Interacting Drug</th>
<th>Potential problem</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Fluctuations in prothrombin time in heavy drinkers or patients with liver</td>
</tr>
<tr>
<td>Allopurinol</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Uncommon but unpredictable interaction – monitor INR more closely when allopurinol started.</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>The onset of this interaction may be slow and may persist after amiodarone has been withdrawn.</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>Unpredictable increase or reduction in anticoagulant effect</td>
<td>Monitor INR closely. INR may be difficult to control in patients taking tricyclic antidepressants.</td>
</tr>
<tr>
<td>Anabolic Steroids (e.g. danazol, stanozolol)</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Interaction develops rapidly, possibly within 2 or 3 days.</td>
</tr>
<tr>
<td>Aspirin</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Avoid aspirin as an analgesic – use Paracetamol as a safer alternative. Low dose aspirin 75mg daily appears not to interact to any clinically relevant extent but may increase the risk of bleeding due to antiplatelet effect.</td>
</tr>
<tr>
<td>Azathioprine</td>
<td>Reduces anticoagulant effect of warfarin</td>
<td>Warfarin dose may need to be increased when azathioprine started and reduced if azathioprine is stopped.</td>
</tr>
<tr>
<td>Barbiturates (e.g., Phenobarbital)</td>
<td>Reduces anticoagulant effect of warfarin</td>
<td>May require 30-60% increase in warfarin dose. The reduction in anticoagulant effects begins within a week, reaching a maximum after about 3 weeks and may still be evident up to 6 weeks after stopping the barbiturate.</td>
</tr>
<tr>
<td>Bezafibrate</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Bleeding is likely if the anticoagulant dose is not reduced appropriately (between one-third to one-half and then adjusted as per INR).</td>
</tr>
</tbody>
</table>

27. Warfarin Interactions

<table>
<thead>
<tr>
<th>Interacting Drug</th>
<th>Potential problem</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boldo</td>
<td>May increase anticoagulant effect of warfarin</td>
<td>Modest rise in INR seen in a patient taking Boldo and Fenugreek.</td>
</tr>
<tr>
<td>Carbamazepine</td>
<td>Reduces anticoagulant effect of warfarin</td>
<td>Dose of warfarin may need to be increased (up to double dose). Oxcarbamazepine does not appear to interact.</td>
</tr>
<tr>
<td>Cefaclor</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Cefuroxime, cefalexin or cefradine are safer alternatives.</td>
</tr>
<tr>
<td>Celecoxib</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Rare cases of increased INR and bleeding reported.</td>
</tr>
<tr>
<td>Cimetidine</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Unpredictable but common interaction. Use ranitidine instead.</td>
</tr>
<tr>
<td>Interacting Drug</td>
<td>Potential problem</td>
<td>Comment</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>May increase the anticoagulant effect of warfarin</td>
<td>Rare and unpredictable interaction. Monitor INR. Use alternative antibiotic if possible.</td>
</tr>
<tr>
<td>Ciprofibrate</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Bleeding is likely if the anticoagulant dose is not reduced appropriately (between one-third to one-half and then adjusted as per INR).</td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Marked increase in INR has been reported. If a macrolide is required, Azithromycin is a safer alternative.</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>Mild bleeding can occur even though INRs remain stable and within range</td>
<td>Increased risk of bleeding due to antiplatelet effect. Manufacturer advises avoid concomitant use.</td>
</tr>
<tr>
<td>Colestyramine</td>
<td>Reduces anticoagulant effect of warfarin by preventing the absorption of warfarin.</td>
<td>Separating the dosages as much as possible may minimise the effects of this interaction.</td>
</tr>
<tr>
<td>Coenzyme Q10</td>
<td>Reduces anticoagulant effect</td>
<td>Monitor INR. Avoid use of products containing coenzyme Q10.</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td>Reduces anticoagulant effect of warfarin</td>
<td>Generally avoided in thromboembolic disorders.</td>
</tr>
<tr>
<td>Corticosteroids</td>
<td>Variable response</td>
<td>Low to moderate doses can increase or decrease the anticoagulant effect of warfarin. High doses have been reported to increase the anticoagulant effects. Monitor INR.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interacting Drug</th>
