

Management of Dental Patients on Warfarin Therapy in a Primary Care Setting

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Abstract: The surgical management of patients on anticoagulant therapy is often poorly understood in all fields of medicine (not just dentistry).

Until now there has been no uniform approach to managing these patients and much of the advice routinely given by medical practitioners and haematologists has fallen behind the recent evidence.

Many medical conditions from atrial fibrillation to prosthetic heart valves predispose patients to venous thrombosis and pulmonary embolism (Table 1). In order to prevent these complications, these patients are normally placed on an anticoagulant. By far the most common one in use is Warfarin, which is a derivative of 4 hydroxycoumarin.

Dent Update 2004; 31: 379–384

Clinical Relevance: This article will attempt to review the current literature and focus on developing guidelines concerning the management of patients on Warfarin while carrying out procedures found in the primary care setting.

Warfarin works by acting as an inhibitor of vitamin K. Vitamin K is required by blood coagulation factors II, VII, IX, X and protein C (which are produced by the liver) for their activation from profactors to their active form as shown in the equation (Figure 1).

So it can be seen that factor VII is affected first and this increases a test called the prothrombin time (PT).

The prothrombin time is carried out by adding calcium and thromboplastin to a citrated sample of the patient's blood. Thromboplastin is a phospholipid extract of tissue (brain, lung, placenta). This can be of human origin (as used in the UK) or of animal extraction, e.g. rabbit (as used more commonly in the USA). Different

sources have different sensitivities leading to different laboratories providing different PT values (measured in seconds) for the same patient's sample, depending on what type of thromboplastin is used. In order to combat this, the World Health Organization (WHO) recommended that a standardized PT test be conducted using the International Normalized Ratio (INR).

This was done by comparing the patient's PT with the mean normal PT of a group of healthy patients taken by using the thromboplastin used by that particular laboratory. This result was then given as a ratio. This then eliminates the varying sensitivities of thromboplastins used by different laboratories.

$$\text{INR} = \frac{\text{PT}}{\text{Mean normal PT}}$$

The higher the INR value the greater the level of anticoagulation.

So it can be seen that continuous anticoagulant therapy is a life-saving treatment, but may put patients at greater risk of experiencing haemorrhage after any procedure producing bleeding; in dentistry this ranges from simple scaling to cranio-facial surgery.

Many studies have compared bleeding complications in patients who have had their anticoagulation altered to those whose regime was left unchanged. The majority found that, where the following good local measures were used, there is no significant difference in the amount of

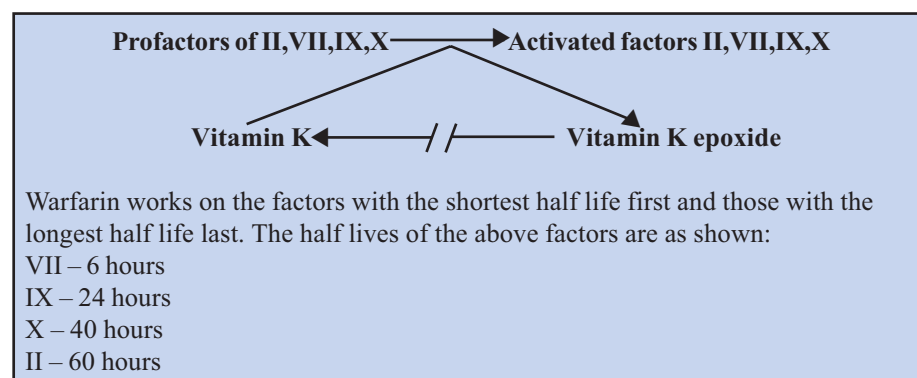


Figure 1. Blood coagulation factors affected by Warfarin.

