



THE CONTINUING PROFESSIONAL DEVELOPMENT PROGRAMME



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MODULE 186

Welcome to the one hundred and eighty sixth module in the *Pharmacy Magazine* Continuing Professional Development Programme, which looks at warfarin and MURs. It is valid until March 2014.

Continuing professional development (CPD) is now a legal requirement for pharmacists. Journal-based educational programmes are an important means of keeping up-to-date with clinical and professional developments and form a significant element of your CPD. Completion of this module will contribute to the nine pieces of CPD that must be recorded a year.

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Self-assess your learning needs:

- What are the main indications for warfarin use?
- How close to the target INR value should a reading be so it is clinically acceptable?
- What information is contained in an anti-coagulation patient's yellow book?

This module supports the following CPD competences: C1a-d, C1h, C1i, C3a, C3e, C4b and C4f. More details on p vii

CURRENT THINKING ON...

WARFARIN AND MURs

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Introduction

Warfarin is a commonly prescribed drug that has a number of complex issues and potential complications arising from its use. Both warfarin and the conditions treated by the drug are therefore ideal as a focus for targeted MURs.

This module can be used as a general update on warfarin as well as a resource to inform the development of community pharmacy medicines reviews focusing on warfarin, including medicines use reviews (MURs) in England and Wales, and as part of the Chronic Medication Service (CMS) in Scotland. The principles outlined here will use the MUR as a framework and are applicable to other medicines reviews.

Importance of harm reduction

Drug related morbidity accounts for 4.3 per cent of preventable hospital stays. The four main drug groups accounting for over half

(51 per cent) of preventable drug-related hospital admissions are:

- Antiplatelet agents: 16 per cent
- Diuretics: 16 per cent
- NSAIDs: 11 per cent
- Anticoagulants: 8 per cent¹.

Over 500,000 patients are currently prescribed oral anticoagulants in the UK, with warfarin the most commonly used. Between 1990 and 2002, there were 480 reported cases of harm or near harm from the use of anticoagulants and 120 deaths were reported, of which warfarin was responsible for 92 (77 per cent)². The use of warfarin has been steadily increasing in recent years and, as a result of the reported morbidity and mortality associated with its use, the National Patient Safety Agency (NPSA) issued guidance in 2007 on 'Actions that can make anticoagulant therapy safer'.

It is important that warfarin services adhere to the British Committee for Standards in

FOR THIS MODULE

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GOAL: To update knowledge of warfarin therapy and provide an overview of conducting medicines reviews for patients on warfarin.

OBJECTIVES: After completing this module you should be able to:

- Describe the relevant duration of treatment and recommended INR level for warfarin
- Advise patients about interactions with other prescribed medicines, non-prescription treatments and dietary supplements
- Conduct a medicines review to improve warfarin safety.



Haematology (BCSH) Guidelines^{2,3}; however it has been recognised that not every service will adhere to every safety indicator⁴. This module has also drawn on material published by the National Patient Safety Agency⁵ and, although it was current when written, it is important that the most up-to-date references are reviewed as part of your CPD. The BCSH guidelines are due to be reviewed in 2013.

This module will illustrate a structured approach to delivering a targeted MUR and safe warfarin therapy service based on the Medicines Related Consultation Framework (MRCF)⁶. It will support pharmacists to develop skills that complement this consultation structure.

Warfarin antagonises the effect of vitamin K, suppressing the formation of clotting factors VII and prothrombin⁷. It takes at least 48-72 hours for the anticoagulant effects to develop fully². Prescribed to patients with an elevated risk of thrombus (clot), warfarin's main indications are in deep vein thrombosis, pulmonary embolism, atrial fibrillation, prophylaxis after insertion of a prosthetic heart valve⁸ and, increasingly, stroke⁹. The duration of treatment

Table 1: Warfarin indications, duration of treatment and target INR levels

Indication	Duration of treatment	Target INR
Calf vein thrombosis	3 months (6 weeks for post-surgical thrombosis)	2.5
Pulmonary embolism/proximal DVT	6 months	2.5
Recurrence of VTE when no longer on warfarin therapy	Optimum duration of therapy unknown (further treatment required)	2.5
Cardioversion	3 weeks before and 4 weeks after	2.5
Atrial fibrillation	Lifelong	2.5
Recurrence of VTE while on warfarin therapy	Optimum duration of therapy unknown	3.5
Mechanical prosthetic heart valve	Lifelong	3.5

is dependent on the condition but some patients may require lifelong therapy^{2,3}.

