Government of Western Australia
Department of Health

Guidelines for the Western Australian Anticoagulation Medication Chart

Version 3, 2014

Revised by the
WA Anticoagulation Steering Group
&
Office of Safety and Quality in Healthcare

The Office of Safety and Quality would like to acknowledge the contribution of the WA Anticoagulation Steering Group members in the revision of the WA Anticoagulation Medication Chart in 2012.

- Dr Ben Carnley
- Dr Julie Crawford
- Dr Tony Ryan
- Dr Mark Newman
- Dr James Williamson
- Dr Graeme Cull
- Dr Graham Cullingford
- Dr Michael Leahy
- Dr Amanda Ling
- Dr Ross Baker
- Dr Rebecca Howman
- Ms Maire Connolly
- Ms Michaela Walters
- Ms Barbara O'Callaghan
- Ms Karen Flounders
- Ms Tandy-Sue Copeland
- Ms Ann Berwick
- Mr Yang Gee Peng
- Dr Stephen Lim
- Mr David McKnight
- Mr Chris Hopps
- Mr Phil Nairn

Suggested Citation:
WA Anticoagulation Medication Chart Guidelines, February 2014
Perth: Department of Health, WA.

Contents

1. INTRODUCTION

1.1 Preamble

This chart was developed by a multidisciplinary working group convened by the Western Australian Medication Safety Group.

The aim of the chart is to improve dosing and monitoring of anticoagulants and subsequently reduce the risk of anticoagulant related patient harm. To achieve this, the chart co-locates recommended dosing and monitoring regimen with the prescription orders. Where monitoring is required (warfarin and intravenous heparin), the test results are co-located with prescription orders to facilitate appropriate dose adjustments.

The dosing and monitoring regimen provided represent current best practice in the majority of patients; however they do not cover all clinical scenarios and do not replace the need for clinical judgement.

The best practice recommendations included in this book refer to the in hospital management of anticoagulants and may not be appropriate in ambulatory care.

1.2 When should this chart be used?

This chart should be used for every hospital episode where a patient is prescribed an oral, intravenous or subcutaneous anticoagulant. This includes but is not limited to warfarin, unfractionated heparin (UFH), low molecular weight heparin (LMWH) and new oral anticoagulant agents. (e.g. rivaroxaban, apixaban, dabigatran)

1.3 Important – Cross-referencing with NIMC

Ensure that use of the anticoagulant chart is documented on the main medication chart (NIMC).

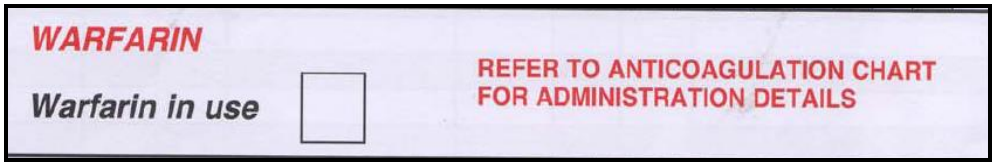
This can be done by

i) Cross-reference chart on front of NIMC

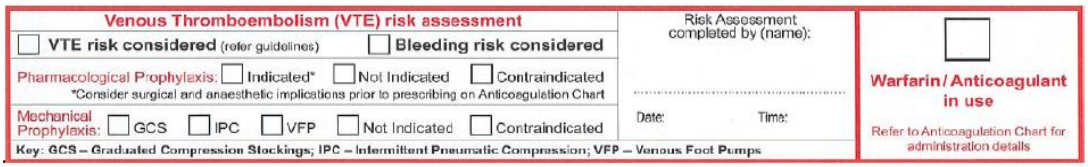
ii) Apply the "Anticoagulant Chart in Use" sticker in the place of a regular drug order

Examples :

iii) Tick the “warfarin/anticoagulant in use” box on the inside of the NIMC



Or with VTE Risk Assessment Tool in NIMC – tick “warfarin/anticoagulant in use” box



In principle, the requirements for using the Anticoagulation Medication Chart are the same as those of the National Inpatient Medication Chart (NIMC). Refer to "Guidelines for the use of the NIMC" available at http://www.safetyandquality.health.wa.gov.au/medication/standardised_charts_sup.cfm

1.4 Recommendations for use of anticoagulants

The recommendations for the use of subcutaneous LMWH, warfarin and intravenous UFH represent current best practice. However these do not cover all clinical scenarios and do not replace the need to clinical judgement.

1.5 Patient Information

The following sections are identical to the NIMC and should be completed following the Health Department Guidelines, including:

- **Patient location**
- **Patient Identification**
- **Patient weight and height**
- **Number of charts**

1.6 Adverse Drug Reactions

If an ADR including any allergies is recorded on the NIMC affix a red ADR alert sticker to the front page of the Anticoagulant chart in the space provided.

2 RELEVENT MEDICAL HISTORY

2.1 Best practice

Prior to initiating any anticoagulant therapy, patients must be screened for:

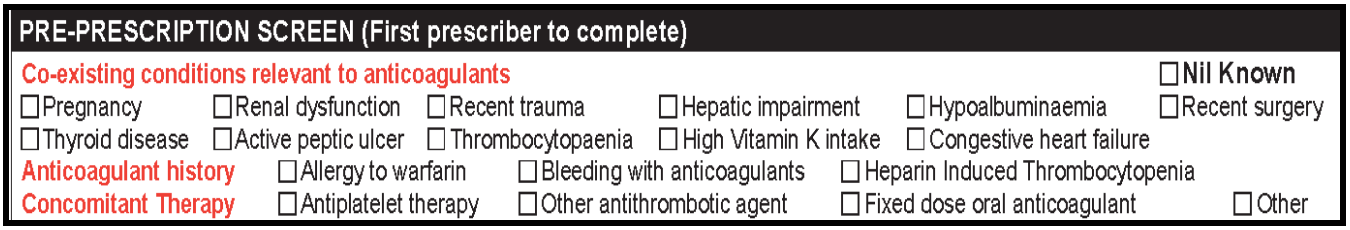
• co-existing diseases or conditions that could affect the decision to prescribe or dose requirements

• past anticoagulant related adverse incidents

• concomitant antiplatelet or antithrombotic therapy

This recommendation is based on the Medication Safety Self Assessment for Antithrombotics Therapy in Australian Hospitals[1] and alerts the prescriber to a possible need for dose modification or a need to monitor more closely.

