Government of Western Australia
Department of Health

Guidelines for the WA Anticoagulation Medication Chart (WA AMC)

WA AMC User Guide

For Chart Version 05/2022

Acknowledgement

The Patient Safety and Clinical Quality Directorate (Medicines and Technology Unit) would like to acknowledge the contribution of the WA Anticoagulation Steering Group members in the revision of the WA Anticoagulation Medication Chart in 2021/2022.

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- Dr Mark Newman
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Contents

1. INTRODUCTION

1.1 Preamble

The aim of the WA Anticoagulation Medication Chart (WA AMC) 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 user-guide refer to the in-hospital management of anticoagulants and may not be appropriate in ambulatory care.

The benefits of the WA AMC:

- Provides one chart for all anticoagulant prescriptions to reduce the risk of duplicate prescribing;
- Point of care guidelines for initiation, monitoring and reversal of anticoagulants;
- Enables the effective achievement of therapeutic levels;
- Minimise the risk of bleeding events due to supra-therapeutic levels.

1.2 When should this chart be used?

This chart should be used for every hospital episode where an adult hospital inpatient is prescribed an oral, intravenous or subcutaneous anticoagulant. This includes but is not limited to warfarin, direct oral anticoagulant (DOAC) including apixaban, dabigatran or rivaroxaban, unfractionated heparin (UFH) and low molecular weight heparin (LMWH).

1.3 Important – Cross-referencing with WA HMC

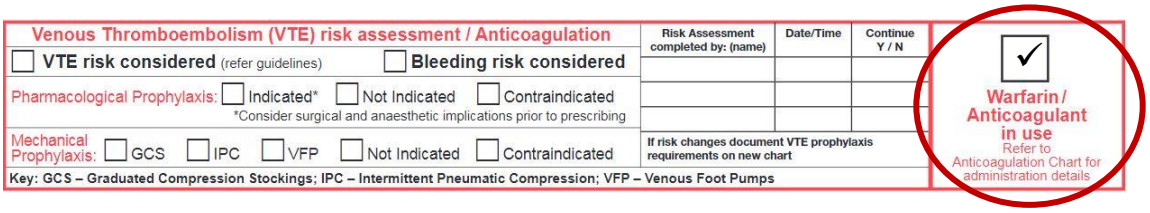
Ensure that use of the anticoagulant chart is documented on the main medication chart WA hospital medication chart (WA HMC).

This can be done by cross-referencing on the front (example 1) and/or inside (example 2) of the WA HMC.

Example 1: Front of WA HMC

Example 2: Inside of WA HMC

I. Tick the "warfarin/anticoagulant in use" box on the inside of the WA HMC



Ensure that the active WA AMC is kept alongside the current active WA HMC, preferably in a medication chart file. A number of medication incidents have been identified through DATIX Clinical

Incident Management System (CIMS) were attributed to the anticoagulant chart not being filed appropriately next to the medication chart.

II. Apply the "Anticoagulant Chart in Use" sticker in the place of a regular drug order

In principle, the requirements for using the Anticoagulation Medication Chart are the same as those of the WA HMC. Refer to WA HMC user guide on the Medication Chart website.

1.4 Recommendations for use of anticoagulants

The recommendations on the Anticoagulation Medication Chart for the use of subcutaneous LMWH, DOACs, warfarin and intravenous UFH represent current best practice.

However, these do not cover all clinical scenarios and do not replace the need for clinical judgement. Further guidelines on each type of anticoagulant can be found on the Medication Chart website.

1.5 Patient Information

The following sections are identical to the WA HMC 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 WA HMC, affix a red ADR alert sticker to the front page of the Anticoagulant chart in the space provided.

2 RELEVANT MEDICAL HISTORY

2.1 Best practice

Prior to initiating any anticoagulant therapy, it is important to screen patients for bleeding risk including:

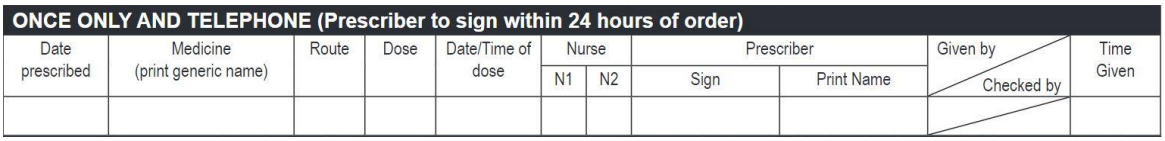
- co-existing diseases or conditions that could affect the decision to prescribe or dose requirements
- past anticoagulant related adverse incidents
- concomitant antiplatelet or antithrombotic therapy

2.2 Bleeding Risk Assessment

This section must be completed by the first prescriber on the anticoagulant chart. Please refer to local Venous Thromboembolism guidelines for bleeding risk assessment.

3. ONCE ONLY AND TELEPHONE 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 WA HMC and should be completed following the WA HMC guidelines.



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

4. REGULAR DOSE ORDERS - Prophylaxis and Treatment

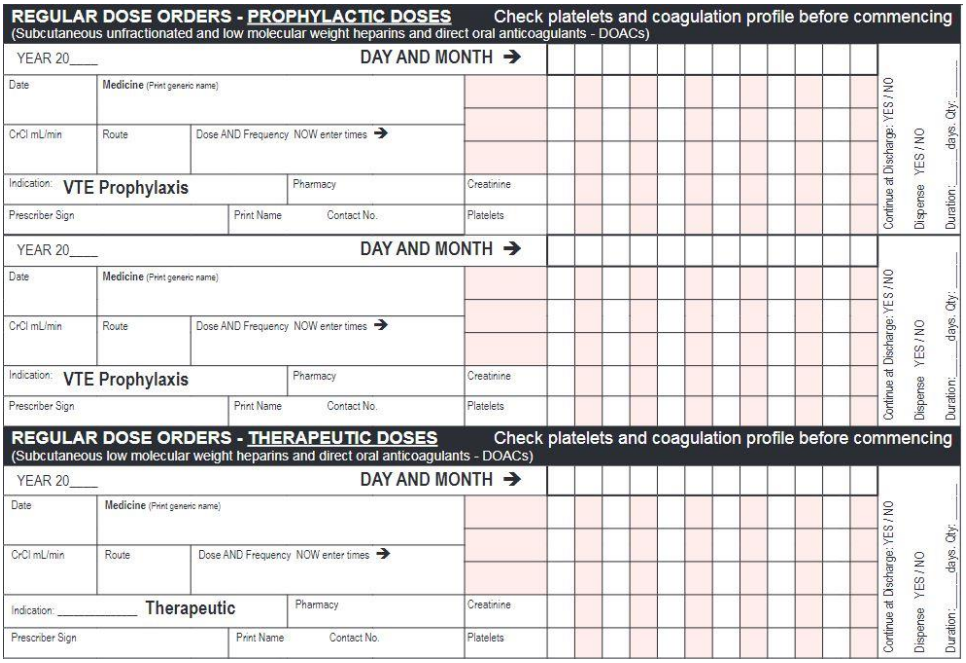
This section is used for regular dose orders for anticoagulants including:

- Subcutaneous unfractionated heparin
- Subcutaneous enoxaparin or dalteparin
- Direct oral anticoagulant (i.e. rivaroxaban, apixaban and dabigatran)

It is similar to the Regular Orders section of the WA HMC and should be completed following the **WA HMC 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 change anticoagulant agent or change the indication of anticoagulant therapy.



Information that is required in this section of the chart includes:

Year, Day and Month	Document year, day and month that first anticoagulant therapy is commenced.
Date	Date the medication order was commenced in hospital.
Medication	Print generic name of anticoagulant.
Creatinine Clearance (mL/min)	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:

<table>
<tr><td></td><td>

eviQ
Australian Medicines Handbook (AMH)
National Kidney Foundation)

Do not use eGFR provided with the laboratory results.