Warfarin dosing is dependent on baseline prothrombin time (PT), which is recorded as the International Normalised Ratio (INR). Patients' target INR values vary depending on their condition. An INR that falls within 0.5 of the target value is generally deemed acceptable. The INR may be recorded once every 12 weeks once the patient is stabilised³.

The NPSA Patient Safety Alert 18 – 'Actions that can make oral anticoagulant therapy safer'⁵ – highlighted the need to develop processes and systems to support safe warfarin therapy.

Research has shown that community pharmacists were unaware of patients' INR values and suggested that MURs could be developed to support the medicines safety agenda¹⁰. Further studies have explored warfarin-specific MURs¹¹ and initial findings suggest that patients prescribed warfarin value the MUR service¹².

Warfarin dosing

There are two commonly used regimens for initiating and predicting the maintenance dose of warfarin for individual patients. The Fennerty regimen is most commonly used for those patients requiring a rapid introduction of oral anticoagulants (e.g. those with acute venous thromboembolism who are also on heparin)¹³. This regimen recommends a starting warfarin dose of 10mg on the first day, with subsequent doses dependent on INR measurements.

Initiation of warfarin requires daily INR monitoring for at least the first four days, followed by weekly INR monitoring once the required therapeutic range is achieved. The frequency of INR monitoring can then be extended to four-weekly in the first few months of warfarin treatment.

The Tait and Sefcick regimen is a more gradual way of warfarin loading and is suitable for patients who do not require rapid anticoagulation (e.g. elderly patients in the community with atrial fibrillation). This regimen recommends the use of 5mg warfarin for the first four days. The INR is then checked on days five and eight, and this is used to predict subsequent warfarin doses¹⁴.

Lower loading doses can be considered for patients who have an increased bleeding



Warfarin is an ideal candidate drug for a targeted MUR

Reflection exercise 1

- Do you know where to find the indication, duration of treatment and target INR for a patient?
- Do you have any copies of the oral anticoagulant therapy record book? If not, where can you get them from?

tendency. Examples of such patients include those with a prolonged baseline prothrombin time, abnormal liver function, patients with cardiac failure, elderly patients, patients with a low body weight, and patients taking other drugs that may potentiate oral anticoagulants².

The daily maintenance dose of warfarin for the majority of patients is 3-9mg once daily, although a small number of patients will take warfarin doses outside this range.

Warfarin indications

There are a number of conditions treated by warfarin and the indication for its use will determine the target INR and duration of treatment (see Table 1)². MURs are an ideal opportunity to check that patients know the indication and duration of their treatment.

INR monitoring

The BCSH 2005 guidance identified that the INR time-in-range is a more effective safety indicator than the proportion of INRs within target. However most community pharmacists do not have access to the decision support software required to calculate the INR time-in-range, so the secondary safety measure of percentage of INRs in range is used in practice³.

Once a patient is stable on warfarin treatment, the INR is monitored every 12 weeks. INR results are recorded in the patient's oral anticoagulant therapy record book, commonly known as the 'yellow book'. The book is produced by the British Haematology Society, together with the NPSA, and has become the most commonly used patient-held record for those taking anticoagulants. It contains an anticoagulant alert card, a treatment record with details of test results/warfarin dose to be used, and some general information about anticoagulants.

In some areas of the country patients are provided with INR slips instead of a yellow book.

These give details of the previous three INR results, current warfarin dose, dates of the last and next appointments, as well as a tear-off section containing questions that the patient is required to complete prior to their next appointment.

If a patient has lost his/her yellow book or INR slip, it is important that the pharmacist contacts the anticoagulant clinic or GP surgery in order to obtain the most recent INR result and warfarin dose. A reprint of this information can also be requested at the same time for the patient to keep for his/her records. A new yellow book can be issued from the pharmacy as a replacement for any lost book.

Some patients self-monitor their INR levels using a home monitoring device. The MUR is a good time to check how the patient is managing with self-INR monitoring and also to ensure that he/she is adequately reporting their INR levels to a healthcare professional, who can determine the required dose. Table 2 summarises the suggested recall protocol included in the enhanced service specification outline by the British Medical Association¹⁵.