2.2 Completing the chart



This section should be completed by the first prescriber on the anticoagulant chart. The “Nil significant” box should be ticked where there are no confounding conditions.

Where any ADRs including allergies are listed on the NIMC an ADR sticker should be affixed to the anticoagulant chart.

---

1 Clinical Excellence Commission, NSW (2007). Medication Safety Self Assessment for Antithrombotic Therapy in Australian Hospitals (sections 1.17-1.19), http://www.cec.health.nsw.gov.au/pdf/MSSA-AT.pdf

3. SUBCUTANEOUS ORDERS

This section of the chart must be used for all anticoagulant subcutaneous injections, including LMWH and UFH.

3.1 Best practice in the use of LMWH

Dosing of LMWH is recognised to be a function of the indication, perception of bleeding risk and modifying factors (e.g. renal failure). In WA the recommended dosing regimen for enoxaparin (Clexane®) is:

RECOMMENDATIONS FOR LOW MOLECULAR WEIGHT HEPARIN (LMWH)		
Preferred administration times for twice daily dosing are 0600 and 1800 hr. Daily thromboprophylaxis should be given in the evening.		
ENOXAPARIN DOSAGE AND FREQUENCY (Seek specialist advice in patients weighing < 40kg or > 150kg)		
INDICATION	**Normal renal function***	**Impaired renal function** (CrCl <30 mL/min)*
VTE prophylaxis	40 mg once daily	20 mg once daily
DVT treatment	1.5 mg/kg once daily **OR** 1 mg/kg twice daily	1 mg/kg once daily
Acute Coronary Syndromes/VTE treatment	1 mg/kg twice daily	1 mg/kg once daily
Creatinine Clearance (CrCl) [{(140-age) x Ideal Body Weight(kg)}/Serum Creatinine(µmol/L)[1.2 for males] Seek advice on **Dalteparin (LMWH)** doses, adjustment in renal failure, monitoring and reversal from your clinical pharmacist or specialist.		

Dose modification of these drugs is required when the creatinine clearance (GFR) is less than 30 mL/min. GFR should be estimated using the Cockroft-Gault equation. The Modification of Diet in Renal Disease (eGFR) provided with laboratory results should not be used[2].

Routine monitoring of residual anti-Xa activity as a measure of LMWH therapy is not required. However, in the case of patients at high risk of bleeding, anti-factor Xa monitoring may be appropriate.

While the risk of heparin induced thrombocytopaenia (HIT) is lower with LMWH than unfractionated heparin, screening for HIT with a platelet count at day 5 of therapy is recommended.

Guidelines for treatment reversal: Seek specialist/senior advice. As a guide: Give 1mg protamine sulphate per 1mg enoxaparin/100 units of heparin. Give half the protamine sulphate dose as a slow IV push (10 minutes) and the remainder as an infusion (in 5% glucose or 0.9% saline) over 6-8 hours.

3.2 Timing of VTE prophylaxis in the peri-operative/invasive procedures setting

- Interventional (surgical) procedure for prophylactic doses: withhold 12 hours before procedure and 4-6 hours after procedure.

- Spinal/epidural anaesthesia: do not institute anaesthesia or remove catheter within 12 hours of a dose of LMWH. Treatment may be commenced 2 hours after catheter removal.

Consider longer exclusion periods in the presence of complications or high risk of bleeding.

3.3 Timing of VTE/ACS treatment in the peri-operative/invasive procedures setting:

- Interventional (surgical) procedure: For treatment doses withhold 24 hours before procedure and 24 hours after procedure (48-72 hours for patients at high risk of bleeding).

- Spinal / epidural anaesthesia: do not institute anaesthesia or remove catheter within 24 hours of a treatment dose of LMWH. Treatment may recommence 2 hours after catheter removal.

Consider longer exclusion periods in the presence of complications or high risk of bleeding.

---

2 Roberts, G. W. (2006). "Dosing of key renally cleared drugs in the elderly - Time to be wary of the eGFR." Journal of Pharmacy Practice and Research. **36**(3): 204-209.

3.4 Once Only and Telephone Subcutaneous Orders

This section is for single doses at initiation that do not conform to the timing of regular orders and, telephone orders. This is identical to the "Once Only and Telephone Orders" section of the NIMC and should be completed following the NIMC guidelines.

ONCE ONLY AND TELEPHONE (Prescriber to sign within 24 hours of order)										
Date prescribed	Medication (print generic name)	Route	Dose	Date/Time of dose	Nurse N1	Nurse N2	Prescriber Sign	Prescriber Print name	Given by / Checked by	Time given