For more information, refer to Dose Calculations Cleared by Glomerular Filtration Quick Reference Guide
</td></tr>
<tr><td>Route</td><td>
Use route acceptable abbreviations:

Oral/Per oral: PO
Subcutaneous: SUBCUT (Avoid S/C or sc)

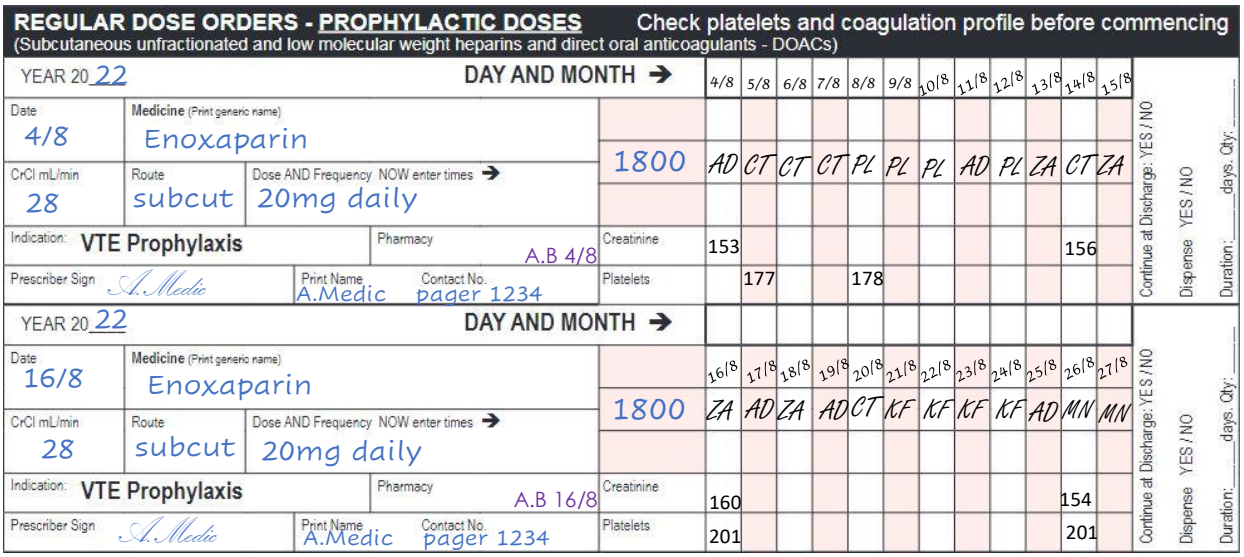
</td></tr>
<tr><td>Dose</td><td>
Recommendations for LMWH and unfractionated subcutaneous heparin available on page 3:
<table>
<tr><th colspan="3">RECOMMENDATIONS FOR UNFRACTIONATED SUBCUTANEOUS HEPARIN</th></tr>
<tr><td>Dosing</td><td colspan="2">VTE prophylaxis: 5000 units bd (0600 & 1800) High Risk Thromboembolism: 5000 units tds (0600,1200,1800)</td></tr>
<tr><td>Withholding subcutaneous UFH</td><td colspan="2">• Withhold subcutaneous heparin a minimum of 6 to 8 hours prior to intervention
• Interventional (surgical) procedure: may commence prophylactic doses 2 hours after procedure.</td></tr>
<tr><td>Monitoring</td><td colspan="2">• Full blood count: Measure platelets at baseline and at least twice weekly. Medical review if platelets less than 50 x 10^9/L</td></tr>
<tr><th colspan="3">RECOMMENDATIONS FOR LOW MOLECULAR WEIGHT HEPARIN (LMWH)</th></tr>
<tr><td colspan="3">Preferred administration times for twice daily dosing are 0600 and 1800 hr. Daily thromboprophylaxis should be given in the evening.</td></tr>
<tr><td colspan="3">Enoxaparin Dosage and Frequency (Seek specialist advice in patients weighing < 40kg and > 120kg)</td></tr>
<tr><td>INDICATION</td><td>Normal renal function</td><td>Impaired renal function (CrCl<30mL/min)</td></tr>
<tr><td>VTE prophylaxis</td><td>40mg once daily</td><td>20mg once daily or consider alternative</td></tr>
<tr><td>DVT/PE treatment</td><td>1.5mg/kg once daily OR 1 mg/kg twice daily</td><td>1mg/kg once daily or consider alternative</td></tr>
<tr><td>Acute Coronary Syndrome/Cardiac Valves</td><td>1mg/kg twice daily</td><td>1mg/kg once daily or consider alternative</td></tr>
<tr><td colspan="3">Dalteparin is commonly used for VTE treatment in cancer patients: dose 200 Units/kg daily subcutaneously for 30 days, then 150 Units/kg daily for 5 months. Total daily dose should not exceed 18,000 Units. Dose adjustment is required for renal impairment and thrombocytopenia. See prescribing guidelines.</td></tr>
</table>
Prescribe dose based on recommendations or local prescribing guidelines. Seek specialist advice when indicated. (e.g. extreme of weights, renal failure)
</td></tr>
<tr><td>Time of administration</td><td>
Preferred administration times for twice daily dosing are 0600 and 1800 hrs. Daily thromboprophylaxis should be given in the evening.

For thrice (3x) daily dosing, preferred administration times are 0600, 1200 and 1800 hrs.
</td></tr>
<tr><td>Indication</td><td>
VTE prophylaxis to be prescribed in the section titled “Prophylactic Doses”.
Treatment doses to be prescribed in the section titled “Therapeutic Doses”. The prescriber is required to document the indication for the treatment dose (i.e. PE, AF, DVT etc.).
</td></tr>
<tr><td>Pharmacy</td><td>This section is for use by the ward/clinical pharmacist.</td></tr>
<tr><td>Creatinine</td><td>There is provision to record creatinine to assist monitoring. Baseline Urea and Electrolytes (U&Es) recommended.</td></tr>
<tr><td>Platelets</td><td>
There is provision to record platelets to assist monitoring. Measure platelets at baseline and at least twice weekly. Medical review if platelets less than 50 x 10^9/L.

Contact Haematologist in all suspected cases of Heparin Induced Thrombocytopaenia (HIT).
</td></tr>
<tr><td>Prescriber sign and print</td><td>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.</td></tr>
<tr><td>Contact</td><td>Contact number of the prescriber.</td></tr>
</table>

4.1 Correct use of Regular Dose Order

Example 1: If the anticoagulant agent is the same and there is no change in indication, the prescriber can continue to order as shown below:



REGULAR DOSE ORDERS - PROPHYLACTIC DOSES Check platelets and coagulation profile before commencing
(Subcutaneous unfractionated and low molecular weight heparins and direct oral anticoagulants - DOACs)

YEAR 20 22 — DAY AND MONTH →

Date	Medicine (Print generic name)	Dose AND Frequency NOW enter times →	Route	CrCl mL/min	Indication	Pharmacy	Prescriber Sign	Print Name	Contact No.
4/8	Enoxaparin	20mg daily	subcut	28	VTE Prophylaxis	A.B 4/8	A.Medic	A.Medic	pager 1234

	4/8	5/8	6/8	7/8	8/8	9/8	10/8	11/8	12/8	13/8	14/8	15/8
1800	AD	CT	CT	CT	PL	PL	PL	AD	PL	ZA	CT	ZA
Creatinine	153										156	
Platelets		177			178							

Continue at Discharge: YES / NO — Dispense YES / NO — Duration: ____ days. Qty: ____