Warfarin dosage can be extremely varied for an individual patient and a MUR is an ideal time to check that the patient is taking his/her warfarin at the same time each day. This is often at 6pm as it allows enough time to get an INR result back from a blood test taken on the same morning.

During the MUR the patient should be educated on the importance of presenting the

yellow book to any healthcare professional involved in his/her care. This could potentially minimise the risk of errors with dose prescribing or interactions with additional treatments.

The MUR also provides an opportunity to explore any changes in warfarin dose that may have occurred over recent months. This should be contained within the yellow book. It is important to explore any reasons for changes in INR control necessitating dose adjustments, such as short courses of interacting medications or recent periods of illness.

There are times when the reason for changes in INR control may be unclear to both the pharmacist and patient. It may be prudent to monitor the INR more carefully during this period. Warfarin dose reductions are required if the patient becomes over-anticoagulated and the exact reduction depends on the target INR and actual INR (see Table 3)⁶.

Signs of over-anticoagulation may manifest as bruising or bleeding. During the MUR, patients should be encouraged to report these signs by documenting them in the yellow book, as well as informing the healthcare professional responsible for their anticoagulation.

The MUR is also a good time to explain to patients why they need to bring the yellow book each time they have a prescription for warfarin in the future. This ensures that the pharmacist can monitor INR levels and confidently issue a prescription in the knowledge that the INR is at a safe level. Document this information on the patient's PMR as this will enable the monitoring of overall trends in INR levels.

Some patients will have their warfarin prescriptions collected on their behalf or delivered. In this situation a note can be placed in the prescription bag asking the patient to contact the pharmacy with the latest INR result and current warfarin dose. If a patient's representative is present in the pharmacy, they can be asked to contact the patient at the point of dispensing to find out the required information.

Discussing adherence and compliance

It is important that pharmacists support patients prescribed warfarin and provide them with

Table 2: INR value and recall action

INR value	Recall action
One INR high	Recall in 7-14 days (stop treatment for 1-3 days) (maximum 1 week in prosthetic valve patients)
One INR low	Recall in 7-14 days
One INR therapeutic	Recall in 4 weeks
Two INRs therapeutic	Recall in 6 weeks (maximum for prosthetic valve patients)
Three INRs therapeutic	Recall in 8 weeks, apart from prosthetic valve patients
Four INRs therapeutic	Recall in 10 weeks, apart from prosthetic valve patients
Five INRs therapeutic	Recall in 12 weeks, apart from prosthetic valve patients



Table 3: Dose reduction management for over-anticoagulation

Target INR =2.5 Actual INR	Dose reduction (%)	Number of days of omitted doses	Target INR = 3.5 Actual INR	Dose reduction (%)	Number of days of omitted doses
3.0-3.5	15	0	4.1-5.0	15	0
3.6-4.0	20	0	5.1-6.0	20	0
4.1-5.0	25	0	6.1-7.9	33	2
5.1-6.0	25	0	> 8.0	50	3
6.1-7.9	33	2			
>8.0	50	3			

appropriate information to encourage the development of informed adherence. This behaviour will improve the extent to which the patient's medicine-taking behaviour matches the prescriber's recommendations.

Compliance

Warfarin doses are expressed as 'mg' rather than number of tablets and a MUR can be used to check that the patient is taking the correct dose. Pharmacists will know that warfarin comes as 1mg, 3mg and 5mg tablets, so it is important to ensure patients are aware of the difference in strengths in order to prevent any confusion with dosing.

During the MUR, check if the patient is complying with the prescribed treatment. If a patient misses a dose, it is important to stress that they must never double or increase subsequent doses to compensate. It is also useful to explore why the patient may have missed a dose and how often this is occurring.

Points for MURs on patients taking warfarin

- Check attendance at anticoagulation clinics
- Check that the warfarin dose is taken at the same time each day and is expressed in **mg**
- Advise patients never to adjust for missed doses
- Advise patients to avoid binge drinking
- Remind patients to present their yellow book with each warfarin prescription
- Advise patients to note in their yellow book any new medication or supplements that they start while taking warfarin
- Ensure patients are aware of the foods and supplements that interact with warfarin
- Find out if the patient purchases any regular OTC medicines and check if they interact with warfarin. Provide advice on the types of OTC products that should be avoided
- Check the patient's dietary intake of green vegetables and advise avoiding making any major changes to this

It may be that the patient has an unusual daily routine that makes it difficult to adhere to the correct time of administration or that he/she has gone on holiday, for instance, and forgotten to take a dose due to time zone differences.