3.5 Regular Dose Orders: Prophylaxis and Treatment

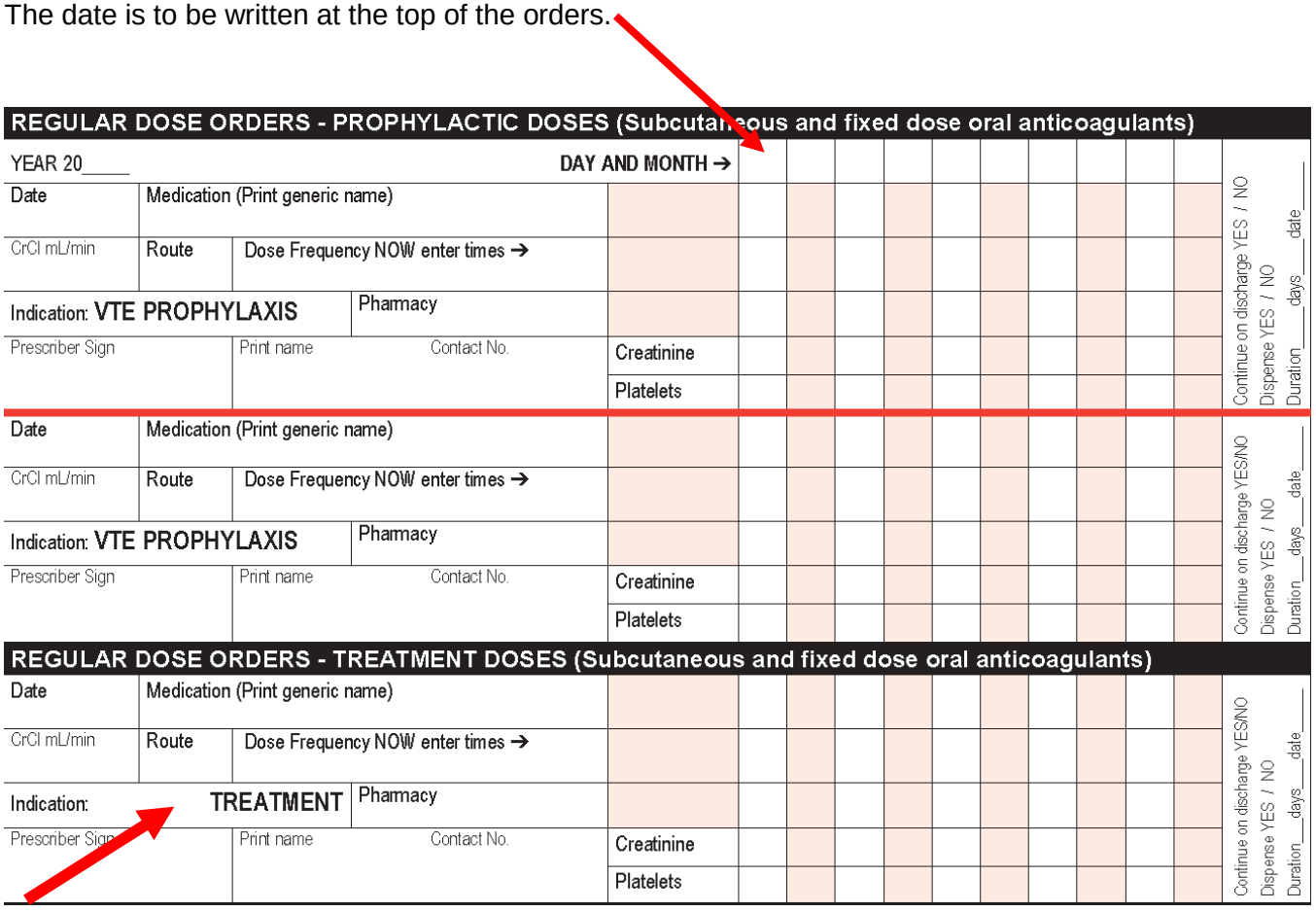
This section is used for regular dose orders of anticoagulant including subcutaneous injections (unfractionated heparin and low molecular weight heparins) and fixed dose oral anticoagulants (e.g. dabigatran and rivaroxaban). It is similar to the Regular Orders section of the NIMC and should be completed following the NIMC guidelines.

This section has been split into two – orders for VTE prophylaxis and VTE treatment.

The VTE prophylaxis section has been developed to cater for patients who need to swap therapy between either unfractionated heparin and low molecular heparin subcutaneous doses or oral fixed dose anticoagulants and subcutaneous heparin doses.

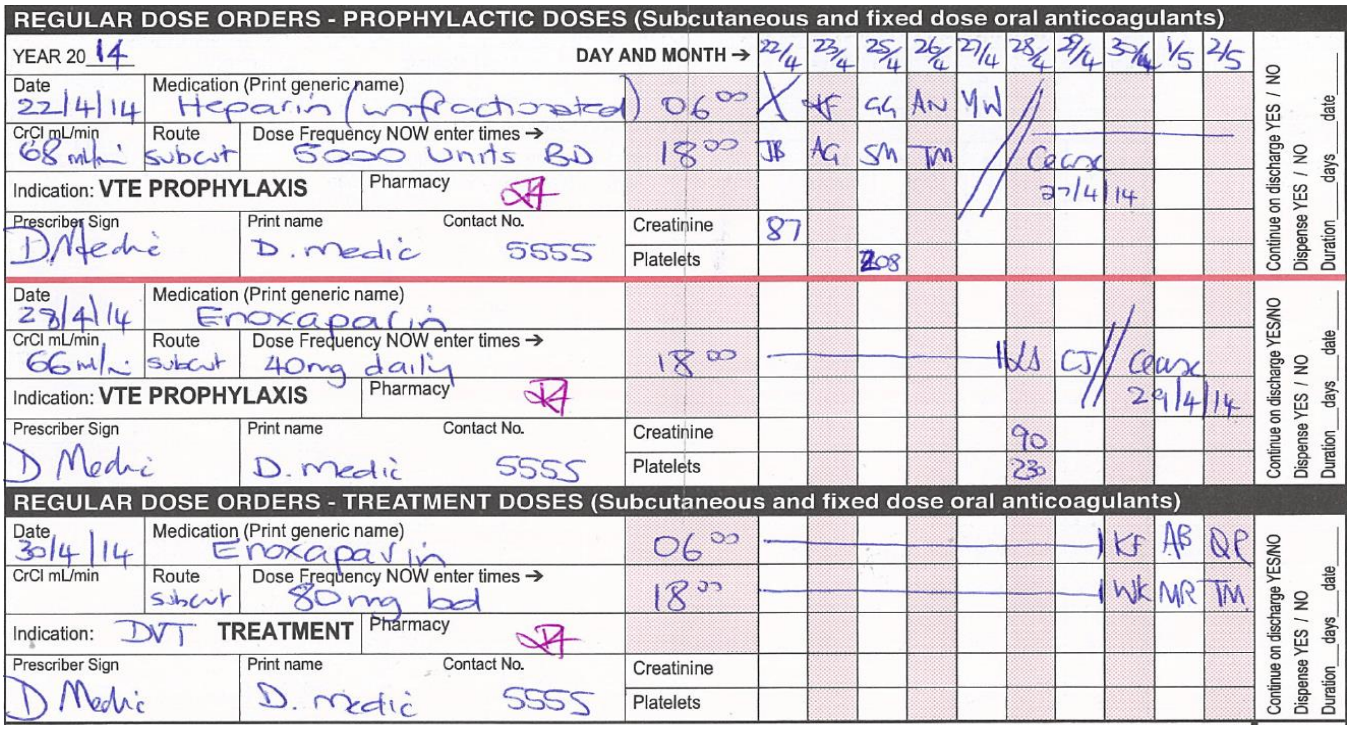
The period of prescription should NOT exceed 10 days.