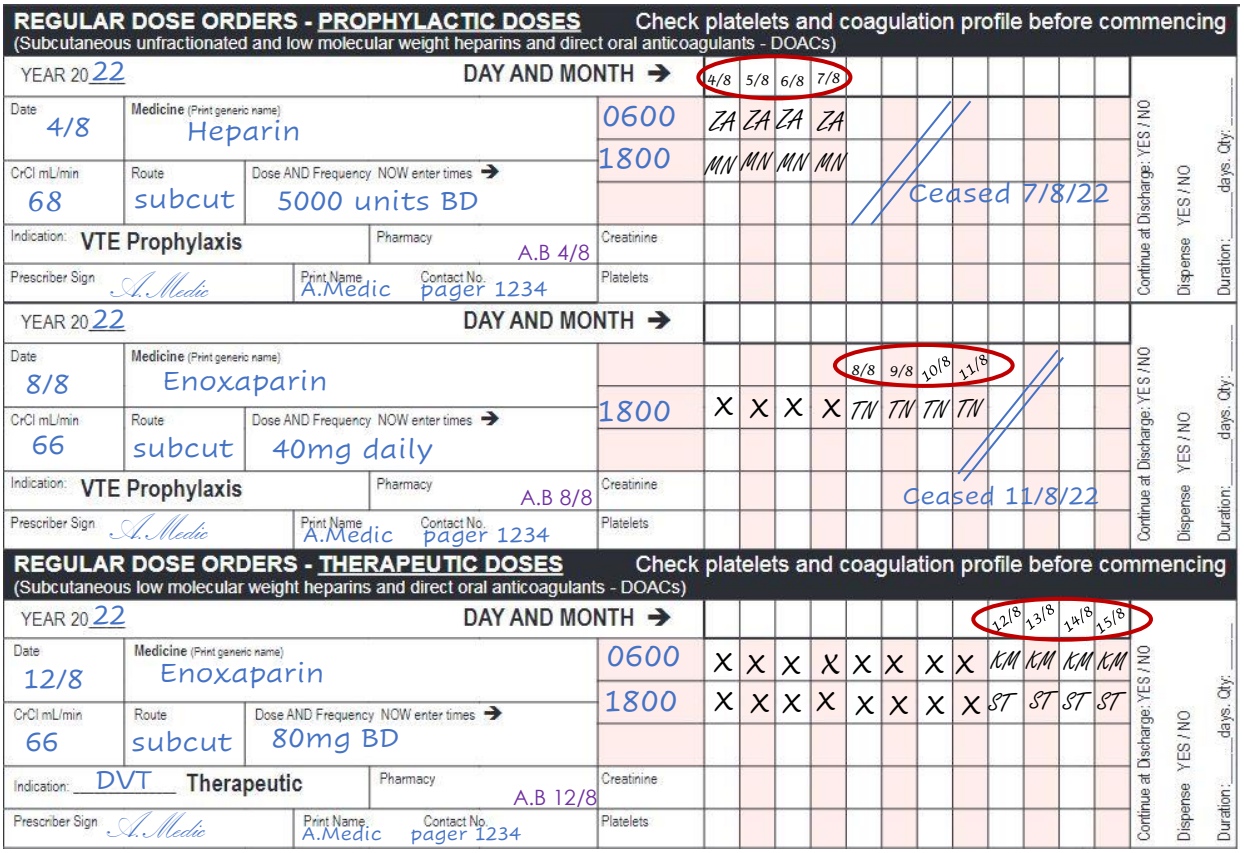
YEAR 20 22 — DAY AND MONTH →

Date	Medicine (Print generic name)	Dose AND Frequency NOW enter times →	Route	CrCl mL/min	Indication	Pharmacy	Prescriber Sign	Print Name	Contact No.
16/8	Enoxaparin	20mg daily	subcut	28	VTE Prophylaxis	A.B 16/8	A.Medic	A.Medic	pager 1234

	16/8	17/8	18/8	19/8	20/8	21/8	22/8	23/8	24/8	25/8	26/8	27/8
1800	ZA	AD	ZA	AD	CT	KF	KF	KF	KF	AD	MN	MN
Creatinine	160										154	
Platelets	201										201	

Continue at Discharge: YES / NO — Dispense YES / NO — Duration: ____ days. Qty: ____

Example 2: Prescription of anticoagulant has changed during the patient's admission. When changing the anticoagulant agent or the indication, the day and month of the order must be carried in the corresponding column across the order as shown below:



REGULAR DOSE ORDERS - PROPHYLACTIC DOSES Check platelets and coagulation profile before commencing
(Subcutaneous unfractionated and low molecular weight heparins and direct oral anticoagulants - DOACs)

YEAR 20 22 — DAY AND MONTH → 4/8 5/8 6/8 7/8

Date	Medicine (Print generic name)	Dose AND Frequency NOW enter times →	Route	CrCl mL/min	Indication	Pharmacy	Prescriber Sign	Print Name	Contact No.
4/8	Heparin	5000 units BD	subcut	68	VTE Prophylaxis	A.B 4/8	A.Medic	A.Medic	pager 1234

	4/8	5/8	6/8	7/8	8/8	9/8	10/8	11/8	12/8	13/8	14/8	15/8
0600	ZA	ZA	ZA	ZA								
1800	MN	MN	MN	MN	Ceased 7/8/22							
Creatinine												
Platelets												

Continue at Discharge: YES / NO — Dispense YES / NO — Duration: ____ days. Qty: ____

YEAR 20 22 — DAY AND MONTH → 8/8 9/8 10/8 11/8

Date	Medicine (Print generic name)	Dose AND Frequency NOW enter times →	Route	CrCl mL/min	Indication	Pharmacy	Prescriber Sign	Print Name	Contact No.
8/8	Enoxaparin	40mg daily	subcut	66	VTE Prophylaxis	A.B 8/8	A.Medic	A.Medic	pager 1234

	4/8	5/8	6/8	7/8	8/8	9/8	10/8	11/8	12/8	13/8	14/8	15/8
1800	X	X	X	X	TN	TN	TN	TN				
Creatinine								Ceased 11/8/22				
Platelets												

Continue at Discharge: YES / NO — Dispense YES / NO — Duration: ____ days. Qty: ____

REGULAR DOSE ORDERS - THERAPEUTIC DOSES Check platelets and coagulation profile before commencing
(Subcutaneous low molecular weight heparins and direct oral anticoagulants - DOACs)

YEAR 20 22 — DAY AND MONTH → 12/8 13/8 14/8 15/8

Date	Medicine (Print generic name)	Dose AND Frequency NOW enter times →	Route	CrCl mL/min	Indication	Pharmacy	Prescriber Sign	Print Name	Contact No.
12/8	Enoxaparin	80mg BD	subcut	66	DVT Therapeutic	A.B 12/8	A.Medic	A.Medic	pager 1234

	4/8	5/8	6/8	7/8	8/8	9/8	10/8	11/8	12/8	13/8	14/8	15/8
0600	X	X	X	X	X	X	X	X	KM	KM	KM	KM
1800	X	X	X	X	X	X	X	X	ST	ST	ST	ST
Creatinine												
Platelets												

Continue at Discharge: YES / NO — Dispense YES / NO — Duration: ____ days. Qty: ____

This helps to ensure that the date can be easily followed across the separate orders and prevent any confusion on whether an agent was administered on a particular day or not.

5. 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 and dalteparin are outlined in the table below.

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 and > 120kg)		
INDICATION	**Normal renal function**	**Impaired renal function** (CrCl<30mL/min)
VTE prophylaxis	40mg once daily	20mg once daily or consider alternative
DVT/PE treatment	1.5mg/kg once daily OR 1 mg/kg twice daily	1mg/kg once daily or consider alternative
Acute Coronary Syndrome/Cardiac Valves	1mg/kg twice daily	1mg/kg once daily or consider alternative
Dalteparin is commonly used for VTE treatment in cancer patients: dose 200 Units/kg daily subcutaneously for 30 days, then 150 Units/kg daily for 5 months. Total daily dose should not exceed 18,000 Units. Dose adjustment is required for renal impairment and thrombocytopenia. See prescribing guidelines.		
Monitoring	• Baseline full blood count and U&Es. Measure platelets at baseline and at least twice weekly. Medical review if platelets lessthan 50 x 10^9/L • Seek specialist advice for monitoring anti-Xa, dose modification or alternative therapeutic options. • Consider anti-Xa levels for patients on high doses, and in obese, pregnant, renal impairment and frail elderly patients.	
Reversing Overtreatment	• Seek specialist advice as protamine only partially neutralises low molecular heparin. Only consider protamine if LMWH has been given within the last 12 hours. • Check hospital guidelines for more detailed advice on protamine use. As a guide: Give 1mg protamine sulfate per 1mg enoxaparin (maximum 50mg as a single dose). • Administer initial dose (up to 50mg) by slow IV push (over 10 minutes) and remaining dose by intravenous infusion (maximum infusion rate 5mg/minute). Reassess the patient and the APTT in 2-4 hours and consider a repeat dose if the patient is still bleeding or the aPTT remains prolonged.	

Dose modification of these drugs is required when the creatinine clearance (GFR) is less than 30 mL/minute. 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.

Routine monitoring of residual anti-factor Xa activity as a measure of LMWH therapy is not required. However, in the case of patients at high risk of bleeding, obese (BMI ≥30kg/m^2), pregnant, renal impairment or frail elderly, anti-factor Xa monitoring may be appropriate. Check hospital guidelines for more detailed advice on monitoring anti-factor Xa levels.

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 for reversing overtreatment as the agent of choice, protamine, only partially neutralises LMWH.

As a guide:

- Only consider protamine if LMWH has been given within the last 12 hours.
- Check hospital guidelines for more detailed advice on protamine use. As a guide: Give 1mg protamine sulfate per 1mg enoxaparin (maximum 50mg as a single dose).
- Administer initial dose (up to 50mg) by slow IV push (over 10 minutes) and remaining dose by intravenous infusion (maximum infusion rate 5mg/minute) in 5% glucose or 0.9% sodium chloride over 6 to 8 hours. Reassess the patient and the APTT in 2-4 hours and consider a repeat dose if the patient is still bleeding or the aPTT remains prolonged.

6. DIRECT ORAL ANTICOAGULANTS (DOACs)

Currently the Direct Oral Anticoagulants available in Australia are apixaban, dabigatran and rivaroxaban. This group of medications are also known as DOACs.

6.1 Best practice

These medications are to be prescribed on the Regular Dose Order section of the anticoagulation medication chart.

As they can be used for prophylaxis or treatment, the prescriber must ensure that they are prescribed in the correct section.

The prescriber is required to document the indication for the treatment dose (i.e. PE (pulmonary embolism), AF (atrial fibrillation), DVT (deep vein thrombosis etc.).