Reflection exercise 2

- How many patients on your PMR are on warfarin?
- How many are 'regulars'?
- Do you know where your patients go to have their INR monitored?
- How is their current dose communicated to them based on the latest INR result?

Another scenario whereby a patient may omit a dose is when there is an increase in the dose resulting in the patient requiring more tablets not accounted for on the prescription. This is easily resolved by contacting the patient's GP surgery to request a prescription for the increased quantity and that the repeat prescription records are changed. Similarly, it is equally important to ensure that a patient has not been prescribed more tablets than needed if the dose has been reduced.

If the patient's warfarin dose is known, then keeping an eye on dispensing intervals from the PMR will give some indication as to whether patients are attending at intervals appropriate to the quantities of warfarin on their prescriptions. For example, if a patient has a two-month supply of warfarin but is attending monthly for his/her warfarin prescription, there could be problems with inadvertent overdosing.

If the patient is attending less frequently than the prescription suggests he/she should, there may be issues with compliance – or perhaps the patient has had a prescription dispensed



Some patients self-monitor their INR levels – useful to check as part of a warfarin MUR?

Table 4: Drug Interactions with warfarin

Drug	Effect on INR	How to manage the interaction
Analgesics (e.g. NSAIDs)	Increased INR and risk of bleeding	Some NSAIDs should be avoided altogether. Regular use of paracetamol (in therapeutic doses of 8 tablets/day) may possibly enhance warfarin effects, so INR should be closely monitored
Antibacterials (e.g. erythromycin, metronidazole, trimethoprim)	Increased INR	INR should be closely monitored if an antibiotic course is prescribed. Check when the patient has been told to go for another INR
Antifungals (e.g. fluconazole, miconazole)	Increased INR	INR should be closely monitored if an antifungal course is prescribed
Antiepileptics (e.g. carbamazepine)	Decreased INR	Monitor INR if carbamazepine is introduced or stopped
Antidepressants (e.g. SSRIs)	Increased INR	Monitor INR if a SSRI is introduced or stopped
Thyroid hormones (e.g. thyroxine, levothyroxine)	Increased INR	Monitor INR and warfarin dose adjustments may be required
Ulcer healing drugs (e.g. esomeprazole, omeprazole, pantoprazole)	Increased INR	Monitor INR and warfarin dose adjustments may be required

somewhere else. Both of these scenarios should trigger a MUR. Irregular dispensing intervals without associated dose changes should also prompt the pharmacist to invite a patient for a MUR.

NPSA guidance

'Actions that can make anticoagulant therapy safer' from the NPSA is intended to improve patient safety⁵. In order to comply with this pharmacists should have access to certain resources (or be able to signpost patients to where they can obtain them). These resources include the yellow book, alert cards, and the local protocol for INR monitoring and details on what to do if the values are too high or low¹⁶.

The key messages applicable to community pharmacists relate to factors that can be checked during a MUR as well as at each dispensing episode:

■ Ensure that patients on anticoagulant medication have received appropriate verbal and written information at the start of their therapy

and, when necessary, throughout their treatment. In practice, this means making sure that patients have received a yellow book and the contents are fully understood

■ Before dispensing a repeat prescription for anticoagulant medication, ensure that the patient's INR is being monitored regularly and is at a safe level for the repeat prescription to

be dispensed. One way of doing this is to ask to see the patient-held yellow book or INR slip when the script is handed in

■ Ensure that doses are expressed in **mg** and not in number of tablets

■ If a patient's prescription has been altered and one or more interacting medicines with warfarin are either started or stopped, check that arrangements for additional INR blood tests have been made and that the anticoagulant service has been informed that an interacting medicine has been prescribed⁵.

In a MUR this information can be documented under the 'general comments' section.

Warfarin interactions

Drug interactions

Warfarin is 99 per cent bound to plasma proteins and is metabolised in the liver by the cytochrome P450 system. Warfarin interactions are attributable to cytochrome P450 enzyme induction, enzyme inhibition or reduced plasma protein binding. Table 4 shows some drug interactions with warfarin, the effect which the interaction is likely to have on the INR and suggestions on how to manage these interactions^{5,8}.