The date is to be written at the top of the orders.



The prescriber is required to document the indication for the treatment dose (i.e. PE, AF, DVT etc)

Example of use:



REGULAR DOSE ORDERS - PROPHYLACTIC DOSES (Subcutaneous and fixed dose oral anticoagulants)

YEAR 20 14 — DAY AND MONTH → 22/4 23/4 25/4 26/4 27/4 28/4 29/4 30/4 1/5 2/5

Date	Medication (Print generic name)												
22/4/14	Heparin (unfractionated)	06⁰⁰	X	HF	GG	AN	YW	//					
CrCl mL/min: 68 mL/min	Route: subcut	Dose Frequency NOW enter times → 5000 Units BD	18⁰⁰	JB	AG	SM	TM		Ceasx 27/4/14				
Indication: VTE PROPHYLAXIS	Pharmacy: ✓												
Prescriber Sign: D Medic	Print name: D. medic	Contact No.: 5555	Creatinine	87					//				
			Platelets			208							

Date	Medication (Print generic name)												
28/4/14	Enoxaparin												
CrCl mL/min: 66 mL/min	Route: subcut	Dose Frequency NOW enter times → 40mg daily	18⁰⁰	—	—	—	—	—	HLS	CJ	//	Ceasx 29/4/14	
Indication: VTE PROPHYLAXIS	Pharmacy: ✓												
Prescriber Sign: D Medic	Print name: D. medic	Contact No.: 5555	Creatinine						90				
			Platelets						230				

REGULAR DOSE ORDERS - TREATMENT DOSES (Subcutaneous and fixed dose oral anticoagulants)

Date	Medication (Print generic name)												
30/4/14	Enoxaparin	06⁰⁰	—	—	—	—	—	—	—	KF	AB	QP	
CrCl mL/min	Route: subcut	Dose Frequency NOW enter times → 80mg bd	18⁰⁰	—	—	—	—	—	—	WK	MR	TM	
Indication: DVT TREATMENT	Pharmacy: ✓												
Prescriber Sign: D Medic	Print name: D. medic	Contact No.: 5555	Creatinine										
			Platelets										

Continue on discharge YES / NO — Dispense YES / NO — Duration ___ days ___ date

Other information that is required in this section of the chart includes:

Date: Date the medication order was commenced in hospital.

Medication: Enoxaparin is pre-printed. If not appropriate strike out and print generic name.

GFR: Document the baseline GFR used to determine LMWH dose. Ideal body weight should be used in cases of extreme weight. Calculators for GFR and IBW are available online (CIAO/Therapeutic Guidelines/Popular links/Creatinine clearance and ideal body weight calculators). Do not use eGFR provided with the laboratory results.

Dose and frequency: Follow recommended dose and frequency. Seek specialist advice for obese patients or weight >150 kg.

Times: Preferred administration times for twice daily dosing are 0600 and 1800.

Daily thromboprophylaxis should be given in the evening.

Indication: Tick the appropriate box. If TREATMENT, specify the condition.

Pharmacy: This section is for use by the ward/clinical pharmacist

Creatinine/ Platelets: There is provision to record creatinine and platelets to assist monitoring. As a minimum platelets should be measured on Day 5.

Prescriber Sign, The signature of the prescriber must be written to complete each medication order.

Print name, For each signature, the name must be written in print at least once on the medication chart.

Contact: A contact number (i.e. page number) for the prescriber should be provided.

4. VARIABLE DOSE ORAL ANTICOAGULANT ORDERS

This section of the chart must be used for all oral anticoagulants, usually warfarin.

4.1 Best practice

Warfarin should be prescribed without brand substitution. Individual patients should remain on one brand of warfarin. Within the WA Public sector Marevan® is the preferred brand.

Before initiating warfarin therapy measure baseline INR. If INR>1.4 do not commence warfarin - seek senior/specialist advice.

Warfarin should be monitored and dose modified based on the INR result.

Initiating treatment: A dose nomogram should be available to provide decision support to junior staff so as to provide assistance with the initiation of warfarin therapy. The warfarin initiation nomogram should be simple and easy to use and balance rapid anticoagulation with bleeding risk. In WA is the recommended nomogram for an INR 2-3 is:

(ADULT) INITIATION DOSING FOR WARFARIN – TARGET INR 2-3 – For Guidance Only			
Day	INR	Suggested dose	■ This dosing regimen takes about 6 days to achieve therapeutic INR, longer in those under 60 years. ■ For younger patients consider 7–10mg on day 1 and day 2. ■ Consider smaller starting doses when the patient is elderly, has low body weight or abnormal liver function, or, is at high bleeding risk. ■ Consider dose modification in the presence of interacting drugs. ■ INR testing is recommended at morning blood rounds. ■ Discontinue heparin after a minimum of 4 days therapy and when INR is therapeutic (>2) for two consecutive days.
1	1.0-1.4	5 mg	
2	No INR	5 mg	
3	<1.8 ≥1.8	5 mg 1 mg	
4&5	<1.5 1.5-1.9 2.0-2.5 2.6-3.5 3.6-4.0 4.1-4.5 >4.5	7 mg 5mg 4mg 3mg 2mg 1mg See treatment reversal	
6 onwards	Measure on alternate days until stable (daily if drug interaction or high bleeding risk)	As for days 4&5 or per clinical judgement	

This dosing regimen takes about 6 days to achieve therapeutic INR, longer in those under 60 years.

If a shorter time to therapeutic levels is indicated or for younger patients consider 7 to 10 mg on day 1 and day 2.

Consider smaller starting doses when the patient is elderly, has low body weight or abnormal liver function, or, is at high bleeding risk. Consider dose modification in the presence of interacting drugs.

Ongoing treatment: In acutely ill patients daily monitoring of INR may be appropriate.

Monitor INR more frequently when any change in treatment involves drugs known to interact with warfarin.