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Indications	UK INR Target
Pulmonary embolus	2.5
Deep vein thrombosis	2.5
Atrial fibrillation	2.5
Recurrence of embolism after stopping Warfarin	2.5
Recurrence of embolism during Warfarin therapy	3.5
Mechanical heart valves	3.5
Antiphospholipid syndrome	3.5

Table 1. Types of medical conditions that require Warfarin therapy.¹

uncontrolled haemorrhage:^{2,3,4,5}

- Pressure with gauze;
- Periodontal packing;
- Suckdown splint/immediate denture placement;
- Suturing;
- Haemostatic scaffolding, e.g. oxidized cellulose;
- Tranexamic mouthwash – not in primary care;⁶
- Local anaesthetic with vasoconstrictor;

Even those studies^{7,8,9} that did measure a small but significant increase in postoperative bleeding complications found that these were easily controlled by repeat application of local measures.

All these studies concluded if the INR was within the therapeutic range, i.e. ≤ 4 then it need not be altered for simple surgical procedures.

There has been a range of protocols in the past advocating substitution of heparin for Warfarin,^{10,11} decreasing the levels of anticoagulation pre-operatively,¹² or even stopping the patient's Warfarin for two days pre-operatively.^{13,14,15}

It is important to remember that Warfarin has been prescribed for a reason. Delayed bleeding is an inconvenience; at most it is very distressing to the patient. However a thrombo-embolic event, which is a possible consequence of interfering with a patient's Warfarin, can often be fatal.

A multistudy review⁹ of 950 patients which included 2400 surgical procedures (extractions, alveolar surgery and gingival surgery) were conducted where the anticoagulation levels were left unchanged. Out of the 2400 procedures,

only 12 patients suffered bleeding that was uncontrolled by local measures. In 7 of the 12 the levels of anticoagulation were above recommended therapeutic levels. In 3 of these patients it was hypothesized that this may have been as a result of concomitant administration of antibiotics (see later).

An important note from this study is that none of the 12 suffered any long-term harm.

Another study reviewed over 500 reports of patients who had had their anticoagulation withdrawn. This uncovered the following:

- Four fatalities:
 - Two cerebral thromboses;
 - One myocardial infarction;
 - One unspecified embolus.
- Two non-fatal emboli:
 - One cerebral embolus;
 - One brachial embolus.

The majority, however, had no adverse effects.

The aim of this paper is to look at some of the current literature regarding the role and consequences of Warfarin therapy and its management in a dental setting. Finally, the intention is to produce an easily understood, evidence-based guide to handling these patients in a primary care setting.

There has been a reasonable flow of research which examined patients on Warfarin undergoing procedures in oral surgery. However, those procedures often considered to be in the field of restorative dentistry are covered very scantily in terms of good quality research. Many of the conclusions here have had to be

drawn from studies conducted on dento-alveolar surgery patients and collation of the very best of expert opinion.

Below is a list of procedures which potentially cause a risk of haemorrhage and so require the patient's current INR value to be known:

- Extractions;
- Gingival surgery;
- Subgingival scaling and root planing;
- Regional nerve blocks;
- Subgingival fillings;
- Pulp extirpation.

UNIQUENESS OF HAEMORRHAGE IN DENTISTRY

Dental procedures are unique within surgical specialties as they rarely involve major vessels and bleeding sites can be easily accessed to treat by local pressure postoperatively. Therefore, protocols and procedures used in other surgical specialties are probably not applicable to the majority of dentistry.

Not all haematologists will be familiar with the practical details of many of the procedures that we carry out.

In a recent survey¹⁶ of physicians controlling patients' anticoagulation therapy in the United States, more of them advised withdrawing anticoagulant therapy for patients about to undergo endodontic therapy than for those about to undergo professional cleaning, even though most dentists will acknowledge that scaling and root planing may produce a greater risk of haemorrhage.

It is important, therefore, that the treating dentist should provide both the practical details of the procedure and present an evidenced-based argument for management of their patient. Ideally, a consensus should be reached.