RECOMMENDATIONS FOR DIRECT ORAL ANTICOAGULANTS		
Direct Oral Anticoagulant Agents (DOACs) – Apixaban, Dabigatran, Rivaroxaban (also known as NOACs) • Prescribe with care in elderly (>75 years), underweight (<50kg), overweight (>150kg) and patients with renal impairment (CrCl < 50mL/min). • Prior to DOAC initiation: Record: FBC, Coagulation status (INR, aPTT and PT), renal and liver function. Check for drug interactions prior to prescribing. • If the patient is on warfarin: Discontinue warfarin and start DOAC when INR is 2.0 or less • Refer to local prescribing guidelines for further information.		
Apixaban (Eliquis®)	**Dabigatran** (Pradaxa®) Idarucizumab is the reversal agent for dabigatran Refer to local hospital guidelines.	**Rivaroxaban** (Xarelto®) (Use with caution if CrCL 15-29mL/min)
Treatment of DVT/PE: • CrCl >25 mL/min: 10mg twice daily for first 7 days, then 5mg twice daily thereafter		**Treatment and Prevention of DVT/PE:** • CrCl ≥ 15 mL/min: 15mg twice daily for 3 weeks, then 20mg once daily • Seek specialist advice if CrCl 15-29mL/min
Non-Valvular Atrial Fibrillation (therapeutic dose): 5mg twice daily Reduce to 2.5mg twice daily IF at least 2 of the following risks: ☐ SCr ≥ 133 micromol/L ☐ Age ≥ 80 years, ☐ Weight ≤ 60 kg	**Non-Valvular Atrial Fibrillation (therapeutic dose):** • CrCl ≥ 50 mL/min: 150mg twice daily • CrCl 30-49 mL/min or ≥ 75years: 110mg twice daily	**Non-Valvular Atrial Fibrillation (therapeutic dose):** • CrCl ≥ 50 mL/min: 20mg once daily • CrCl 30-49 mL/min: 15mg once daily • CrCl 15-29 mL/min: seek specialist advice
VTE prophylaxis: **Total Hip or Knee Replacement** • CrCl > 25mL/min: 2.5mg twice daily Hip: up to 38 days | Knee: up to 14 days	**VTE prophylaxis:** **Total Hip or Knee Replacement** • CrCl > 50 mL/min: 220mg (2 x 110 mg) once daily • CrCl 30-50 mL/min: 150mg (2 x 75 mg) once daily Hip: up to 35 days | Knee: up to 10 days	**VTE prophylaxis:** **Total Hip or Knee Replacement** • CrCl ≥ 15 mL/min: 10mg once daily Hip: up to 35 days | Knee: up to 14 days
		Prevention of cardiovascular events in chronic stable CAD/PVD (in combination with aspirin): • CrCl≥ 15mL/min: 2.5 mg twice daily

6.2 Reversal of DOACs

Idarucizumab is the reversal agent for dabigatran. Currently, there is no reversal agent available for apixaban and rivaroxaban.

Refer to local hospital guidelines for further information.

6.3 DOAC-Drug interactions

Completing this section is Pharmacist's responsibility and allows the pharmacist to communicate potential clinically significant DOAC-drug interactions to the prescriber. Resources that can be used to confirm significant drug interactions include Australian Medicines Handbook, eMIMS, Stockley's Drug Interactions or UpToDate, all available online via HSP libraries.

Pharmaceutical review:	
WARFARIN OR DOAC DRUG INTERACTIONS (Pharmacy: Indicate drug and expected interaction) Details:	Sign Date

At the Time of Admission

- List all concomitant therapy that has a significant interaction.

During the Hospital Episode

- Add any new medications that have a significant interaction, and
- Highlight any change(s) made to the medication(s) listed.

Each entry should be signed and dated. Pharmacists may also document any significant interactions in the integrated patient notes or Medication History and Management Plan Form (WA MMP). If documentation of DOAC interactions is elsewhere other than the AMC, they are to cross reference on the chart.

6.4 Regular Dose Orders: Prophylaxis and Treatment

<table>
<tr><td>Year, Day and Month</td><td>Document year, day and month that first anticoagulant therapy is commenced.</td></tr>
<tr><td>Date</td><td>Date the medication order was commenced in hospital.</td></tr>
<tr><td>Medication</td><td>Print generic name of DOAC.</td></tr>
<tr><td>Creatinine Clearance (mL/min)</td><td>Document the baseline GFR used to determine DOAC dose.

Ideal body weight should be used in cases of extreme weight. Calculators for GFR and IBW are available online:

• eviQ
• Australian Medicines Handbook (AMH)
• National Kidney Foundation)

Do not use eGFR provided with the laboratory results.

For more information, refer to Dose Calculations Cleared by Glomerular Filtration Quick Reference Guide</td></tr>
<tr><td>Route</td><td>Oral, PO</td></tr>
<tr><td>Dose</td><td>Recommendations for DOACs dosages available on page 4:

RECOMMENDATIONS FOR DIRECT ORAL ANTICOAGULANTS
Direct Oral Anticoagulant Agents (DOACs) – Apixaban, Dabigatran, Rivaroxaban (also known as NOACs)
• Prescribe with care in elderly (>75 years), underweight (<50kg), overweight (>150kg) and patients with renal impairment (CrCl < 50mL/min).
• Prior to DOAC initiation: Record: FBC, Coagulation status (INR, aPTT and PT), renal and liver function. Check for drug interactions prior to prescribing.
• If the patient is on warfarin: Discontinue warfarin and start DOAC when INR is 2.0 or less
• Refer to local prescribing guidelines for further information.

Apixaban (Eliquis®) | Dabigatran (Pradaxa®) Idarucizumab is the reversal agent for dabigatran Refer to local hospital guidelines. | Rivaroxaban (Xarelto®) (Use with caution if CrCL 15-29mL/min)

Treatment of DVT/PE: • CrCl >25 mL/min: 10mg twice daily for first 7 days, then 5mg twice daily thereafter | | Treatment and Prevention of DVT/PE: • CrCl ≥ 15 mL/min: 15mg twice daily for 3 weeks, then 20mg once daily • Seek specialist advice if CrCl 15-29mL/min

Non-Valvular Atrial Fibrillation (therapeutic dose): 5mg twice daily Reduce to 2.5mg twice daily IF at least 2 of the following risks: ☐ SCr ≥ 133 micromol/L ☐ Age ≥ 80 years, ☐ Weight ≤ 60 kg | Non-Valvular Atrial Fibrillation (therapeutic dose): • CrCl ≥ 50 mL/min: 150mg twice daily • CrCl 30-49 mL/min or ≥ 75years: 110mg twice daily | Non-Valvular Atrial Fibrillation (therapeutic dose): • CrCl ≥ 50 mL/min: 20mg once daily • CrCl 30-49 mL/min: 15mg once daily • CrCl 15-29 mL/min: seek specialist advice

VTE prophylaxis: Total Hip or Knee Replacement • CrCl > 25mL/min: 2.5mg twice daily Hip: up to 38 days | Knee: up to 14 days | VTE prophylaxis: Total Hip or Knee Replacement • CrCl > 50 mL/min: 220mg (2 x 110 mg) once daily • CrCl 30-50 mL/min: 150mg (2 x 75 mg) once daily Hip: up to 35 days | Knee: up to 10 days | VTE prophylaxis: Total Hip or Knee Replacement • CrCl ≥ 15 mL/min: 10mg once daily Hip: up to 35 days | Knee: up to 14 days

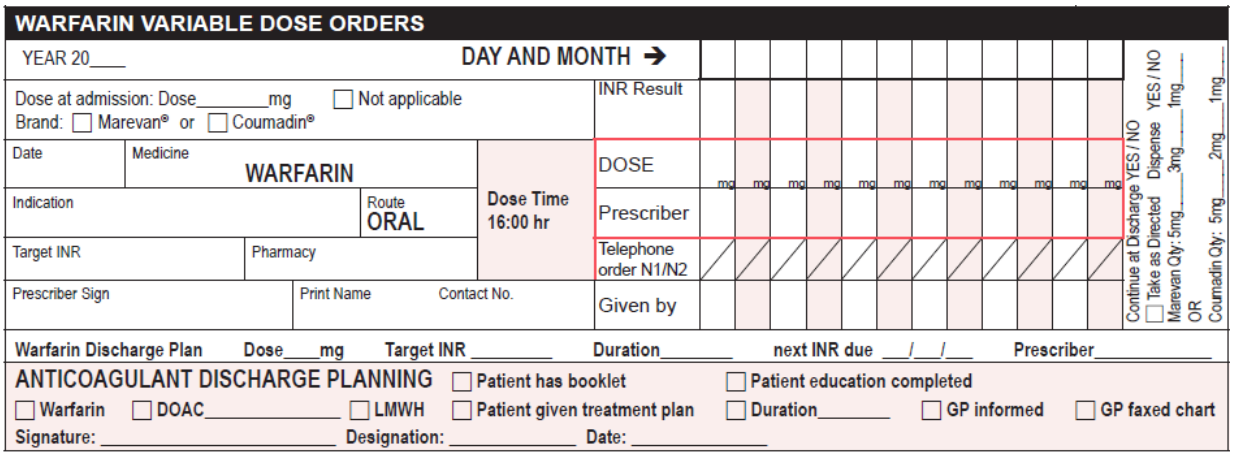
Prevention of cardiovascular events in chronic stable CAD/PVD (in combination with aspirin): • CrCl≥ 15mL/min: 2.5 mg twice daily

Refer to local prescribing guidelines for further information. Treatment recommendations do not cover all clinical scenarios and do no replace the need for clinical judgment.</td></tr>
<tr><td>Time of administration</td><td>Preferred administration times for twice daily dosing are 0800 and 1800 hrs. Daily thromboprophylaxis should be given in the evening.</td></tr>
<tr><td>Indication</td><td>VTE prophylaxis to be prescribed in the section titled “Prophylactic Doses”.</td></tr>
</table>

	Treatment doses to be prescribed in the section titled “Therapeutic Doses”. The prescriber is required to document the indication for the treatment dose (i.e. PE, AF, DVT etc.).
Pharmacy	This section is for use by the ward/clinical pharmacist.
Creatinine	There is provision to record creatinine to assist monitoring. Prior to DOAC initiation, record renal function.
Platelets	There is provision to record platelets to assist monitoring. Prior to DOAC initiation, record platelets.
Prescriber sign and print	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.
Contact	Contact number of the prescriber.