Recommended time for inpatient dosing is 1600. This allows the medical team caring for the patient to order the next dose based on INR results, rather than leaving it for after-hours staff.

INR testing is recommended at morning blood round.

Indication for treatment, appropriate target range and planned duration of treatment should all be documented.

All patients should receive warfarin education, including written information prior to discharge. This should be documented. It is recognised that education may be completed by pharmacy, nursing or medical staff.

The dose modifications made to warfarin therapy should be communicated to the primary care practitioner to assist further dose modification in the early post-discharge phase.

In the case of acute VTE treatment, heparin (unfractionated or low molecular weight) should be given for at least of 5 days and until the INR is greater than 2 for two consecutive days.

4.2 Reversal of Over-treatment

Reversal of over-treatment should be managed in accordance with the Australasian Society of Thrombosis and Haemostasis[3]. In the case of bleeding, always seek advice from senior staff or a specialist.

Risk factors for bleeding complications include: recent surgery/trauma/bleed, advanced age, renal failure, hypertension, alcohol abuse, active GI disease, antiplatelet therapy and other relevant co-morbidity.

REVERSING WARFARIN OVER-TREATMENT (bleeding risk increases exponentially from INR 5 to 9. Monitor closely INR ≥ 6)					
Clinical Setting		**Management**			
INR	**Bleeding**	**Warfarin**	**Vitamin K**	**Prothrombinex VF**	**Comments**
Greater than therapeutic range but <5	**Absent**	Reduce dose or omit next dose			Resume warfarin at reduced dose when INR approaches therapeutic range. If INR <10% above therapeutic level, dose reduction may not be necessary.
5 – 9	**Absent** (Low risk)	Stop			Measure INR in 24 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.
	Absent (High Risk)*	Stop	1–2 mg (oral)[1] Or 0.5-1mg IV[2]		Measure INR within 24 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.
>9	**Absent** (Low risk)	Stop	2.5–5mg (oral)[1] Or 1 mg (IV)[2]		Measure INR in 6–12 hours Resume warfarin at reduced dose when INR is within the therapeutic range.
	Absent (High Risk)*	Stop	1 mg (IV)	Consider 25 IU/kg [3,4] See weight based nomogram	Measure INR in 6–12 hours Resume warfarin at reduced dose when INR is within the therapeutic range.
Clinically significant bleeding where warfarin is a contributing factor. **High Risk Bleeding e.g. Intracranial Haemorrhage (ICH) or massive haemorrhage. *Seek consultation with a haematologist / specialist.***		Stop	5 – 10 mg (IV)[2]	25 IU/kg [3,4] See weight based nomogram	Assess patient continuously until INR < 5 and bleeding stops. Reassess need for warfarin therapy with supervising team. If Prothrombinex VF is unavailable, give FFP (10 – 15mL/kg)[4] in addition to vitamin K. ***FFP (10-15mL/kg)[4] should be considered in addition to Prothrombinex VF for high risk bleeding e.g. ICH or massive haemorrhage.***
Notes		*[1] undiluted paediatric IV formulation* *[2] undiluted as slow IV bolus over at least 30 seconds* *[3] at a rate of 3mL/min. 500 Units of factor IX in 1 vial of Prothrombinex VF* *[4] available from transfusion service* ***For reversal prior to a procedure – Refer to hospital guidelines or seek specialist advice.***			
***High Bleeding Risk** One or more →*		■ **Recent surgery / trauma / bleed** ■ **Advanced age**	■ **Renal Failure** ■ **Hypertension**	■ **Alcohol abuse** ■ **Active GI bleed**	■ **Antiplatelet therapy** ■ **Other relevant co-morbidity**

NOTES:

[1]Oral Vitamin K: use undiluted paediatric IV formulation.

[2]IV Vitamin K: use undiluted as slow IV bolus over at least 30 seconds.

[3]Prothrombinex VF should be dosed to deliver 25-50 units of factor IX/kg at a rate of 3mL/min.

1 vial of Prothrombinex VF contains 500 units of factor IX.

[4]Prothrombinex VF and fresh frozen plasma are available from transfusion service.

---

3 Baker, R. I., P. B. Coughlin, et al. (2004). "Warfarin reversal: consensus guidelines, on behalf of the Australasian Society of Thrombosis and Haemostasis." Medical Journal of Australia **181**(9): 492-7.

4.3 Warfarin-Drug Interactions

WARFARIN DRUG INTERACTIONS (Pharmacy: Indicate drug, type of change (if any) and expected interaction) Details:	Sign	Date

Completing this section is pharmacy responsibility, and allows the pharmacist to communicate potential clinically significant interactions to the prescriber. Details of drug interactions are available online (CIAO/Australian Medicines Handbook/Appendix B Drug interactions/Warfarin or eMIMS/Essential resources/MIMS DrugAlert Interactions).

At The Time of Admission

List all concomitant therapy that has a significant warfarin interaction.

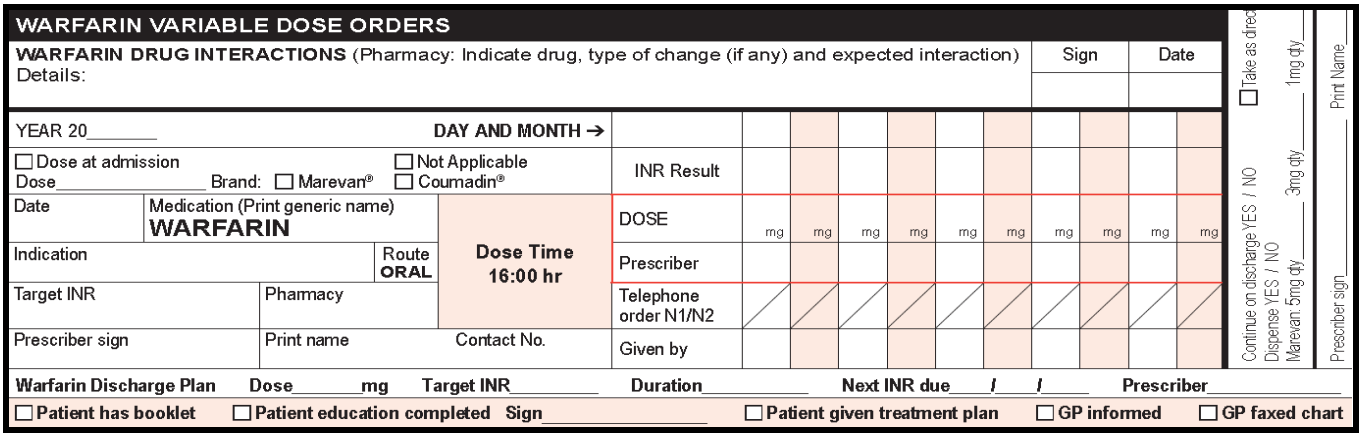
During the Hospital Episode

• Add any new medications that that have a significant interaction, and

• Highlight any change made to the medications listed.