PATIENTS AT SPECIAL RISK OF HAEMORRHAGE

Certain patients are at a higher risk of haemorrhage. Though treatment in a primary care setting is not absolutely contra-indicated even in these cases, these patients are best referred to a unit with good medical back-up and experience

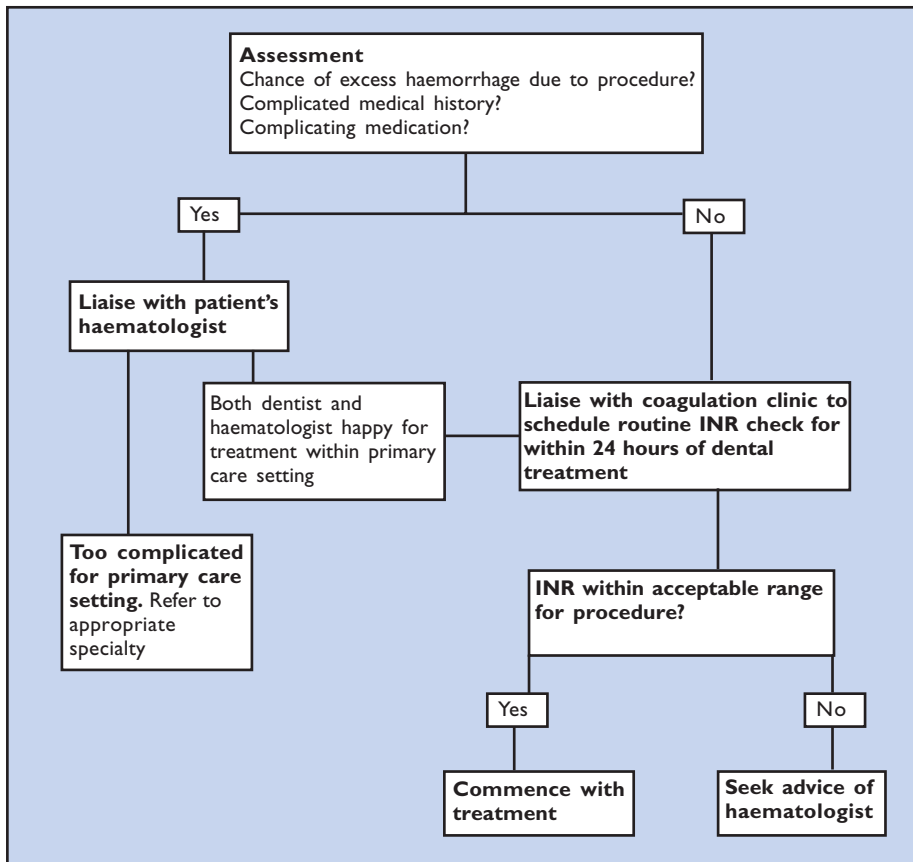


Figure 2. Management of patients taking Warfarin in a primary care setting.

in handling any excessive haemorrhage. This is advised owing to unpredictability in extent of bleeding these patients may experience.

These patients can be grouped into:

- Those whose medical history increases the likelihood of bleeding:
 - liver disease;
 - obstructive jaundice.
 Both of these impair vitamin K metabolism and so potentiate the anticoagulation effects of Warfarin.
- Those whose concomitant medication makes the effects of Warfarin unpredictable (Table 2).

COMMON MEDICATION PRESCRIBED IN DENTISTRY AND ITS INTERACTION WITH WARFARIN^{17,18}

Penicillins

Interaction between penicillin and

Warfarin are anecdotal¹⁷ and rare. Considering the high frequency of prescribing of these two drugs, their presence in situations of polypharmacy must be large, and yet the reports of reactions are rare. However, practitioners should ask their patients to be vigilant in case of any signs of unusual haemorrhage.

Azoles, e.g. Metronidazole, Fluconazole, Ketaconazole

This group of antifungals/antibacterials can cause a marked increase in the INR of a patient taking Warfarin. This can occur because azoles have been found to interfere with various steps in the metabolism of Warfarin. They should be avoided if at all possible. If they must be prescribed, the consultant haematologist should be informed so that a closer level of monitoring can be instituted.

Erythromycin

Erythromycin causes an unpredictable

reaction with concurrent use of Warfarin affecting only certain individuals. Patients should be advised to be aware of any signs of excessive haemorrhage.

Clindamycin

With Clindamycin there is no evidence of any interaction.