<th>Potential problem</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranberry Juice</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Avoid use in patients taking warfarin.</td>
</tr>
<tr>
<td>Cytotoxics</td>
<td>Increases anticoagulant effect of warfarin reported with some cytotoxics</td>
<td>Refer patients on concurrent cytotoxic agents to secondary care for management of anticoagulation.</td>
</tr>
<tr>
<td>Danshen</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Advise patients not to use Danshen whilst taking warfarin.</td>
</tr>
<tr>
<td>Devil’s Claw</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Bleeding disorders visible on the skin (purpura) have been reported.</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>Cases of bleeding reported with concomitant use.</td>
<td>Unpredictable – monitor INR &amp; adverse effects. Avoid if possible. Ibuprofen or Naproxen are less likely to interact with warfarin.</td>
</tr>
<tr>
<td>Dipyridamole</td>
<td>Mild bleeding sometimes occur even though INRs remain stable and within range.</td>
<td>Increased risk of bleeding due to antiplatelet effect.</td>
</tr>
<tr>
<td>Interacting Drug</td>
<td>Potential problem</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Disulfiram</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Review concurrent use of warfarin in patients requiring Disulfiram.</td>
</tr>
<tr>
<td>Dong quai (Angelica sinensis)</td>
<td>Reports of marked increases anticoagulant effect of warfarin</td>
<td>Advise patients not to use Dong quai whilst taking warfarin. Increased bleeding time &amp; bruising.</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Serious but unpredictable. The elderly are at greater risk. Monitor closely.</td>
</tr>
<tr>
<td>Esomeprazole</td>
<td></td>
<td>Monitor INR if adding or stopping esomeprazole.</td>
</tr>
<tr>
<td>Fenofibrate</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Bleeding is likely if the anticoagulant dose is not reduced appropriately (between one-third to one-half and then adjusted as per INR).</td>
</tr>
<tr>
<td>Feverfew</td>
<td>Altered bleeding time reported</td>
<td>Advise patients not to use Feverfew whilst taking warfarin. Monitor INR.</td>
</tr>
<tr>
<td>Fluconazole</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Monitor and reduce warfarin dose accordingly.</td>
</tr>
<tr>
<td>Flurbiprofen</td>
<td>Cases of bleeding reported with concomitant use.</td>
<td>Unpredictable – monitor INR &amp; adverse effects. Avoid if possible.</td>
</tr>
<tr>
<td>Flutamide</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Monitor and reduce warfarin dose as necessary.</td>
</tr>
<tr>
<td>Garlic</td>
<td>Case reports of increased anticoagulant effect of warfarin</td>
<td>Advise patients NOT to take garlic supplements. Regular ingestion of foods containing garlic should not pose a problem.</td>
</tr>
<tr>
<td>Gemfibrozil</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Bleeding is likely if the anticoagulant dose is not reduced appropriately (between one-third to one-half and then adjusted as per INR).</td>
</tr>
<tr>
<td>Gingko Biloba</td>
<td>Isolated reports of increased risk of bleeding</td>
<td>Advise patients not to use Gingo Biloba whilst taking warfarin.</td>
</tr>
<tr>
<td>Ginseng</td>
<td>Reports of spontaneous bleeding in patients using Ginseng without anticoagulants</td>
<td>Ginseng contains antiplatelet components, so avoid use in patients taking warfarin.</td>
</tr>
<tr>
<td>Grapefruit juice</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>May cause a modest rise in INR.</td>
</tr>
<tr>
<td>Drug</td>
<td>Effect on Warfarin</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
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<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Glucagon</td>
<td>Large doses (&gt;50mg over 2 days) increase anticoagulant effect of warfarin</td>
<td>Reduce dose of warfarin &amp; monitor INR closely. Smaller doses (total of 30mg) are reported not to interact.</td>
</tr>
<tr>
<td>Glucosamine</td>
<td>Reports of increases in INRs</td>
<td>Patients on warfarin are recommended not to take Glucosamine.</td>
</tr>
<tr>
<td>Glucosamine / Chondroitin</td>
<td>Increased risk of bleeding</td>
<td>Chondroitin has anticoagulant activity and should be avoided in warfarin patients.</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>Reduces anticoagulant effect of warfarin</td>
<td>Unpredictable (effects some but not all patients) – monitor INR.</td>
</tr>
<tr>
<td>Indometacin</td>