Each entry should be signed and dated.

4.4 Variable Dose Orders



The left hand side of the chart is completed at the time the order is started:

Dose at admission: This refers to the use of warfarin prior to hospital presentation. If not used prior to hospital presentation tick Not Applicable, otherwise indicate the brand of warfarin and the last pre-hospital dose.

Date: Date medication order was started in hospital.

Medication: Warfarin is pre-printed. If not appropriate, print generic drug name.

Warfarin brands are not equivalent and cannot be used interchangeably.

Marevan® is the brand of warfarin recommended for use in WA hospitals.

If Coumadin® used prior to hospital presentation use patient's own Coumadin® if available. If switching from Coumadin® to Marevan® monitor INR daily.

Indication: Indication for oral anticoagulant therapy.

Target INR: Document the target INR.

TARGET INR RANGE	
2.0-3.0	■ Therapy for DVT or PE ■ Preventing DVT: high risk patients e.g. hip or knee surgery ■ Preventing systemic embolism: AF valvular heart disease, post MI, bioprosthetic heart valves (first 3 months)
2.5-3.5	■ Bileaflet mechanical heart valve (aortic)
3.0-4.0	■ Mechanical prosthetic valve (high risk)

Pharmacy: This section is for use by the ward/clinical pharmacist

Prescriber Sign Print name, Contact: The signature of the prescriber must be written to complete each medication order. For each signature, the name must be written in print at least once on the medication chart.

Dose time: The recommended time is 1600. This time is pre-printed on the chart. If this is not suitable, cross out 1600 and enter appropriate time.

The right hand side of the chart must be completed each day

INR result: Recommended time for INR testing is 0700 (morning blood round). Document the INR result for this day. If no test was performed this day, leave blank.

Dose: documented Dose prescribed for this day. If a dose is to be withheld this should be following the NIMC guidelines. If initiating warfarin, see nomogram on page 4.

Prescriber: Initials of doctor prescribing the daily warfarin dose. If the name is not already printed on the chart document the medical notes included printed name and signature.

Phone orders: Phone orders are not appropriate at all institutions - check local policy. Where allowed, two nurses must check the prescription and sign appropriately. Nursing staff should record full details in Clinical Record and doctor must sign order within 24 hours.

Given by: Initials of the nurse administering the daily dose.

4.5 Discharge Treatment Plan

This should be completed by the prescriber at the time of hospital discharge.

Warfarin Discharge Plan	Dose_____mg	Target INR_____	Duration_____	Next INR due___/___/____	Prescriber_____
☐ Patient has booklet	☐ Patient education completed	Sign_____	☐ Patient given treatment plan	☐ GP informed	☐ GP faxed chart

Dose: Dose to be taken until the next INR test.

Target INR: as above

Duration: The expected duration of therapy eg long-term, 3-6 months.

Next INR: Date the next INR test is due.

To ensure continuity of care, the front page should be copied or preferably faxed to the GP.

This provides information about the treatment plan as well as informing the GP about the course of treatment during the hospital episode of care.

4.6 Discharge Process

☐ Patient has booklet	☐ Patient education completed	Sign_____	☐ Patient given treatment plan	☐ GP informed	☐ GP faxed chart

This is a checklist and all activities should be completed by the time of hospital discharge. This is the official warfarin education and discharge record and will usually be completed by the pharmacist. However in some cases such as after-hours discharge this will need to be completed by another member of the clinical team. The person completing each of these mandatory activities must sign that the activity has been completed and print name.

Warfarin booklet provided: This may include on a previous episode. “Living with warfarin – information for patients” is available through the pharmacy department or contact wamsg@health.wa.gov.au.

Patient education completed: This may include on a previous episode, provided the patient’s knowledge has been checked.

Patient given treatment plan: The patient should be informed about the **discharge dose** and **date of next INR test**. The warfarin book contains a detachable wallet/purse size warfarin treatment card. Document the treatment plan on this card.

GP communication: Indicate whether the patient’s GP has been contacted about the management plan. Fax or copy this page to the GP at discharge.

4.7 Discharge Supply

	Continue on discharge YES/NO Dispense YES/NO 5mg qty____/ 3mg qty____/ 1mg qty____	Continue on discharge YES/NO Dispense YES/NO Duration ___days/qty____
Prescriber sign_____Print Name_____date / /		Pharmacist _____date / /

This section is similar to the NIMC and should be completed following the NIMC guidelines. Note that warfarin tablet strengths are pre-printed. Indicate the number of tablets of each strength required. Hospitals that have undergone PBS reform will not need to use this section for supply, the discharge supply should be written on a PBS prescription along with the patient’s other medications required at discharge.

5. INTRAVENOUS UNFRACTIONATED HEPARIN

5.1 Best practice

Given the common use of dual antiplatelet therapy in the setting of ACS management, less intensive initial and maintenance dosing is advisable compared with the treatment of VTE. Accordingly indication-dependent nomograms are appropriate.

The nomograms are only valid for a standard dilution of 50 units/mL of heparin. Dilute 25,000 units of unfractionated heparin in 500 mL of 0.9% sodium chloride (or 5% glucose).

Intravenous heparin should be prescribed using weight based initial bolus and infusion rates.

5.2 Initial bolus dose Initial infusion rate

VENOUS THROMBOEMBOLISM 80 units/kg 18 units/kg/h

ACUTE CORONARY SYNDROMES 60 units/kg 12 units/kg/h

Intravenous UFH should be monitored using the activated partial thromboplastin time (aPTT).

aPTT levels should be measured at baseline, then within 6 hours of each infusion rate change. When the aPTT is within the therapeutic range it should be re-measured within 24 hours (or the next morning).

