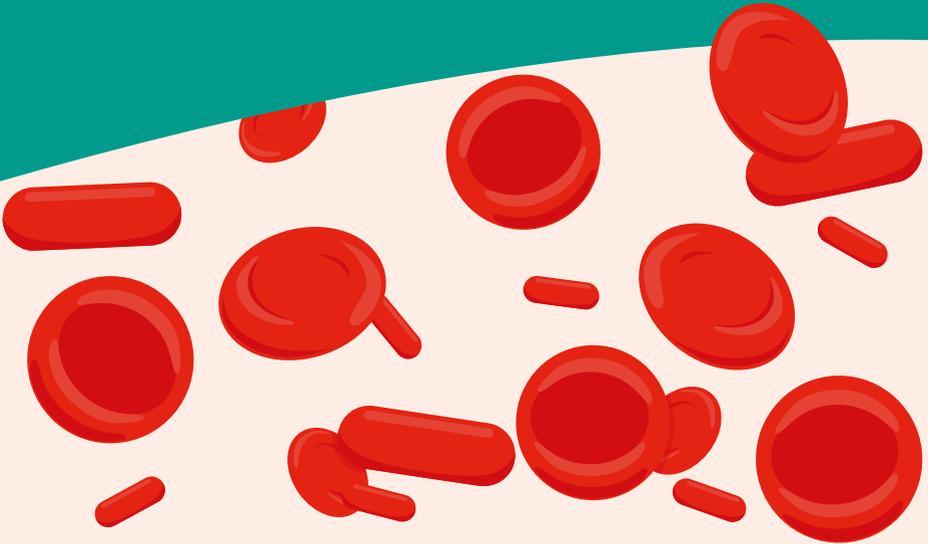


International Normalised Ratio (INR) Testing and Warfarin

Information for parents and carers



Leeds children's
hospital

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Introduction

What is INR?

INR means International Normalised Ratio (INR) and is a method of measuring how fast the blood clots. In a person not taking warfarin, the INR value will be one. The higher the INR the longer it takes for the blood to clot, for instance an INR of two means that it takes the blood twice as long to form clots compared to somebody not taking warfarin. Your doctor or specialist nurse will tell you what your/your child's target INR range is as it will depend on why warfarin has been prescribed.

What is warfarin?

Warfarin is a medicine that is classed as an anticoagulant. This means that warfarin is used to help prevent blood clots forming in the blood so that blood can flow freely throughout the body. Warfarin is used as a treatment to help prevent blood clots from occurring in people who are at higher risk of clots, for example after heart surgery. It is also used for people who already have a clot to help make sure they don't get any more clots while the body works to break the clot down.

What is INR testing?

To help measure the INR we use an INR machine which calculates how long it takes for the blood to clot and works out the ratio giving the INR result. INR testing involves obtaining a small sample of blood, usually a finger prick and applying a drop of blood to a test strip. INR testing is important as this determines what dose of warfarin is needed which the warfarin clinic will manage via telephone appointments.



Home INR Testing

If you decide to do home testing, you will be given an INR monitor, initial testing strips and lancets. Training will be provided on how to do INR testing by the children's cardiac nurse specialist team. Once your child has been discharged home, further test strips and lancets will be provided on prescription from the GP. A yearly review will be required which involves a comparison test to check the result on the home INR monitor and same as the INR result within hospital. This will be arranged by the children's cardiac nurse specialists.

How to take warfarin

Warfarin is available in four different strength tablets:

- Depending on the INR value obtained, the dose of warfarin may change to help keep the value in the target range.
- It is important to always have a supply of each strength tablet to enable different doses to be given. Please ask your GP to add all strengths of warfarin to a repeat prescription.
- The tablets come in different colours to make identification of the strengths easier.

Warfarin is given **ONCE** a day. Ideally the dose should be given at the same time every day. It does not matter what time the dose is given, try to find a way to fit this in to the daily routine.

In most cases it is preferred to give the dose in the evening, this means that if an INR reading has been taken that day and the dose of warfarin needs to be changed, this change can occur the same day.



If unable to swallow tablets whole, warfarin can be crushed and mixed with water, milk, juice or soft food. It is very important that **ALL** of the food/drink that the dose has been mixed with is given. If not, the dose given will be incomplete and this can lead to unstable INR readings.