If a patient commences or discontinues an interacting drug while taking warfarin, he/she should be advised to write the details in the yellow book and to inform other healthcare professionals involved in his/her care. During

Table 5: Common supplement and food interactions with warfarin

Supplement/food	Effect on INR
Ginseng	Decreased INR
Coenzyme Q10	Increased INR
Devil's claw	Increased INR
Ginkgo	No effect but patients should be advised to monitor INR closely if they start taking ginkgo as there have been isolated reports of INR changes
Glucosamine	Increased INR
St John's wort	Decreased INR
Cranberry	Increased INR
Grapefruit	Increased INR
Tea	Decreased INR
Soy sauce, soya milk & soya bean	Decreased INR
Alcohol	INR control affected by major consumption that exceeds safe drinking levels (Safe drinking levels are a maximum weekly allowance of 14 units for women and 21 units for men)
Green vegetables (e.g. spinach, brussels sprouts)	Variable effects on INR. Major changes in quantities consumed in patient's diet should be avoided



Table 6: Warfarin audit results

Warfarin audit (2007/8 baseline repeated in 2009/10)	2007/8 n=129	2009/10 n=241
Patients presented their yellow books with their prescription	11.9%	42.7%
Pharmacists knew patients' INR therapeutic ranges	34.5%	69.7%
Pharmacists knew patients' intended durations of treatment	13.5%	81.1%
Patients' INR values were NOT recorded in the PMR system	79.0%	35.7%
Warfarin prescribed as the number of tablets	50.0%	24.3%

the MUR advise the patient to be vigilant for signs of bleeding and ensure he/she is aware of the action needed to be taken if any bleeding is suspected. It is also important to educate patients on the OTC products that may interact with warfarin, as they may not be fully aware of the ingredients of some of the combination products that are available.

Food & supplement interactions

Supplements can be purchased from non-pharmacy outlets and patients should be made aware of the potential interactions. A list can be produced for the purposes of issuing to the patient when providing this information in a MUR. Table 5 shows some of the food and supplements that interact with warfarin and their effect on INR control¹⁷.

During a MUR find out if the patient regularly purchases any supplements that may interact with warfarin. Advise the patient to document this information in his/her yellow book. This information should also be documented under the 'general comments' section of the MUR form. The MUR is also an ideal time to find out how much alcohol the patient consumes and, where necessary, to educate the person on safe limits of alcohol consumption.

Reflection exercise 3

You are conducting a MUR with a patient who takes warfarin. His last INR was above the target limit. The patient has not taken any interacting drugs and has not made any major changes to his diet but has recently started taking glucosamine. What do you advise?

Table 7: Assessment of pharmacy-related warfarin issues

Pharmacy issues – does the pharmacist have access to adequate resources to support patient care during warfarin therapy (initiation and maintenance)?	Yes	No
Does the pharmacy have a supply of the yellow book 'Oral anticoagulation therapy: important information for patients'? If not, can the pharmacist signpost the patient to a service that can provide them with one?		
Does the pharmacy have a supply of alert cards? If not, can the pharmacist signpost the patient to a service that can provide them with a card?		
Does the pharmacist know the referral pathway and can they signpost the patient appropriately?		
Can patients be referred by the pharmacist for additional INR blood tests if they are prescribed clinically significant interacting drugs?		
Is the pharmacist aware of the local INR recall protocol for high and low values during maintenance (NOT initiation) therapy?		

Table 8: Audit template for warfarin prescriptions

Prescription issues – Instructions: enter results for each of your next 5 warfarin patients into the following table (✓=yes, X=no, n/a=not applicable)	Pt1	Pt2	Pt3	Pt4	Pt5
Are warfarin doses expressed in mg?					
Are warfarin doses expressed as the number of tablets?					
Does the warfarin dosing regimen include alternate day dosing?					
Does the warfarin dosing regimen indicate more complex than alternate day dosing?					
Does the warfarin dosing regimen require a tablet to be split?					
Is warfarin generically prescribed?					
Can the pharmacist assess the time-in-range of target INR (within 0.5 of INR target) for the past 12 months? [The standard should be 60%]					