Each laboratory should determine its own therapeutic target range for heparin against a gold standard test (eg residual anti-Xa activity).

Dose modification of intravenous UFH should be based on the aPTT using a weight based maintenance nomogram.

VENOUS THROMBOEMBOLISM		
aPTT	**Action required**	**Rate change**
<AA	80 units/kg bolus	Increase 4 units/kg/h
AA-<BB	40 units/kg bolus	Increase 2 units/kg/h
BB-DD (Therapeutic range)	No change	No change
>DD-EE	No change	Decrease 2 units/kg/h
>EE	Hold infusion for 60 minutes	Decrease 3 units/kg/h
ACUTE CORONARY SYNDROMES		
aPTT	**Action required**	**Rate change**
<AA	60 units/kg bolus	Increase 3 units/kg/h
AA-<BB	No change	Increase 2 units/kg/h
BB-CC (Therapeutic range)	No change	No change
>CC-DD	No change	Decrease 1 units/kg/h
>DD-EE	Hold infusion for 30 minutes	Decrease 2 units/kg/h
>EE	Hold infusion for 60 minutes	Decrease 3 units/kg/h

Medical responsibilities include –

- Prescription of initial bolus dose and infusion rate,
- Selection of maintenance nomogram

or

- Prescription of dose modification following each aPTT test,
- Monitoring for complications of anticoagulation, and
- Identification of treatment end points.

Nursing responsibilities include –

- Ensuring that an aPTT has been taken at the indicated time,
- Obtaining the aPTT result in a timely manner,
- Alerting the prescriber to extreme aPTT results
- Implementing dose modification as indicated by prescribed nomogram

or

- Contacting the prescriber with the aPTT result for prescription of dose modification.
- Nursing staff are to ensure that unfractionated heparin infusions are not stopped to allow patients to attend investigations; a nurse escort is required in this setting.

In the setting of VTE treatment, where warfarin therapy is being initiated, intravenous unfractionated heparin should be continued until the INR is greater than 2.0 in two consecutive days.

Measure platelets at baseline and at least twice weekly.

Contact haematologist in all suspected cases of Heparin Induced Thrombocytopaenia (HIT).

5.3 Reversing Heparin Treatment

Protamine reversal should be reserved for cases of major of bleeding or where required prior to emergency surgery. For high aPTT without bleeding apply relevant nomogram. Protamine reversal should always be carried out with senior/specialist advice. As a guide: Estimate heparin dose received in last hour. Administer 1mg protamine sulphate per 100 units of heparin (max 50 mg) as a slow IV push (over 10 minutes). Monitor aPTT immediately after the bolus then as required.

Completing the chart

5.4 Intravenous injection/infusion orders

INTRAVENOUS PRESCRIPTION ORDER Prescriber to complete. (A new prescription is required if the order (total dose, fluid or volume) is changed)							
Target aPTT:		Indication: ☐ VTE ☐ Acute Coronary Syndrome (ACS) ☐ Other(specify)					Weight: kg
Date	Drug	Total dose (units)	Fluid	Volume (mL)	Signature	Print name	Contact
	HEPARIN	25,000 units	0.9% SODIUM CHLORIDE	500 mL			

This must be completed by the prescriber. A new prescription is required if the order (total dose, fluid or volume) is changed. This requires a new anticoagulation chart.

Target aPTT: See the recommendations on page 3 or as specified by consultant. Note that this varies between test centres and are hospital specific.

Indication: Tick appropriate box.

Weight: The patient weight used to determine the dose should be documented.

Date: Date of prescription (total dose, fluid or volume).

Drug: Heparin is pre-printed. If not appropriate, print generic name.

Total dose: Number of **units** to be diluted. 25,000 Units is pre-printed. Amend if required.

Fluid: Type of dilution fluid. Normal saline is pre-printed. Amend if required.

Volume: Volume of dilution fluid. 500 are pre-printed. Amend if required.

Prescriber Sign
Print name,
Contact: The signature of the prescriber must be written to complete each medication order. For each signature, the name must be written in print at least once on the medication chart.

5.5 Initial dose order and administration

INITIAL BOLUS DOSE AND INITIAL INFUSION RATE Prescriber to complete ORDER								
Date	Baseline aPTT	Date/Time of dose	Initial Bolus (units)	Initial Infusion Rate (mL/hour)	Prescriber		Nurse	
					Signature	Print Name	Time	N1/N2

The prescriber should document:

Date: Date of order.

Baseline aPTT: aPTT must be measured prior to treatment commencing.

Date/time of dose: Date/time of initial bolus dose.

Bolus dose (units): Total number of units to be given by bolus. This should be based on the patient weight and indication.

Infusion rate (mL/hr): mL of prepared solution to be infused each hour. This should be based on the patient weight and indication.

Prescriber: Signature, Print name The signature of the prescriber must be written to complete each medication order. For each signature, the name must be written in print at east once on the medication chart.

The nurse administering the initial dose then documents:

Time: The time the therapy commenced.

N1/N2: Two nurses to check/sign initial dose. The volume (of standard solutions) corresponding to each bolus dose is shown on page 3.

5.6 Maintenance infusion rate and bolus doses

MAINTENANCE INFUSION RATE CHANGES AND BOLUS DOSES

Prescriber to complete order ☐ Prescriber to be contacted following each aPTT test
☐ Nursing staff to adjust dose based on nomogram for ☐ VTE ☐ ACS using_____kg column

Date	Prescriber signature	Print name	Contact	Pharmacy

This section should be completed following each aPTT test.

Indication and weight based nomograms are provided on the chart. These allow nursing staff to make appropriate adjustments. These nomograms are only valid for 50 units/mL concentration.