7. WARFARIN VARIABLE DOSE ORDERS

This section of the chart is specifically for warfarin.

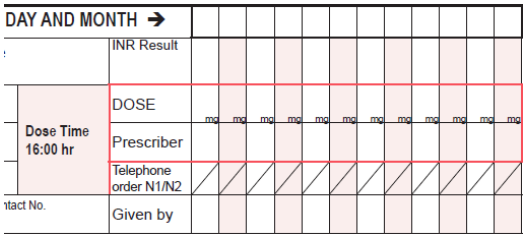


7.1 Prescribing Warfarin

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

Year, Day and Month	Document year, day and month that warfarin is commenced.
Dose at admission	This refers to the patient’s dose of warfarin prior to hospital admission. If the patient was taking an alternating dose, please specify the last dose taken prior to hospital admission. For example, if the patient usually takes 4mg alternating with 5mg, specify the dose the patient had prior to admission. Tick the brand the patient was taking prior to admission (Marevan® or Coumadin®).. If warfarin was not used prior to hospital presentation tick Not Applicable.
Date	Date medication order was started in hospital.
Medication	Warfarin is pre-printed.
Indication	Indication for warfarin treatment (e.g. AF (atrial fibrillation), MVR (Mitral valve replacement) etc.).

<table>
<tr><td>Target INR</td><td>Document the target INR. Target INR ranges available on page 4.
<table><tr><th colspan="2">RECOMMENDATIONS FOR WARFARIN</th></tr><tr><td colspan="2">Warfarin brands are NOT equivalent and cannot be used interchangeably.</td></tr><tr><td colspan="2">TARGET INR RANGE</td></tr><tr><td>2.0-3.0</td><td>• 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)</td></tr><tr><td>2.0-3.0</td><td>• Aortic bileaflet mechanical heart valve – if no other risk factors</td></tr><tr><td>2.5-3.5</td><td>• Starr-Edwards mechanical heart valves. Mitral bileaflet mechanical heart valve or aortic if risk factors for thromboembolic event including AF, previous thromboembolism, LV dysfunction, hypercoagulable condition.</td></tr></table></td></tr>
<tr><td>Pharmacy</td><td>This section is for use by the ward/clinical pharmacist.</td></tr>
<tr><td>Prescriber Sign and print name</td><td>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.</td></tr>
<tr><td>Contact number</td><td>Contact number/pager number of the prescriber.</td></tr>
<tr><td>Dose time</td><td>The recommended time is 1600, which is pre-printed on the chart. This time was chosen to allow pathology testing to be done in the morning (0700) so that the evening dose can be modified based on the result if required. 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.

If this is not suitable, cross out 1600 and enter appropriate time.</td></tr>
<tr><td colspan="2">The right-hand side of the chart must be completed each day
 
</td></tr>
<tr><td>INR result</td><td>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.</td></tr>
<tr><td>Dose documented</td><td>Dose prescribed for this day.

If a dose is to be withheld this should be documented following the WA HMC guidelines using (W) . If initiating warfarin, see initiation nomogram on the next page.</td></tr>
<tr><td>Prescriber</td><td>Initials of doctor prescribing the daily warfarin dose. For each signature, the name must be written in print at least once on the medication chart.</td></tr>
<tr><td>Phone orders</td><td>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 medical record and the doctor must sign order within 24 hours.</td></tr>
<tr><td>Given by</td><td>Initials of the nurse administering the daily dose.</td></tr>
</table>

7.2 Best practice

Warfarin brands are NOT equivalent and cannot be used interchangeably

The two brands of warfarin available in Australia, Marevan® and Coumadin®, are not interchangeable and swapping brands may affect INR control. WA Health Service Providers should use the Marevan® brand for patients initiated on warfarin. Coumadin® is for continuation only as per the WA State Medicines Formulary.

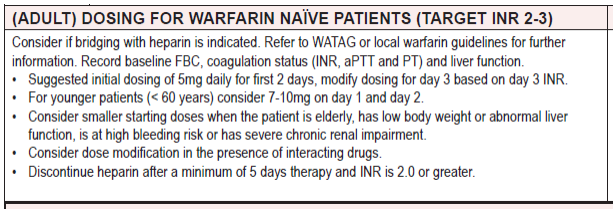
When commencing warfarin, it is important to measure the baseline INR. If the baseline INR is 1.4 or above without warfarin, then liver function and nutrition status should be assessed, and specialist advice sought regarding the patient's suitability for anticoagulation with warfarin.

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

Refer to Guidelines for Anticoagulation using Warfarin for further information.

Initiating treatment

A dosing guide is available for prescribers initiating warfarin in treatment naïve patients. The dosing guide provided represents 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.



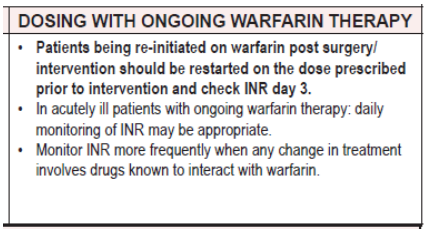
(ADULT) DOSING FOR WARFARIN NAÏVE PATIENTS (TARGET INR 2-3)

Consider if bridging with heparin is indicated. Refer to WATAG or local warfarin guidelines for further information. Record baseline FBC, coagulation status (INR, aPTT and PT) and liver function.

- Suggested initial dosing of 5mg daily for first 2 days, modify dosing for day 3 based on day 3 INR.
- For younger patients (< 60 years) 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, is at high bleeding risk or has severe chronic renal impairment.
- Consider dose modification in the presence of interacting drugs.
- Discontinue heparin after a minimum of 5 days therapy and INR is 2.0 or greater.

- Consider if bridging with heparin is indicated. Record baseline Full Blood Count (FBC), coagulation status (INR, aPTT and PT) and liver function.
- For younger patients (<60 years) 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, is at high bleeding risk or has severe chronic renal impairment.
- Consider dose modification in the presence of interacting drugs.
- If patient is on heparin, discontinue heparin after minimum of 5 days therapy and INR is 2.0 or greater.

Ongoing treatment:



DOSING WITH ONGOING WARFARIN THERAPY

- **Patients being re-initiated on warfarin post surgery/ intervention should be restarted on the dose prescribed prior to intervention and check INR day 3.**
- In acutely ill patients with ongoing warfarin therapy: daily monitoring of INR may be appropriate.
- Monitor INR more frequently when any change in treatment involves drugs known to interact with warfarin.

- Patients being re-initiated on warfarin post-surgery/intervention should be restarted on the dose prescribed prior to intervention and check INR day 3.
- In acutely ill patients with ongoing warfarin therapy, 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 (0700).
- Indication for treatment, appropriate target range and planned duration of treatment should all be documented.

All patients should receive warfarin education, including written information when warfarin therapy is initiated in hospital. This should be documented. It is recognised that education may be completed by pharmacy, nursing or medical staff.

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.

