# Anticoagulation

## *Executive summary*

## Introduction

Anticoagulation is the use of drugs to reduce the ability of the blood to coagulate. It is indicated in the treatment of venous thromboembolic disease, after cardiac surgery involving implantation of a metal valve and in the prevention of complications from atrial fibrillation and other conditions leading to thrombosis in the ventricles of the heart.

When a decision is made to anticoagulate a patient, the indications, target INR range and expected length of treatment must be recorded clearly in the notes and communicated to the patient. The risks involved must be clearly communicated to the patient and their relatives along with recommendations for how they should respond to unexpected events.

When a patient on anticoagulation presents with an INR outside their target range, the patient should see a doctor familiar with the use of warfarin, to ensure that the patient is quickly treated and the INR is returned to the target range.

## Target users

* Doctors
* Nurses

## Target area of use

* Outpatient department
* Ward

## Key areas of focus / New additions / Changes

This guideline outlines the use of anticoagulants in our practice, focusing on the decision to initiate treatment, the process of initiating treatment, ongoing adjustments to keep the patient in the target range and the response to a raised INR.

## Limitations

We do not have out-of-hours access to APTT or INR measurements, limiting our ability to safely use unfractionated heparin. Low molecular weight heparin (LMWH) is outside our budget for drugs for the general public. Modern direct oral anticoagulants (DOACs) are outside our budget for all patients.

## Indications for anticoagulation

Anticoagulation is indicated in 3 groups of conditions:

1. Venous thrombo-embolic disease (pulmonary embolism (PE) and deep vein thrombosis (DVT))
2. Metal artificial heart valves
3. Atrial fibrillation and intracardiac thrombosis

Warfarin is contraindicated in pregnancy.

### Venous thrombo-embolic disease

A separate guideline (Deep vein thrombosis and pulmonary embolism MeG-CLS-055) provides guidance on making the diagnosis. Once a diagnosis of DVT or PE has been made anticoagulation is an essential part of treatment. It should be continued for at least 3 months for patients with DVT and for at least 6 months for those with PE. The target INR range is 2.0-3.0.

### Metal artificial heart valve

These patients need lifelong anticoagulation. They will usually return to us from surgery already established on warfarin treatment and with advice from the surgeons about the INR range. If there is no advice then an INR range of 3.0-4.0 is appropriate. When their INR is raised, great care should be taken to avoid lowering it too far or making it difficult to anticoagulate them in the medium term (see section on treatment of raised INR).

### Atrial fibrillation and ventricular thrombosis

Anticoagulation is indicated to reduce the risk of stroke when a thrombosis is visible on ECHO or in a patient with atrial fibrillation who scores for this on a risk score such as CHA2DS2-Vasc score. This score has been validated in developed countries and patients where anticoagulation is widely available and relatively safe and patients are expected to be treated for life. This should be offset against the risk of bleeding, which can be estimated through scores such as HAS-BLED score.

In our setting, where we are the only centre able to safely manage anticoagulation and where access to services to treat complications such as gastrointestinal bleeding and intracerebral bleeding are limited, a careful risk benefit analysis must be made if anticoagulation is considered. This should take into account where the patient lives and their commitment to returning to the clinic frequently for INR checks as well as the more clinical aspects. In general, we are not able to commit to lifelong anticoagulation for most of these patients.

If the patient is able to pay for a regular supply of a direct acting oral anticoagulant, this may be a viable option. If you wish to calculate the CHA2DS2-Vasc score, you can find a calculator here: <https://www.mdcalc.com/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk>; HASBLED is available here: https://www.mdcalc.com/has-bled-score-major-bleeding-risk

## Initiating anticoagulation

Patients with PE or DVT and those with visible thrombosis in their ventricle will require rapid anticoagulation with heparin treatment, bridging to warfarin treatment for the longer term.