INFUSION NOMOGRAMS FOR INTRAVENOUS UNFRACTIONATED HEPARIN USE

The nomograms (weight-based guides) are only valid when using an unfractionated heparin concentration of 50 units/mL and STANDARD aPTT targets.
INITIAL ORDER: Prescriber should complete order (initial bolus and initial infusion rate) on page 2. See below for recommended doses.
MAINTENANCE: Prescriber to indicate on page 2 whether nurse should maintain infusion rate based on nomogram as indicated OR whether the prescriber is to be contacted following each aPTT test.
IT IS RECOMMENDED THAT BOLUS DOSES BE DRAWN UP (AS PRESCRIBED) FROM SEPARATE AMPOULES INTO A SYRINGE FOR ADMINISTRATION. THE PRESCRIBER SHOULD ALWAYS BE CONTACTED FOR EXTREME aPTT LEVELS.

VENOUS THROMBOEMBOLISM

INITIAL	INITIAL ORDER		WEIGHT BASED GUIDE FOR INITIAL DOSE											
		Weight (kg)	<40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
	Bolus dose 80 units/kg	Units	3200	3600	4000	4400	4800	5200	5600	6000	6400	6800	7200	7200
	Infusion 18 units/kg/hour	Rate (mL/hr)	14	16	18	20	22	23	25	27	29	31	32	32
MAINTENANCE	MAINTENANCE ORDER		WEIGHT BASED RATE FOR MAINTENANCE DOSE											
		Weight (kg)	<40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
	aPTT	**Dose Adjustment**	**Rate change (mL/hour)** Re-measure aPTT within 6 hours of each rate change											
	< Aa	**80 units/kg bolus (as per initial bolus) plus increase rate by 4 units/kg/hour**	+3	+4	+4	+4	+5	+5	+6	+6	+6	+7	+7	+8
	Bb – Cc	**40 units/kg bolus (half initial bolus) plus increase rate by 2 units/kg/hour**	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+4	+4
	Dd – Ee	No change	Re-measure aPTT within 24 hours (or next morning)											
	Ff – Gg	Reduce 2 units/kg/hour	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3	-4	-4
	Hh – Jj	**Contact Doctor, hold 60 minutes then reduce 3 units/kg/hour**	-2	-3	-3	-3	-4	-4	-4	-5	-5	-5	-5	-6

ACUTE CORONARY SYNDROME (and for patients at higher risk of bleeding and/or on dual antiplatelet therapy)

INITIAL	INITIAL ORDER		WEIGHT BASED GUIDE FOR INITIAL DOSE											
		Weight (kg)	<40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
	Bolus dose 60 units/kg	Units	2400	2800	3000	3300	3600	4000	4000	4000	4000	4000	4000	4000
	Infusion 12 units/kg/hour	Rate (mL/hr)	10	11	12	13	14	15	17	18	19	20	20	20
MAINTENANCE	MAINTENANCE ORDER		WEIGHT BASED RATE FOR MAINTENANCE DOSE											
		Weight (kg)	<40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
	aPTT	**Dose Adjustment**	**Rate change (mL/hour)** Re-measure aPTT within 6 hours of each rate change											
	< Kk	**60 units/kg bolus (as per initial bolus) plus increase rate by 3 units/kg/hour**	+2	+3	+3	+3	+4	+4	+4	+5	+5	+5	+5	+6
	Ll – Mm	Increase 2 units/kg/hour	+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+4	+4
	Nn – Pp	No change	Re-measure aPTT within 24 hours (or next morning)											
	Qq – Rr	Reduce 1 unit/kg/hour	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2	-2
	Ss – Tt	**Hold 30 minutes** then reduce 2 units/kg/hour	-2	-2	-2	-2	-2	-3	-3	-3	-3	-3	-4	-4
	> Zz	**Contact doctor, hold 60 minutes then reduce 3 units/kg/hour**	-2	-3	-3	-3	-4	-4	-4	-5	-5	-5	-5	-6

The prescriber should complete the information on page 3:

Weight band: Circle the weight band to be used on the appropriate nomogram

Date: Date of the order.

Prescriber: Signature, Print name, Contact

must The prescriber must sign to complete the order. For each signature, the name be written in print at least once on the medication chart.

Pharmacy: This section is for use by the ward/clinical pharmacist.

On page 3, the first nurse should strike out the nomogram that is not applicable and highlight the appropriate weight column.

aPTT test

aPTT test			Bolus and infusion rate administration									
Date	Time Taken	aPTT	Time	IV bolus (units)	Bolus Sign	Hold (mins)	Time Stopped	Hold (Sign)	Time Started	New Rate (mL/hour)	Rate Sign	Prescriber Sign

The nurse records the date and time the blood was taken and the aPTT result.

5.7 Infusion change and bolus dose

This will usually be completed by nursing staff following the prescribed nomogram or as specifically ordered by the prescriber.

Time: If a bolus dose is indicated, record the time the dose is administered.

IV bolus (units): If a bolus dose is indicated, record the total number of units administered.

Bolus sign: Two nurses to check/sign the bolus dose**.**

Hold (mins): If temporary stop to infusion indicated, record the length of the pause required.

Time stopped: If infusion stopped record the time the infusion was stopped.

Hold sign: Two nurses to check/sign infusion temporarily stopped**.**

Time started: Record the time an infusion rate is changed. This includes following a pause. If the aPTT is within the target range and no change is required indicate the time that the aPTT result noted.

Rate (mL/hr): Record the rate of infusion. Where the aPTT is within the target range the infusion rate will be the same as the previous, otherwise document the new rate.

Rate sign: Two nurses check/sign the rate of infusion.

Dr Sign: Each aPTT test result and subsequent action should be reviewed by the responsible prescriber.

5.8 Infusion bag changes

INFUSION BAG CHANGES Nursing staff to document each new bag. Infusion should only be interrupted when indicated by aPTT											
Date	Time Commenced	Checked	Given	Time Completed	Volume Infused (mL)	Date	Time Commenced	Checked	Given	Time Completed	Volume Infused (mL)

This section must be completed by nurses every time a new infusion bag is hung. An infusion of unfractionated heparin is a continuous infusion and should not be interrupted (eg for showering, imaging) unless ordered by the doctor.

Date: Date the bag was hung.

Time commenced: Time infusion commenced.

Checked: Name/signature of nurse checking infusion.

Given: Name/signature of nurse putting up infusion.

Time completed: Time the bag was removed.

Volume infused: Total volume infused.

.