7.3 Reversal of Over-treatment

An INR greater than or equal to 5 significantly increases the risk of bleeding. Refer to the table below:

Reversing Warfarin Over-Treatment

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 (seek advice if cardiac valve replacement)	Prothrombinex VF	Comments
Greater than therapeutic range but <4.5	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.
4.5 – 10	Absent (Low risk)	Stop			Measure INR in 24 hours. Resume warfarin at reduced dose when INR approaches the therapeutic range.
	Absent (High Risk)*	Stop	Consider 1–2 mg (oral)[1] Or 0.5–1mg IV[2]		Measure INR within 24 hours. Resume warfarin at reduced dose when INR approaches the therapeutic range.
>10	Absent (Low risk)	Stop	3–5mg (oral)[1] Or IV[2]		Measure INR in 12-24 hours. Resume warfarin at reduced dose when INR approaches the therapeutic range.
	Absent (High Risk)*	Stop	3–5mg IV[2]	Consider 15-30 Units/kg[3,4] See weight based nomogram	Measure INR in 12-24 hours. Resume warfarin at reduced dose when INR approaches the therapeutic range. Close monitoring over the following week.
Clinically significant bleeding where warfarin is a contributing factor. e.g. Intracranial or massive haemorrhage		Stop	5–10 mg (IV)[2]	25–50 Units/kg[3,4] doses may be appropriate as per warfarin reversal guidelines, See weight based nomogram	*Only add Fresh Frozen Plasma (FFP) if critical organ bleeding (150-300mL) or if Prothrombinex VF is unavailable (FFP 15mL/kg). If required seek consultation with a haematologist / specialist.*
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. Seek advice with Vitamin K in cardiac valve replacement.					
*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

There are 3 options available to reduce a patient's INR.

- Withholding of warfarin doses
- Vitamin K (Phytomenadione)
- Prothrombin Complex Concentrate (PCC) or Fresh Frozen Plasma (FFP)

This may be a desired action if the INR is well above the therapeutic range or in the presence of bleeding and/or bruising. The appropriate option/s is dependent upon the urgency of INR reduction/normalisation or the patient's risk of bleeding and/or bruising.

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, severe renal impairment and failure, hypertension, alcohol abuse, active gastrointestinal (GI) disease, antiplatelet therapy and other relevant co-morbidity.

7.4 Warfarin-Drug Interactions

Completing this section is a Pharmacist's responsibility and allows the pharmacist to communicate potential clinically significant warfarin-drug interactions to the prescriber. Resources that can be used to confirm significant drug interactions include Australian Medicines Handbook, eMIMS, Stockley's Drug Interactions or UpToDate, all available online via HSP libraries.

Information is also available on the Guidelines for Anticoagulation using Warfarin.

Pharmaceutical review:	
WARFARIN OR DOAC DRUG INTERACTIONS (Pharmacy: Indicate drug and expected interaction) Details:	Sign Date

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.

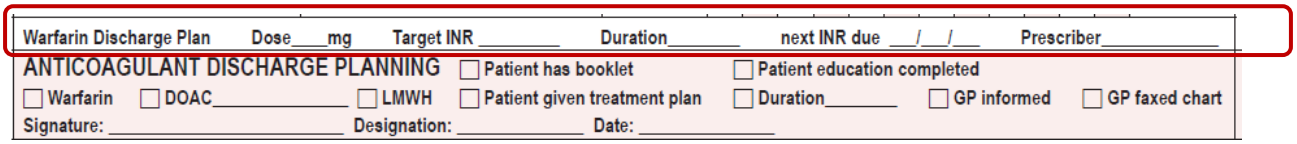
Each entry should be signed and dated. Pharmacists may also document any significant interactions in the integrated patient notes or Medication History form (WA MMP). If documentation of the interactions is elsewhere other than the AMC, they are to cross reference on the chart.

8. Discharge Treatment Plan

This should be completed by the prescriber at the time of hospital discharge for patients being discharge on either warfarin, a DOAC or LMWH.

8.1 Warfarin Discharge Plan

If a patient is being discharge on warfarin this section will need to be completed by prescriber. This section of the **Discharge Treatment Plan** is specific for warfarin discharge.


Warfarin Discharge Plan Dose___mg Target INR _____ Duration_____ next INR due __/__/__ Prescriber_____
ANTICOAGULANT DISCHARGE PLANNING ☐ Patient has booklet ☐ Patient education completed
☐ Warfarin ☐ DOAC_____ ☐ LMWH ☐ Patient given treatment plan ☐ Duration_____ ☐ GP informed ☐ GP faxed chart
Signature: _____ Designation: _____ Date: _____

Dose	Dose to be taken until the next INR test.
Target INR	Document the target INR
Duration	The expected duration of therapy e.g. long-term, 3-6 months.
Next INR	Date the next INR test is due.
Prescriber	Prescriber should sign this section once it is complete

Prior to hospital discharge:

- Patients should receive warfarin education and counselling, which may be completed by pharmacy, nursing or medical staff.
- Patients should receive written information, Living with Warfarin: Information for patients booklet.
- Patient given treatment plan or medication list.

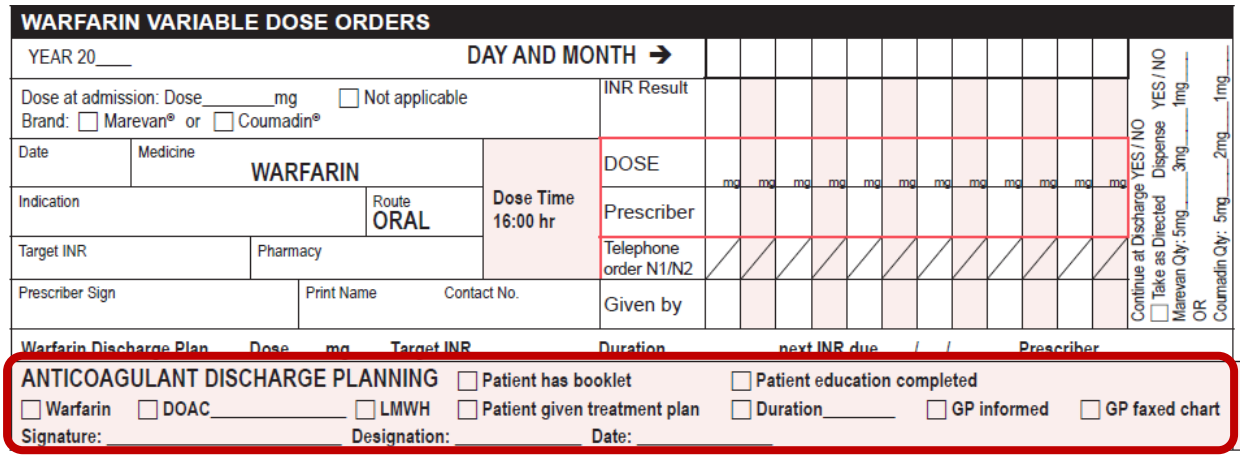
The dose modifications made to warfarin therapy should be communicated to the primary care practitioner to assist further dose modification in the early post-discharge phase.

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.

In situations where the patient does not manage their own medicines, education should also be provided to the person who manages the patient's medications (e.g. carer, family members).

8.2 Anticoagulant Discharge Plan

This section is to be completed for any patient that will be discharged with either warfarin, a DOAC or LMWH.



This is a checklist, and all activities should be completed by the time of hospital discharge. This is the official medication 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.

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

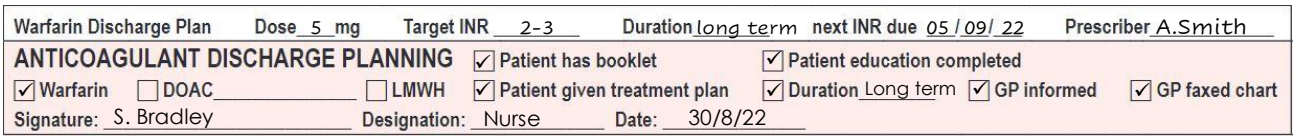
This provides information about the treatment plan as well as informing the GP about the course of treatment during the hospital episode of care.

The following must be completed:

Medication	The person completing this section must indicate the appropriate medication the patient is being discharged on by ticking the corresponding box: Warfarin, DOAC (apixaban, dabigatran or rivaroxaban) or LMWH.
Patient has booklet	Must be ticked once a patient is given an information booklet and/or Consumer Medication Information (CMI) leaflet. This may include on a previous episode. Recommended written information: • "Living with warfarin – information for patients" booklet for warfarin • "Living with a Direct-Vitamin K Antagonist Oral Anticoagulant (DOAC)" booklet for DOACs These are available on the WA Health Website: Medication Safety Resources. There are also several resources available through the Pharmacy department.
Patient education completed	This may include on a previous episode, provided the patient's knowledge has been checked. Education may be provided by pharmacy, nursing or medical staff.
Patient given treatment plan	The patient should be informed about the **discharge dose and frequency.**

	If the patient is being discharged on warfarin, the **date of next INR test** should also be included. The warfarin book contains a detachable wallet/purse size warfarin treatment card. Document the treatment plan on this card. A patient may also be provided with a medication list with the details of the treatment plan.
Duration	The expected duration of therapy e.g. life-long, 3-6 months.
GP informed	Indicate whether the patient's GP has been contacted about the management plan.
GP faxed chart	Indicate if a fax or copy this page was sent to the GP at discharge.

An example of a completed **Anticoagulant Discharge Planning** section for a patient being discharged on warfarin:



8.3 Discharge Supply

Public hospitals that have undergone PBS reform will not need to use this section for supply, the discharge prescription along with creation of consumer medication list and discharge summary should be generated from the WA Electronic Discharge Summary Application (currently Notification and Clinical Summary (NaCS)).