Side effects

As warfarin increases the time it takes for blood to clot, it is common for children to experience increased bleeding and bruising following an injury. Girls may also notice that their periods are heavier.

The following side effects indicate that the INR may be above the target range:

- Unexplained dizziness or weakness
- Unusual, unexpected and or excessive bruises
- Excessive bleeding or heavily bleeding wounds
- A nose bleed that won't stop and/or heavy nose bleeds
- Dark/black stools, blood in urine (indicating an internal bleed)
- If the patient becomes ill with vomiting, the vomit may appear blood streaked
- Periods excessively heavier than normal
- Bleeding gums upon brushing their teeth

If you notice any of these symptoms you/your child needs their INR testing. You should then contact either the warfarin clinic, a member of the medical team caring for you or your GP.

If it is a medical emergency then call 999 or go to A&E.

Foods and their vitamin K content

Vitamin K helps the blood to form clots; this is a necessary process that helps prevent excessive bleeding following injury. Warfarin works to slow down the clotting process by reducing the production of clotting factors that rely on the presence of vitamin K. As such, vitamin K is essentially the antidote to warfarin and can reverse its effects in the body.



Many foods contain vitamin K, in particular, green leafy vegetables. This does not mean you need to stop eating them, you should however, be consistent in how often you eat them and the size of the portion you eat. For example if you have broccoli twice a week then continue to do this and have roughly the same amount each time. The dose of warfarin will be adjusted for the current diet and average vitamin K intake.

Foods such as carbohydrates (e.g. pasta, rice), meat, poultry and dairy products tend to be low in vitamin K.

The following should be avoided when taking warfarin as they can significantly increase the INR:

- Cranberry juice
- Grapefruit juice
- Pomegranate juice

There are many things that can affect your INR level, food, medications (prescribed drugs, illegal/street drugs, herbal remedies, over the counter medicines), alcohol, stress, exercise and so on.



Foods and their vitamin K content

The table below shows examples of the different foods which contain, high, medium and low vitamin K per average serving.

<i>High vitamin K (>100mcg)</i>	<i>Medium vitamin K (more than 50-100mcg)</i>	<i>Low vitamin K (less than 50mcg)</i>
Brussel sprouts	Asparagus	Avocado
Collard greens	Broccoli	Bananas
Kale	Cabbage	Beans (green/yellow)
Mustard greens	Endive	Canola oil
Spinach	Lettuce	Carrots
Turnip greens	Sauerkraut	Cauliflower
		Celery
		Chickpeas
		Corn
		Cucumber
		Fruits
		Mayonnaise
		Olive oil
		Peas
		Peppers
		Potatoes
		Soya bean oil
		Tomatoes

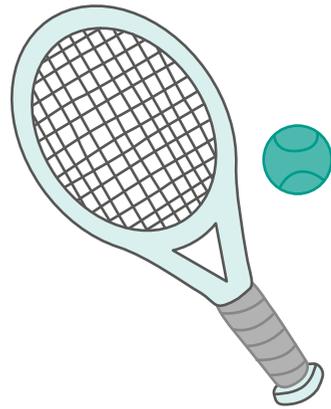
Adapted from "Amount of vitamin K in different foods", UpToDate. Accessed May 2020

Exercise and taking warfarin

Children that are taking anti-coagulants are still able to participate in some low risk physical activities; however there are certain physical activities that should be avoided in case they sustain any injury which can increase the risk of bleeding.

Examples of contact sports that should be avoided are listed below:

- Rugby
- Martial arts
- Horse riding
- Boxing
- Hockey



Low risk activities include:

- Swimming
- Tennis
- Badminton

Activities such as football and cricket can be played as well, however not at a competitive level. Any injury sustained during these activities may increase risk of bruising or bleeding. If possible protective gear should be worn. Helmets should be worn for cycling to reduce the risk of head injury.

A letter will be sent to your child's school to inform them that your child has commenced on warfarin and provide them with information that they require. However if more information is required then please do not hesitate to get in touch with the Children's cardiac nurse specialist team.