Heparin can cause heparin induced thrombocytopenia (HIT), which is a life-threatening complication, when given for more than 4 days. The platelet count should be monitored before treatment and again at 4 days, then every 2-3 days until day 14 or the heparin is stopped (if earlier). HIT is very rare in obstetric patients given heparin and, in all groups, usually presents before day 15.

### Unfractionated heparin

This can be given subcutaneously at a dose of 250 units/kg up to 15,000 units BD. The APTT should be monitored daily whilst on this treatment.

This is a compromise. This treatment is effective for DVT, but has not been shown to be effective in other conditions. However, iv heparin is not safe without regular APTT measurements 4 times each 24 hour period and this is not available to us.

### LMWH

Enoxaparin is available for staff and study participants. It is available in local pharmacies at about D1000 per injection if other patients would prefer to use it. Give 1.5 mg/kg enoxaparin sc OD.

### Warfarin

Patients receiving warfarin for a metal valve will usually have been started on warfarin before returning to our care. This section does not address their care.

Use a 10 mg starting dose for adults starting on warfarin for DVT, PE or AF. This requires fewer INR measurements and more rapidly achieves anticoagulation compared to 5 mg starting dose regimens. Give 10 mg warfarin on days 1 and 2, then check the INR on day 3. The doses are given at 8 pm and the INR is checked in the morning. Warfarin should be prescribed both on the drug chart and on the green warfarin chart.

Use a lower starting dose for older patients or those who are frail with altered metabolism.

Use the figure on the next page to calculate the doses for days 3 and 4. Recheck the INR on day 5 and use the figure to calculate the dose for days 5, 6 and 7. The INR should be rechecked on day 8 and further dosing is according to the next section of the guideline.

Continue heparin for at least 5 days or until the INR is 2.0 or above – whichever is latest. This is because warfarin is associated with an initial hypercoagulability which reduces by day 5.

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## Ongoing treatment with warfarin

The adjustment of warfarin doses to maintain a steady INR is as much an art as it is a science. This is partly because the patient also has to contribute to their ongoing care, by taking the warfarin dose at about the same time every day and by having regular habits with regard to diet.

### Patient counselling

Patients need to understand the risks and benefits of warfarin treatment. Counsel them on the importance of eating regularly and taking their medications every day – ideally in the evening at a similar time. For those without watches, they can take it as the sun goes down or when they hear the evening call to prayer. Alternatively, encourage them to set an alarm on their phone.

Some foods, which contain a lot of vitamin K, can interfere with warfarin treatment. These include green leafy vegetables, liver and alcohol. They can take these, but should do so on regular basis – taking about the same amount each week. If they suddenly increase or decrease what they take, then the INR will change accordingly. Similarly certain drugs can increase the INR. These include regular paracetamol, ciprofloxacin, macrolides, mebendazole and related medications, statins, NSAIDs and some herbal medications. Patients should tell any doctor prescribing medication for them that they are on warfarin.

Patients should also be warned that they may need to come to the clinic more frequently than usual or even be admitted for a few days, if their INR goes out of range or is unstable.

### Checking the INR and responding to the result

The INR should initially be checked on a weekly basis, increasing to 2 weekly, then monthly as the result stabilizes. If the result is found to be outside range, then the frequency will need to be increased again.

The INR must be interpreted in the context of recent results and any changes of warfarin dose. If the INR has remained within range but has tended either to rise or fall, you will need to adjust the warfarin dose accordingly to change this trend. Also if the result has drifted just out of range, don’t make big adjustments to the dose, small adjustments should be adequate

When the INR is outside range, think about why this has happened. Has the patient missed doses or stopped taking the medication? Have they changed their diet? Were they given concomitant medications? Has something else changed?