Please note: this chart has **not** yet been endorsed by the Commonwealth Department of Health as a PBS prescription.

Private contracted health entitles may use this section of the chart.

For each medication prescribed for an inpatient that is required for discharge medications, ALL of the following information must be documented in the discharge supply section:

- Continue on discharge Yes / No
- Dispense Yes / No
- Duration in days
- Quantity required to be dispensed

In addition to the above, the following information is also required to be documented once:

- Prescriber's signature
- Prescriber to print name
- Prescriber's contact number
- Date the discharge prescriptions are ordered
- Pharmacist signature
- Date the discharge medication is dispensed

Note: Warfarin tablet strengths for each of the brands are pre-printed on the chart. The prescriber must indicate the number of tablets of each strength that are required.

9. INTRAVENOUS UNFRACTIONATED HEPARIN

Please note:

Each hospital is required to check with their Pathology laboratory to determine the hospital specific therapeutic target range for heparin against a gold standard test (e.g. residual anti-Xa activity).

*Because of this, hospitals **should not use** a WA Anticoagulation Chart from another hospital as aPTT target ranges will change from hospital to hospital.*

9.1 Best practice

Heparin efficacy is related to dose regardless of route. The initial dose is more important than the aPTT in predicting efficacy.

The WA AMC uses a weight-based nomogram for initiating unfractionated heparin infusion therapy for Venous Thromboembolism (VTE) and Acute Coronary Syndrome (ACS).

Given the common use of dual antiplatelet therapy in the setting of ACS management, less intensive initial and bolus and infusion rate dosing is advisable compared with the treatment of VTE.

The nomogram is 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.

9.2 Determining 'Initial Bolus Dose' and 'Initial Infusion Rate'

The initial bolus dose and initial infusion rate are based on the **indication of therapy** (ACS management or VTE treatment), along with the patient's weight.

This nomogram is found on page 3 of the WA AMC (see below).

IT IS RECOMMENDED THAT ALL BOLUS DOSES BE DRAWN UP FROM SEPARATE AMPOULES INTO A SYRINGE FOR ADMINISTRATION.

Venous Thromboembolism (DVT/PE) Bolus and Initial Rate Requirements

		Weight Based Guide For Initial Dose											
	Weight	≤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
Initial Rate 18 units/kg/hour	Rate (mL/hour)	14	16	18	20	22	23	25	27	29	31	32	32

Acute Coronary Syndrome Bolus and Initial Rate Requirements

		Weight Based Guide For Initial Dose											
	Weight	≤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
Initial Rate 12 units/kg/hour	Rate (mL/hour)	10	11	12	13	14	15	17	19	20	20	20	20

VENOUS THROMBOEMBOLISM

Bolus dose: 80 units/kg, Initial infusion rate: 18 units/kg/hour

ACUTE CORONARY SYNDROMES

Bolus dose 60 units/kg, Initial infusion rate: 12 units/kg/hour

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

It is important that a bolus dose of UFH is prescribed and administered on initiating UFH infusion to ensure that the therapeutic range is reached within the first 24 hours of therapy.

It is recommended that all bolus doses be drawn up from a separate ampoule into a syringe for administration.

Medical responsibilities include –

- Prescription of initial bolus dose and infusion rate,
- Selection of maintenance nomogram, and
- Ordering subsequent aPTT tests.

or

- Prescription of infusion rate 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 (within 1 hours of the lab receiving the sample),
- Alerting the prescriber to extreme aPTT results,
- Titrating heparin infusion dose as per aPTT level and prescribed infusion nomogram.

or

- Contacting the prescriber with the aPTT result for prescription of infusion 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 for two consecutive days.

Platelets should be measured at baseline and at least twice weekly.

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

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

9.3 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.

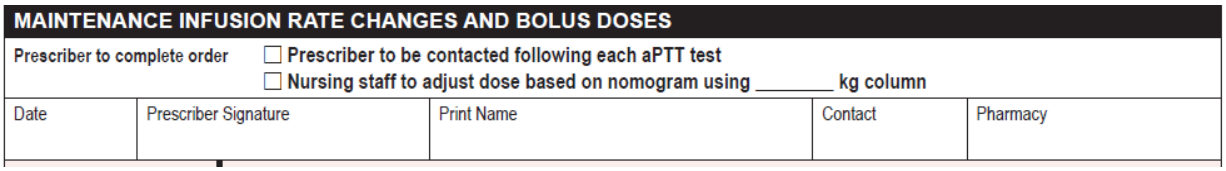
The prescriber to complete	
Target aPTT	See the recommendations on page 3 of chart or as specified by consultant. Note that this varies between test centres and is hospital specific.
Indication	Tick appropriate box either: VTE, ACS or Other. If the 'Other' box is ticked, the prescriber must specify indication next to the box.
Weight	The patient weight used to determine the dose should be documented.
Date	Date of prescription
Drug	Heparin is pre-printed.
Total dose	Number of **units** to be diluted. 25,000 Units is pre-printed. Amend if required. **Note:** The nomogram is only valid for a standard dilution of 50 units/mL of heparin.
Fluid	Type of dilution fluid. 0.9% sodium chloride is pre-printed. Amend if required. Heparin may be administered in 5% glucose.
Volume of dilution	Volume of dilution fluid. 500mL are pre-printed. Amend if required. **Note:** The nomogram is only valid for a standard dilution of 50 units/mL of heparin.
Prescriber: Signature and 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 least once on the medication chart.
Contact	The prescriber's contact details - page number.

9.5 Initial dose order and administration

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

The prescriber to complete	
Date	Date of order.
Baseline aPTT	aPTT must be measured prior to treatment commencing.
Baseline Platelets	Baseline platelet count 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)	Volume, in mL, of prepared solution to be infused each hour. This should be based on the patient weight and indication. The volume of standard solution (unfractionated heparin 25,000 units in 500mL sodium chloride 0.9%) corresponding to each bolus dose based on the patient weight and indication is shown on page 3.
Prescriber: Signature and 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 least 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.

9.6 Maintenance infusion rate changes 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 using _____ kg column				
Date	Prescriber Signature	Print Name	Contact	Pharmacy

The prescriber must indicate at top of this section whether:

- Prescriber to be contacted following each aPTT test

  OR

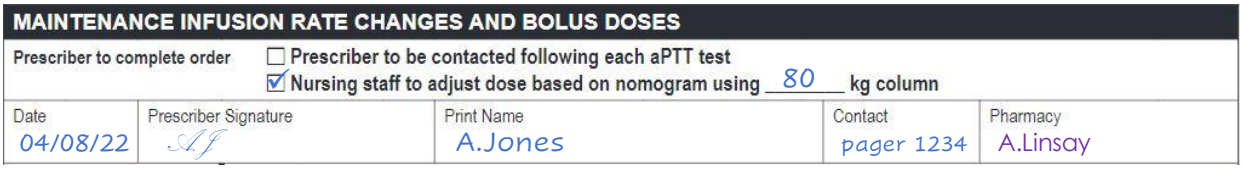
- Nursing staff to adjust dose based on nomogram using specified kg column

The nomogram for modifying rate of administration for Venous Thromboembolism and Acute Coronary Syndrome is found on page 3 of the WA AMC. This is a combined nomogram for both ACS and VTE treatment and is an updated safety feature of the revised chart. This must only be used for the standard solution (unfractionated heparin 25,000 units in 500mL sodium chloride 0.9%).

PLEASE NOTE: Fluid restricted patients requiring a more concentrated solution (unfractionated heparin 25,000 units in 50mL sodium chloride 0.9%) must cross out the existing nomogram on the WA AMC and use the Fluid Restricted Nomogram found on the website.

The prescriber to complete	
Indicate how to adjust dose	Prescriber to tick one of the two boxes to indicate how to adjust dose of infusion based on aPTT level. If prescriber intends nursing staff to adjust dose, then the prescriber must write the weight in the space provided.
Date	Date of the order.
Prescriber: Signature and 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 least once on the medication chart.
Contact	The prescriber's contact details.
Pharmacy	This section is for use by the ward/clinical pharmacist.
Weight based nomogram Page 3	If the prescriber intends for nursing staff to adjust the dose using the weight-based nomogram, then the prescriber must draw a rectangle around the appropriate weight band. Ensure that the rectangle does not obstruct any clinical information.

Example: If the prescriber intends for nursing staff to use the weight-based nomogram to adjust the infusion dose for an 80kg patient, they are to write the weight in the space provided and draw a rectangle around the 80kg weight band.