Note: Prolonged microbial therapy can alter the gut flora, especially those microbes responsible for vitamin K absorption and hence an increased chance of haemorrhage. There is, however, no evidence that single dose antibiotic cover regimes, as stated in the BNF, cause significant change in patients' INR.¹⁷

NSAIDs, e.g. Diclofenac, Ibuprofen, Naproxen, Ketaprofen

NSAIDs may cause gastric irritation, reversibly interfere with platelet adhesion and are thought to potentiate the anticoagulant effect of Warfarin.

Paracetamol

There is no evidence of interaction of paracetamol with Warfarin.

PRACTICAL MANAGEMENT

Most patients carry a yellow record book of their INR readings. These are usually taken at between every two

<p>Potentiating</p> <ul style="list-style-type: none"> ● Fluconazole ● Ketaconazole ● Metronidazole ● NSAIDs ● Corticosteroids ● Cephalosporins ● Chloral hydrate ● Penicillins ● Erythromycins ● Diflunisal ● Salicylates ● Propoxyphene ● Tetracyclines <p>Opposing</p> <ul style="list-style-type: none"> ● Ascorbic acid ● Barbiturates ● Dicloxacillin sodium ● Nafcillin

Table 2. Medication which may affect a patient's INR.^{14,18}

DENTAL TREATMENT	INR RANGE					> 4
	< 2	2 to < 2.5	2.5 to < 3	3 to 3.5	> 3.5 to 4	
Examination, radiographs, study models						
Simple restorative dentistry, supragingival prophylaxis + x-ray, infiltrations						
Complex restorative dentistry, scaling and root planing, endodontics, ID blocks					Probably safe (IR)	Not advised Consult patients haematology physician
Simple extractions, curettage, gingivoplasty localized				Local measures	Local measures	Not advised
Multiple extractions, removal of single bony impaction			Local measures	Local measures	Local measures	Not advised
Gingivectomy, apicoectomy, minor periodontal flap surgery, placement of single implant		Probably safe (IR)	Probably safe (IR)	Not advised	Not advised	Not advised
Extensive flap surgery, extraction of multiple bony impactions, multiple implant placement	Probably safe (IR)	Not advised	Not advised	Not advised	Not advised	Not advised

Table 3. Safety evaluation chart for carrying out procedures on anticoagulated patients. Note: IR = Insufficient good quality research.

weeks and every six weeks. Examining this record will give you the following information:

- How often they have their INR checked;
- How stable their INR is;
- An idea of the patient's normal value.

If a procedure that may lead to haemorrhage is to be performed, then it is important that an INR value is obtained not more than 24 hours from commencement of the procedure^{3,5,19} This can be done by liaising with the anticoagulation clinic and scheduling

the appointment to fall less than 24 hours after the scheduled INR check or *vice versa*.

The 24-hour rule gives a sufficient window to obtain the results but not so long that any significant changes in the value are likely to have taken place (assuming that none of the earlier risk factors has been instigated).

Extractions

Minor oral surgical procedures can be carried out without alteration of the Warfarin dose, as long as the INR is less than four. These include simple extractions of 1–3 teeth and surgical

removal of teeth. Good local measures should be used throughout.^{2,3,4,5,7,9}

Gingival surgery

Localized gingivoplasties with good local measures are probably acceptable within the therapeutic range up to an INR of 4.^{19,20}

Quadrant gingivectomies should be done in stages, a small section being attempted first to assess the haemorrhage risk.²⁰

Sub-gingival scaling

Care should be exercised to avoid

excessive soft tissue trauma when carrying out sub-gingival scaling.²⁰

Regional nerve blocks

Regional nerve blocks should be avoided wherever possible and replaced with suitable alternatives. For example, intraligamentary injections to replace ID blocks.

Pulp Extirpation

Pulp extirpation is unlikely to cause significant haemorrhage compared to non-anticoagulated patients.^{19,20}

In order to provide a framework for the management of these patients, a protocol has been devised in the form of a step-by-step flow diagram and a table by Herman *et al.*,¹⁹ which cross-references INR values with common dental treatments encountered in the primary dental care setting, has been adapted (Figure 2 and Table 3).

CONCLUSION

Most of the recent literature regarding Warfarin and dental surgery is in agreement that, with good local measures, routine oral surgical procedures can be undertaken without the need for alteration of the INR, when it is within the therapeutic range.