Table 9: Audit template for warfarin patients

Patient issues – Instructions: enter results for each of your next 5 warfarin patients into the following table (✓=yes, X=no, n/a=not applicable)	Pt1	Pt2	Pt3	Pt4	Pt5
Does the pharmacy's patient medication record system have a 12-month record of INR values (or is there a complete record for the duration of therapy if the patient has been a regular for less than 12 months)?					
Has the patient presented the most recent INR value with his/her prescription?					
Has the patient presented a 6-month INR value history with his/her prescription if NOT using a regular pharmacy?					
Has the patient been provided with an alert card?					
Does the patient medication record indicate the patient's intended duration of treatment?					
Is the pharmacist aware of the patient's INR target?					
Is the patient aware that he/she needs to keep at least a week's supply of warfarin?					
Is there more than three months between the most recent INR test result and the warfarin prescription?					
Is the patient aware of the intended duration between INR recalls?					
Is the duration between intended recalls appropriate for this patient?					
Is the patient aware of the need for anticoagulation?					
Is the patient aware of possible side-effects of treatment?					
Is the patient aware what to do if a dose is missed?					
Is the patient aware what to do if he/she vomits after taking a dose?					
Is the patient aware that he/she needs to keep the amount of specific foods/supplements consistent?					
Is the patient aware of the risks of binge drinking?					
Is the patient aware that he/she needs to inform his/her dentist about being prescribed warfarin?					
Is the patient aware of the need to take warfarin at the same time each day?					
If appropriate, following hospital discharge, can the discharge note be reviewed to ensure that it contains information confirming that the patient is currently prescribed warfarin?					

Common foods rich in vitamin K

Some foods are naturally rich in vitamin K. Examples of these are avocado, brussels sprouts, cabbage, cereals (wheat, bran and oats), chick peas, chives, egg yolks, lettuce, liver, mature cheeses, spinach, spring onions and watercress. Patients may continue to consume these foods but should be advised that some fluctuations in their INR control may result if they eat them in excessive amounts compared to what they are used to. Advise patients to remain consistent in the quantities that they consume.

Developing a warfarin MUR service

The 1998 and 2005 guidance and NPSA alert have identified audit standards that pharmacists will find useful to refer to when considering warfarin-related MURs. And in Hertfordshire, for instance, the local pharmaceutical committee, former primary care trust and GPs have supported community pharmacists to develop and deliver targeted MURs. A community pharmacy baseline audit was conducted in 2007/8 to identify gaps in service provision and then re-audited in 2009/10. Some of the audit findings are presented in Table 6. These have highlighted that standards have improved but pharmacists have to continue to work in partnership with patients and GPs to make warfarin therapy even safer.

Audit standards: adherence to safe therapy

Tables 7, 8 and 9 can be used to conduct a baseline audit (or you could use them as a MUR checklist). You should also adapt your standard operating procedure to ensure that you collect and collate the information included in the tables to ensure safe warfarin therapy.

Reflection exercise 4

Review your warfarin standard operating procedure. Does it suggest that you record patients' INR values in the PMR system?

More information

MUR Training is an online resource to help pharmacists who want ideas on how to develop their MUR skills – www.murtraining.co.uk

CPD competences

This module supports the following community pharmacy competences:

Competence	Where this module supports competence development
C1a-d, C3a	The module addresses a number of issues, including the importance of assessing medication needs of patients prescribed warfarin, their adherence to the medication, recognising potential interactions and side-effects, and the need to support medicines reconciliation post-discharge. It also encourages pharmacists to consider other issues including the importance of regular INR monitoring. Reflection exercise 1 encourages pharmacists to identify if they have access to the resources required to support the safe supply of warfarin.
C3e, C1h, C1i	Pharmacists have a key role to play in the pharmaceutical care of patients prescribed warfarin and the module identifies how clinical audit and developing the patient medication record system can support the implementation of NPSA Patient Safety Alert 18: 'Actions that can make oral anticoagulation safer'. Reflection exercise 2 encourages pharmacists to consider the patient pathway in terms of where they go to be monitored and how their current dose is communicated to them.
C3e, C4b, C4f	Key recommendations from NPSA Alert 18 and BCSH guidelines on safer oral anticoagulation therapy are outlined, highlighting the need for patients and healthcare professionals to share information. Reflection exercises 3 and 4 encourage pharmacists to explore what factors affect INR values and how the MUR service can support patient care. Pharmacists are encouraged to review their standard operating procedures to ensure that they reflect the BCSH guidelines and NPSA safety alert.