Other important bits you need to know

Surgical and dental procedures

If your child has any planned surgical procedures or dental work which needs to be done, then sometimes it may be necessary to stop taking the warfarin a few days before or change the dosing. The doctor/surgeon should discuss this with you. You can also contact the warfarin clinic or the children's cardiac nurse specialists.

Immunisations

It is generally safe to have immunisations. Some immunisations and vaccinations can be given as an injection underneath a layer of fat under the skin. This is known as a subcutaneous injection. This may help to reduce bruising and risk of bleeding and may be a preferred option for some immunisations. Some immunisations and vaccinations are given as an injection into the muscle. This is normally fine as long as your child is up to date with their INR monitoring and is within their target range. Always inform your nurse/doctor that your child is taking warfarin before any planned immunisations and vaccinations.

Piercings and Tattoos

Piercings and tattoos are not advised due to the increased risk of bleeding and infection.

Contraception/periods

Periods may become more heavy than usual and last longer. When deciding what contraception to take, it is advisable to avoid the combined pill to reduce risk of clots. This can be discussed in further detail with the GP and the cardiac nurse specialists when considering methods of contraception.

Holidays and Travel

Inform the warfarin clinic in advance before going on holiday so that INR testing and appointments can be planned. Ensure that you have enough warfarin tablets for the duration of your stay. If home testing, you will also need to make sure you take your INR monitor and the warfarin in the hand luggage if travelling abroad. You can request a letter for carrying medication in the hand luggage from the children's cardiac nurse specialist team.



If not home testing, ensure that an INR has been taken and the warfarin clinic contacted for dosing advice prior to travelling and a further appointment has been scheduled for after your return. Prior to travel, it is worthwhile identifying a medical facility close to your accommodation whilst on holiday that would be able to do an INR check should this be necessary.

Ensure that you take contact details for the warfarin clinic or the medical team caring for your child away with you in case you require advice whilst on holiday.

Head Injury

When taking warfarin it is important to be more vigilant with head injuries, as bumps to the head can sometimes cause internal bleeding. Therefore it is advisable if your child sustains a head injury which is more than a very minor bump, for it to be further assessed either by the GP or take your child to your local A&E.

Other Medicines

Warfarin interacts with lots of medicines which can lead to the INR increasing or decreasing. We therefore recommend speaking to a pharmacist before buying any medicines over the counter to check that they are suitable to be given in combination with warfarin. Inform anyone prescribing medication for you/your child that they are taking warfarin.

In particular be aware of the following types of pain relief:

- Paracetamol is the recommended painkiller in people taking warfarin however be aware that this can also lead to an increase in the INR when taken regularly
- Non-steroidal anti-inflammatory medicines such as ibuprofen, diclofenac and naproxen should be avoided as these increase the risk of bleeding
- Aspirin- should be avoided (unless prescribed by a doctor) as this increases the risk of bleeding

Some other medicines to be aware of:

- Antibiotics- if your child is started on a course of antibiotics please inform the warfarin clinic when the course starts as we may want to monitor the INR reading more closely
- Miconazole oral gel
- Herbal medicines
- Multivitamins- be aware that some multivitamin preparations contain vitamin K
- Dietary supplements- may contain vitamin K

This list is not exhaustive. Please inform the warfarin clinic if your child is prescribed any new medication. Check with your pharmacist or the pharmacist in warfarin clinic before starting any new medications you have bought over the counter.

Children's warfarin clinic

The clinic is a pharmacist-led telephone clinic that runs at the following times:

<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
<i>1:30pm-4pm</i>	<i>9am-12:30pm</i>	<i>1:30pm-4pm</i>	<i>9am-12:30pm</i>	<i>1pm-4pm</i>

The doctors looking after your child will refer them to our clinic and once we have received all the necessary information, we will allocate you a time slot to telephone us. You will receive a letter with the time of your first appointment

During your appointments, we will discuss with you your child's INR result; we will ask you:

- if there have been any changes to your child's health
- if there have been any changes to your child's medication
- if there have been any changes to your child's diet
- if your child has shown any unusual signs of bleeding such as nose bleeds, unexplained bruising, blood in their urine or stools, that are uncommon to them

We will then advise what dose of warfarin your child should take and when their INR needs retesting.