There is still much scope for further studies into procedures found within the restorative sphere, although on the whole these are less invasive and carry a lower risk of haemorrhage than those experienced by our oral surgery colleagues.

Many patients, who could be treated safely and far more conveniently in the primary care setting, are referred into the hospital system for treatment by a range of dental specialists. Indeed, many patients say this is where they would prefer to be treated. It is the hope of the author that this article has provided the necessary background information and an easy to follow set of guidelines to provide the care these patients require.

ACKNOWLEDGEMENT


I would like to thank Dr Brian Nattress for his guidance and support on this project and Gerald O'Sullivan, my first boss, whose standards and infectious enthusiasm for dentistry still guide me.

REFERENCES


- Guideline therapeutic target INRs for patients on Warfarin. *Br J Haematol* 1998; **101**: 374–387.
- Devani P, Lavery KM, Howell CJT. Dental extractions in patients on warfarin: is alteration of anticoagulant regime necessary. *Br J Maxillofac Surg* 1998; **36**: 107–111.
- Ramstrom G, Sindet-Pedersen S, Hall G *et al.* Prevention of post surgical bleeding in oral surgery using tranexamic acid, without modification of oral anticoagulant. *J Oral Maxillofac Surg* 1993; **51**: 1211–1216.
- Blinder D, Manor Y, Martinowitz U *et al.* Dental extractions in patients maintained on continued oral anticoagulant. *Oral Surg Oral Med Oral Pathol Oral Radiol Endodontology* 1999; **88**: 137–140.
- Borea G, Mantebugnoli L, Capuzzi P *et al.* Tranexamic acid as a mouthwash in anticoagulant treated patients undergoing oral surgery. An alternative method to discontinuing anticoagulant therapy. *Oral Surg Oral Med Oral Pathol* 1993; **75**: 29–31.
- Northwest Medicines Information Centre. *Surgical Management of the Primary Care Patient on Warfarin*, July 2001.
- Bailey BMW, Fordyce AM. Complications of dental extractions in patients receiving warfarin anticoagulant therapy: a controlled clinical trial. *Br Dent J* 1983; **155**: 308–310.
- Weibert RT. Oral anticoagulant therapy in patients undergoing dental surgery. *Clin Pharmacol* 1992; **11**: 857–864.
- Wahl MJ. Myths of dental surgery in-patients receiving anticoagulant therapy. *J Am Dent Assoc* 2000; **131**: 77–81.
- Roser SM, Rosenbloom B. Continued anticoagulant in oral surgery procedures. *Oral Surg Oral Med Oral Pathol* 1975; **40**: 448–457.
- Madura JA, Rookstool M, Wease G. The

management of patients on chronic coumadin therapy undergoing subsequent surgical procedures. *Am Surg* 1994; **60**: 542–546.

- Johnston WT, Leary JM. Management of dental patients with bleeding disorders: review and update. *Oral Surg Oral Med Oral Pathol* 1988; **66**: 297–303.
- Donoff RB. *Massachusetts General Hospital Manual of Oral and Maxillofacial Surgery*. St Louis: CV Mosby, 1987; pp. 100–102, 152.
- Seward GR, Harris M, McGowan DA. *Killey's and Kay's Outline of Oral Surgery, Part 1*. Bristol: Wright, 1987; pp. 355–357.
- Mulligan R, Weitzel KG. Pretreatment management of the patient receiving anticoagulant drugs. *J Am Dent Assoc* 1988; **117**: 479–483.
- Wahl MJ, Howell J. Altering anticoagulation therapy: a survey of physicians. *J Am Dent Assoc* 1996; **127**: 625–638.
- Stockley IH. *Drug interactions* 5th edition. London: Pharmaceutical Press, 1999.
- Dental Practitioners Formulary 2000–2002*. London: Pharmaceutical Press, 2000.
- Herman WW, Kanzelman JL, Sutley SH. Current perspectives on dental patients receiving coumarin anticoagulant therapy. *J Am Dent Assoc* 1997; **128**: 327–335.
- Chugani V, Nattress BR. Collation and evaluation of email questionnaires from x no. of consultants involved in special care dentistry and periodontology 2002.



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