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ASSESSMENT QUESTIONS

WARFARIN AND MURs

1. Which statement regarding the mode of action of warfarin is TRUE?

- a. It enhances the effects of bradykinin
- b. It antagonises the effects of vitamin K, blood clotting factor VII and prothrombin
- c. It enhances the effect of thrombin
- d. It antagonises the effect of vitamin B and blood clotting factor VIII

2. When initiating warfarin treatment the full anti-coagulant effect can be seen within:

- a. 12-36 hours
- b. 24-36 hours
- c. 48-72 hours
- d. 72-96 hours

3. The recommended duration of treatment and target INR for atrial fibrillation is:

- a. Lifelong treatment and target INR of 2.5
- b. Three months' treatment and target INR of 3.0
- c. Six months' treatment and target INR of 2.5
- d. Lifelong treatment and target INR of 3.0

4. INR monitoring in a patient stable on warfarin can be done:

- a. Weekly
- b. Fortnightly
- c. Every day
- d. Every 12 weeks

5. Which statement regarding over-anticoagulation in a patient is FALSE?

- a. The patient may bruise easily
- b. The INR may be raised
- c. The patient may have bleeding gums
- d. A decrease in the INR may be seen

6. Which statement is TRUE?

- a. NSAIDs interfere with the renal clearance of warfarin
- b. NSAIDs increase INR and the risk of bleeding
- c. NSAIDs interfere with the blood clotting cascade
- d. NSAIDs decrease the INR

7. Which of the following food supplements inhibit the effects of warfarin?

- a. Coenzyme Q10
- b. St John's wort
- c. Devil's claw
- d. Cranberry

8. If a patient's INR target is 2.5 and their actual INR is 6.2, for how many days should warfarin be omitted prior to a dose reduction of 33 per cent?

- a. One day
- b. Two days
- c. Three days
- d. Four days

PHARMACY MAGAZINE CPD RECORD – APRIL 2011

USE THIS FORM TO RECORD YOUR LEARNING AND ACTION POINTS FROM THIS MODULE ON WARFARIN AND MURs OR DOWNLOAD FROM WWW.PHARMACYMAG.CO.UK AFTER COMPLETING THE ONLINE LEARNING SCENARIOS

Activity completed. (Describe what you did to increase your learning. Be specific) (Act)

Name/date:

Time taken to complete activity:

What did I learn that was new in terms of developing my skills, knowledge and behaviours? Have my learning objectives been met?* (Evaluate)

How have I put this into practice? (Give an example of how you applied your learning. Why did it benefit your practice? How did your learning affect outcomes?) (Evaluate)

Do I need to learn anything else in this area? (List your learning action points. How do you intend to meet these action points?) (Reflect)

* If as a result of completing your evaluation you have identified another new learning objective, start a new cycle – this will enable you to start at **Reflect** and then go on to **Plan, Act** and **Evaluate**. This form can be photocopied to avoid having to cut this page out of the module. Complete the learning scenarios at www.pharmacymag.co.uk

MODULE 186 ANSWER SHEET

ENTER YOUR ANSWERS HERE Please mark your answers on the sheet below by placing a cross in the box next to the correct answer. Only mark one box for each question. Once you have completed the answer sheet in ink, return it to the address below together with your payment of £3.75. Clear photocopies are acceptable. You may need to consult other information sources to answer the questions.

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| 1. | a. <input type="checkbox"/> | 2. | a. <input type="checkbox"/> | 3. | a. <input type="checkbox"/> | 4. | a. <input type="checkbox"/> | 5. | a. <input type="checkbox"/> | 6. | a. <input type="checkbox"/> | 7. | a. <input type="checkbox"/> | 8. | a. <input type="checkbox"/> |
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Processing of answers
Completed answer sheets should be sent to Precision Marketing Group, Precision House, Bury Road, Beyton, Bury St Edmunds IP30 9PP (tel: 01284 718918; fax: 01284 718920; email: cpd@precisiondm.com), together with credit/debit card/cheque details to cover administration costs. This assessment will be marked and you will be notified of your result and sent a copy of the correct answers. The examiners' decision is final and no additional correspondence will be entered into.