For larger deviations, leading to the INR being outside range, the table below can be used to make bigger changes to the dose. Repeat the INR in a week or less (but not less than 48 hours) when you use the table.

|  |  |  |
| --- | --- | --- |
| **INR (target range 2.0-3.0)** | **INR (target range 3.0-4.0)** | **Dose change** |
| <1.5 | <2.5 | Increase by 20% |
| 1.6-1.9 | 2.5-2.9 | Increase by 10% |
| 3.1-3.4 | 4.1-4.4 | Decrease by 10% (or repeat after no change) |
| 3.5-3.9 | 4.5-4.9 | Decrease by 20%, consider holding one dose |
| 4.0-4.9 | 5.0-5.9 | Hold until INR returns to range then decrease by 20-30% |

If the patient has a low INR and a metal valve, then use either subcutaneous unfractionated heparin or LMWH at therapeutic doses as described in the initiating anticoagulation section. (Note that we do usually provide LMWH to the cardiac children on warfarin when needed).

## Treatment of raised INR

The risk of bleeding increases with rising INR. When the INR is very high or the patient is bleeding consider how strong the indication is for anticoagulation. Patients in whom the indication is not strong may be best served by stopping the treatment. On the other hand, those with metal valves must be managed with great care, so that they do not fall below the therapeutic range. These patients must be admitted to hospital and you should be prepared to give them heparin until their INR is in range if this occurs.

INRs up to 10, where the patient is not bleeding, can be managed without vitamin K. Warfarin should be stopped and the INR monitored closely until it is in range. It is important to try and identify why the INR has risen so high. This will help determine your response and how you counsel the patient.

If the INR is above 10 and there is no bleeding, consider the use of 1 mg vitamin K given orally as a single dose. This should be discussed with a consultant and only used if absolutely necessary, especially in patients with a metal valve.

If the patient is actively bleeding, treatment will depend upon the INR and the type of bleeding. Use the table below.

|  |  |  |
| --- | --- | --- |
| **Type of bleeding** | **INR** | **Intervention** |
| Major life-threatening bleeding | Any | Omit warfarin  Give 5 mg iv vitamin K  Use fresh whole blood for transfusions |
| Minor bleeding from mucosa (including gums, nose, rectum, anus, urinary tract) | Above 6.0 | Omit warfarin for 1-2 and reintroduce when bleeding is under control and INR < 5.0.  Use vitamin K only if INR above 10 and if you are prepared to admit the patient and give heparin if the INR falls below the therapeutic range. |
| Above range but less than 6.0 | Reduce dose of warfarin by 10%. Consider holding for a few days as per guidance above.  Monitor INR closely. |
| Within range | Continue warfarin unless indications are weak. Look for cause of bleeding. |

## Measuring INR

INRs can be measured either at the bedside using a point-of-care test or in the laboratory. In general, we prefer the point-of-care test as it allows us to obtain an immediate result. Unfortunately, we have had trouble maintaining the machines and they are often not working.

An accurate lab INR requires that the tube is filled full. Whenever possible, ask the patient to attend the lab for the sample to be taken. Request the result urgently. Make a decision about what you will do with the warfarin assuming that the result is well in range. Take the patient’s phone number. Check the result the next day and if the result deviates from your expectation, call the patient to inform them what to do. If you are unsure, bring them back to clinic as soon as possible.

## Key Issues for Nursing care

* Make sure patients understand why they are prescribed anticoagulation.
* Counsel patients on the importance of a regular diet and lifestyle and the importance of taking every dose of medication. Help them think through how to schedule doses and to identify reminders to take the medicine (such as the evening call to prayer or a reminder alarm on their phone). Explain the importance of telling anyone who gives them a drug that they are on warfarin.
* Explain why patients need to return for INR checks and how the frequency of this may change over time.
* Make sure patients know what to do if they start bleeding.

## References

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| **Written by:** | Name: Karen Forrest | Date: 03 December 2019 |
| **Reviewed by:** | Name: Behzad Nadjm | Date: 04 February 2020 |
| **Version:** | **Change history:** | **Review due date:** |
| 1.0 | New document |  |
| Review Comments (*if applicable)* |  |  |