If your child has a home testing CoaguChek® machine

- Please check your child's INR either the night before or the morning of their clinic appointment
- If their INR is out of range or unusually high or low, please recheck it half an hour later

If your child has their INR blood test in hospital/GP

- Please take your child for their blood test the day before their clinic appointment
- We will inform you of the result at their clinic appointment
- After each appointment, we will send you a letter confirming your child's INR, what dose of warfarin they should be taking and when their next appointment is
- We will also send a letter to your GP with this information

Please ensure that you phone at your allocated appointment time

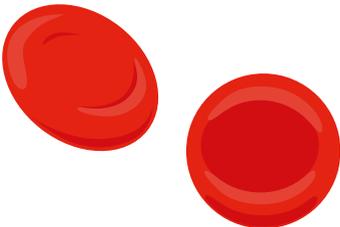
Contact details for the clinic are:

Telephone: 0113 392 2910 (during the above clinic times)

Email: leedsth-tr.childrenswarfarinclinic@nhs.net

Email us at any time Mon-Fri and we will get back to you within the next few days

If you require urgent advice, please contact your GP or your specialist ward



Missed doses and extra doses

For missed doses, don't panic; see information below on what you should do following a missed dose:

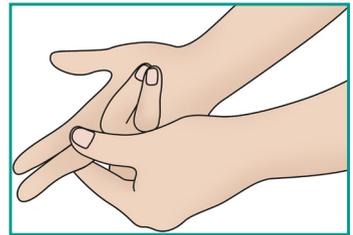
- The dose can be taken up until midnight the same day.
- If past midnight then don't take the missed dose and carry on with the next dose as normal. Please do not double up doses the next day.
- Make a note of the missed dose and the date and let the warfarin clinic know at the next appointment
- If concerned then you can check the INR level two days after the missed dose and contact the warfarin clinic if below range
- If more than one dose is missed then you must contact the warfarin clinic (Monday-Friday). For weekends and out of hours then please contact ward 51.

If there have been extra doses that have been given, the advice on what to do will depend on how much has been taken. Therefore you need to contact the warfarin clinic (Monday-Friday) and ward 51 if it is out of hours and weekends.

Top tips to obtain a good capillary sample

To obtain a good capillary sample, following these steps below will help you to do this:

- Wash hands with warm soapy water in preparation of taking the sample. This ensures that the sample obtained will not be contaminated.
- Select the depth on the pen which is most suitable for you, this may be 5 to start with, but as you become familiar with the technique you may decide to reduce the depth of the lancet.
- When positioning the lancet onto the finger, ensure this is not on the pad and is more to the side. This is because it is more painful on the pads of the fingers.
- Ensure that once you are in the correct position that you are pressing firmly onto the finger.
- Once you have punctured the site, wait five seconds and then to help increase blood flow you may 'milk' from the knuckle out towards the fingertip. However it is important that you do not squeeze! This can affect the sample.
- Once you have a drop of blood that is roughly the size of ladybird, then apply this to the test strip.
- If you do not manage to obtain enough blood then you must start again with a fresh lancet and a different finger. This also includes changing the test strip if it has become contaminated.



Useful reminders for use of Coaguchek XS Monitor

- The user's manual is an excellent guide if you have forgotten anything.
- Always keep batteries in the monitor so that it will remain programmed. You have one minute to change batteries without losing the programme.
- Keeps the machine clean, remembering to leave the test strip area open to dry.
- Test strips and lancets can be obtained from your GP, on prescription.

Each box of test strips is supplied with a specific code chip and will change with each box.

Contact Roche Customer Care Line (Tel 0808 100 7666) if you have any problems with the machine - they will be able to advise and will replace the monitor if necessary (two year warranty).

Useful websites and contacts for parents and families

Children's cardiac nurse specialist team

Available 8:00am-4:00pm Monday-Friday

Tel: 0113 392 5467

Email: ccns.lgi@nhs.net

Ward 51

Tel: 0113 392 7451 (out of hours and weekends)

Children's Warfarin clinic

Tel: 0113 392 2910

Email: leedsth-tr.childrenswarfarinclinic@nhs.net

Leeds congenital hearts

Website: www.leedscongenitalhearts.co.uk

British heart foundation

Website: www.bhf.org.uk

NHS Choices

Website: www.nhs.uk/medicines/warfarin/



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