<td>Indometacin inhibits platelet aggregation and so prolongs bleeding</td>
<td>Avoid NSAIDs in patients taking warfarin if possible. If concurrent use essential, monitor INR closely.</td>
</tr>
<tr>
<td>Influenza vaccine</td>
<td>Usually safe &amp; uneventful, but small numbers of bleeding episodes reported</td>
<td>Evidence shows that influenza vaccination in those taking warfarin is normally safe &amp; uneventful. Advise patient to report any unexplained bleeding.</td>
</tr>
<tr>
<td>Itraconazole</td>
<td>Case report of increased anticoagulant effect of warfarin</td>
<td>Monitor and reduce dose if necessary. Advise patients to report any unexplained bruising or bleeding.</td>
</tr>
<tr>
<td>Ketoconazole</td>
<td>Case reports of increased anticoagulant effect of warfarin</td>
<td>Monitor and reduce dose if necessary. Elderly at greater risk. Advise patients to report any unexplained bruising or bleeding.</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>If concurrent use cannot be avoided, reduce the warfarin dose by between one-third and one-half and monitor closely.</td>
</tr>
<tr>
<td>Miconazole</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Avoid -Potentially serious interaction. This includes topical preparations. Use Nystatin</td>
</tr>
<tr>
<td>Non-Steroidal Anti-inflammatory Drugs (NSAIDs)</td>
<td>NSAIDs irritate stomach lining and reduce platelet aggregation</td>
<td>Avoid where possible. If concomitant use cannot be avoided, monitor INR and adverse events. Ibuprofen or Naproxen are less likely to interact with warfarin.</td>
</tr>
<tr>
<td><strong>Medication</strong></td>
<td><strong>Effect of Warfarin</strong></td>
<td><strong>Possible Impact</strong></td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Omeprazole</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>A small change in INR may be seen. Occasionally clinically significant interactions occur. Use Lansoprazole as an alternative.</td>
</tr>
<tr>
<td>Papaya</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Avoid use in patients taking warfarin. Monitor INR.</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>Increases anticoagulant effect of warfarin when large doses are used over a prolonged time</td>
<td>Intermittent use (&lt;2.5g/week) unlikely to affect INR. A reduction in warfarin dose may be needed for regular paracetamol users.</td>
</tr>
<tr>
<td>Penicillins</td>
<td>Increases and decreases in the anticoagulant effect of warfarin have been seen</td>
<td>Uncommon and unpredictable effect. Close monitoring of INR recommended.</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Can increase or reduce anticoagulant effect of warfarin</td>
<td>Monitor INR and adjust dose of warfarin accordingly.</td>
</tr>
<tr>
<td>Piroxicam</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Avoid NSAIDs in patients taking warfarin if possible. If concurrent use essential, monitor INR closely and reduce dose of warfarin if necessary.</td>
</tr>
<tr>
<td>Rifampicin / Rifabutin</td>
<td>Markedly reduces anticoagulant effect of warfarin</td>
<td>Monitor closely. Reduces anticoagulant effect within 5-7 days. Warfarin dose may need to be double or trebled and reduced on stopping Rifampicin or Rifabutin.</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>Generally small, clinically irrelevant increase in anticoagulant effects</td>
<td>Monitor initially or after dose increases of Simvastatin.</td>
</tr>
<tr>
<td>St John’s Wort</td>
<td>Moderate reduction in the anticoagulant effects of warfarin</td>
<td>CSM advises stopping St John’s Wort and adjusting the dose of warfarin as necessary.</td>
</tr>
<tr>
<td>Sulindac</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Uncommon and unpredictable – monitor INR. Avoid NSAIDs where possible. Ibuprofen or Naproxen less likely to interact.</td>
</tr>
<tr>
<td>Tamoxifen</td>
<td>Markedly increases anticoagulant effect of warfarin</td>
<td>Monitor and reduce warfarin dose as necessary – may need to reduce dose by half.</td>
</tr>
<tr>
<td>Thyroid hormones</td>
<td>Increases anticoagulant effect of warfarin</td>
<td>Monitor and adjust warfarin dose as necessary. Warfarin dose may need to be changed as thyroxine doses are altered.</td>
</tr>
<tr>
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</tr>
<tr>
<td>Vitamin K</td>
<td>Anticoagulant effects of warfarin are reduced or abolished</td>
<td>Vitamin K may be present in enteral feeds, health foods, food supplements, some green vegetables, except tea. If patients are “warfarin resistant” consider this interaction.</td>
</tr>
</tbody>
</table>