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 using 80 kg column				
Date	Prescriber Signature	Print Name	Contact	Pharmacy
04/08/22	AJ	A.Jones	pager 1234	A.Linsay

Nomogram for modifying rate of administration for Venous Thromboembolism and Acute Coronary Syndrome															
MAINTENANCE ORDER			Weight Based Rate For Maintenance Dose												
			Weight	≤40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
MAINTENANCE	aPTT	**Dose Adjustment** Use weight column on nomogram and row for aPTT range for mL/hour conversion of unit/kg/hour		**Rate Change (mL/hour)** This rate equals recommended change in units/hour for a 50 unit/mL dilution. Remeasure aPTT within 6 hours of each rate change											
	≤ Kk	**Bolus dose** as per indication (VTE OR ACS listed above) Then **increase** 3 units/kg/hour		+2	+3	+3	+3	+4	+4	+4	+5	+5	+5	+5	+6
	Ll-Mm	**Increase** 2 units/kg/hour For VTE consider 40 units/kg bolus dose		+2	+2	+2	+2	+2	+3	+3	+3	+3	+3	+4	+4
	Nn-Pp	**No Change**		Remeasure 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
Slight variances of aPTT ranges may occur due to changes in laboratory reagents used. Please check with your Pathology Laboratory.															

9.7 Bolus and infusion rate administration

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)	Platelets

In this section, the doctor or nurse records the date and time the blood was taken and the aPTT result.

The **bolus and infusion rate administration section** will usually be completed by nursing staff following the nomogram or as specifically ordered by the prescriber.

The prescriber or nursing staff to complete	
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 doses are NOT to be administered from the current infusion bag or syringe. Utilise IV line dedicated for medication administration for heparin bolus (if available). If separate line not available: • Pause heparin infusion and close slide clamp • Administer bolus infusion via side arm of heparin infusion line • Flush bolus via sidearm with 5mL of sodium chloride 0.9% • Recommend heparin infusion IMMEDIATELY post-bolus (open slide clamp).
Bolus sign	Two nurses to check/sign the bolus dose.
Hold (minutes)	If withholding the infusion is indicated, record time the infusion is withheld for.
Time stopped	If the infusion has stopped, record the time it was stopped.
Hold sign	Two nurses to check/sign infusion temporarily stopped/withheld.
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.

New Rate (mL/hr)	Record the rate of infusion. If the aPTT result is within the target range, the infusion rate will remain unchanged. If a new rate is indicated based the aPTT result, document the new rate in this section.
Rate sign	Two nurses check/sign the rate of infusion.
Prescriber Sign	Each aPTT test result and subsequent action should be reviewed by the responsible prescriber.
Platelets	There is provision to record platelets to assist monitoring. It is recommended that platelets are measured at baseline and at least twice weekly. Contact Haematologist in all suspected cases of Heparin Induced Thrombocytopenia (HIT).

9.8 Infusion Ceased

INFUSION CEASED:	Date ___/___/___	Time :	Prescriber Signature	Print Name

Following the prescriber's completion of "Infusion Ceased" section on the WA AMC (above), nurse to document date and time of cessation of heparin infusion in patient integrated notes.

9.9 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 (e.g. for showering, imaging) unless ordered by the doctor or as indicated by the aPTT result.

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 in mL

9.10 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 follow nomogram (page 3 of WA AMC).

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 (maximum 50 mg) as a slow IV push (over 10 minutes).
- Monitor aPTT immediately after the bolus then as required.

9.11 Low Volume (Fluid Restricted) Heparin Infusion

A low volume heparin infusion may be prescribed for fluid-restricted patients on IV heparin as indicated by the medical officer. For example, patients with heart failure or severe renal impairment may be prescribed this infusion.

If using Infusion Nomogram for Fluid Restricted Patients: Draw a line through the original nomogram on the WA AMC and attach the fluid restricted copy to the original chart directly over the existing nomogram.

Caution: The Nomogram for Fluid Restricted Patients uses a concentration <u>10 times</u> more than the standard solution (i.e. 25,000 units in 50mL sodium chloride 0.9%)

Treatment recommendations do NOT cover all clinical scenarios and do not replace the need for clinical judgement.

Infusion Nomogram for Intravenous Unfractionated Heparin
For FLUID RESTRICTED PATIENTS
25,000 units in 50 mL

Patients requiring fluid restrictions (e.g. patient with heart failure or severe renal impairment) may require a more concentrated dilution of unfractionated heparin than the standard dilution used in the WA Anticoagulation Medication Chart – 25,000 units in 500mL of sodium chloride 0.9% (50units/mL).

Print a copy of the FLUID RESTRICTED nomogram and ATTACH to Anticoagulation Chart over existing page 3 – put a line through the original nomogram on the WA Anticoagulation Medication Chart.

This nomogram (weight-based guides) is ONLY valid when using an unfractionated heparin concentration of 25,000 units in 50mL (500 units per mL) and STANDARD aPTT targets.

INITIAL ORDER : Prescriber should complete order (initial bolus and initial infusion rate) on page 2. See below for recommended dose for Venous Thromboembolism (VTE) or Acute Coronary Syndrome (ACS).

- It is important that a bolus dose of unfractionated heparin is prescribed and administered on initiating an unfractionated heparin infusion to ensure that the therapeutic range is reached within the first 24 hours of therapy.

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 FOR SAFETY THAT

- **All bolus doses be drawn up from separate ampoules into a syringe for administration**
- **A syringe driver is used to administer the infusion due to the very low infusion rates required**

Venous Thromboembolism (DVT/PE) Bolus and Initial Rate Requirements

		Weight Based Guide For Initial Dose											
Bolus Dose 80 units/kg	Weight	≤40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥95kg
	Units	3200	3600	4000	4400	4800	5200	5600	6000	6400	6800	7200	7200
Initial Rate 18 units/kg/hour	Rate (mL/hour)	1.4	1.6	1.8	2	2.2	2.3	2.5	2.7	2.9	3.1	3.2	3.2

Acute Coronary Syndrome Bolus and Initial Rate Requirements

		Weight Based Guide For Initial Dose											
Bolus Dose 60 units/kg	Weight	≤40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥ 95kg
	Units	2400	2800	3000	3300	3600	4000	4000	4000	4000	4000	4000	4000
Initial Rate 12 units/kg/hour	Rate (mL/hour)	1	1.1	1.2	1.3	1.4	1.5	1.7	1.9	2	2	2	2

Nomogram for modifying rate of administration for Venous Thromboembolism and Acute Coronary Syndrome

MAINTENANCE	MAINTENANCE ORDER Use weight column on nomogram and row for aPTT range for mL/hour conversion of unit/kg/hour		Weight Based Rate For Maintenance Dose											
		Weight	≤40kg	45kg	50kg	55kg	60kg	65kg	70kg	75kg	80kg	85kg	90kg	≥ 95kg
	aPTT	Dose Adjustment	Rate Change (mL/hour) This rate equals recommended change in units/hour for a 500 unit/mL dilution. Remeasure aPTT within 6 hours of each rate change											
	< Kk	**Bolus dose** as per indication (VTE OR ACS listed above) Then **increase** 3 units/kg/hour	+0. 2	+ 0.3	+0.3	+0.3	+0.4	+ 0.4	+ 0.4	+ 0.5	+ 0.5	+0.5	+ 0.5	+ 0.6
	Ll-Mm	**Increase** 2 units/kg/hour For VTE consider 40units/kg bolus dose	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.2	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.3	+ 0.4	+ 0.4
	Nn-Pp	**No Change**	Remeasure aPTT within 24 hours (or next morning)											
	Qq-Rr	**Reduce** 1 unit/kg/hour	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.1	- 0.2	- 0.2	- 0.2	- 0.2	- 0.2
	Ss-Tt	**Hold 30 minutes** Then reduce 2 units/kg/hour	- 0.2	- 0.2	- 0.2	- 0.2	- 0.2	- 0.3	- 0.3	- 0.3	- 0.3	- 0.3	- 0.4	- 0.4
	> Zz	• Contact doctor • Hold 60 minutes • Then reduce 3 units/kg/hour	- 0.2	- 0.3	- 0.3	- 0.3	- 0.4	-0.4	- 0.4	-0.5	- 0.5	- 0.5	- 0.5	- 0.6

Slight variances of aPTT ranges may occur due to changes in laboratory reagents used. Please check with your Pathology Laboratory

***Please note:** Each hospital is required to check with their Pathology laboratory should determine its own therapeutic target range for heparin against a gold standard test (eg residual anti-Xa activity).*
Because of this hospitals should not use a WA Anticoagulation Chart from another hospital as ranges will change from hospital to hospital

In order to maintain the standard safety components and adhere to the underlying principle of standardisation to optimise patient safety, sections of the chart other than the hospital logo and MR number are not to be changed without approval of the Medicines and Technology Unit, Patient Safety and Clinical Quality Directorate, Department of Health.

Recommendations for change to these charts should be lodged to the WA DoH Medicines and Technology Unit. Recommendations for change must be evidence based, with the primary objective of improving patient safety. MTU will screen these requests and escalate to the WA Medication Safety Collaborative where appropriate.

This document can be made available in alternative formats on request for a person with a disability.