Government of **Western Australia**
Department of **Health**

Safe Management of Anticoagulants in WA hospitals

Developed by the WA Anticoagulation Steering Group in conjunction with the Office of Safety and Quality in Healthcare

Overview

This presentation will provide an overview of:

- The layout of the WA Anticoagulation Medication Chart (WAAMC)
- The management of anticoagulants using the chart:
  - Low Molecular Weight Heparins (i.e. enoxaparin)
  - Warfarin
  - Fixed dose new oral anticoagulants (NOACs)
  - Unfractionated heparin

Anticoagulants – High Risk Medications

- Anticoagulants are consistently identified as causing preventable harm to patients.

  Top 10 Most Frequently Reported Medicines Causing Medication Incidents 2012

Medication	(n)	%
Oxycodone	220	4.9
Paracetamol	184	4.1
Insulin	174	4.0
Enoxaparin sodium	121	2.7
Heparin	107	2.3
Morphine	103	2.3
Warfarin sodium	85	1.9
Fentanyl	77	1.7
Amoxycillin	70	1.5
Gentamicin	64	1.4
Total	**1205**	**26.8**

- When used in error or omitted, they can cause life-threatening or fatal bleeding or thrombosis.

Those most commonly involved are:

- unfractionated heparin
- low-molecular weight heparin (LMWH)
  - enoxaparin sodium (Clexane®)
  - dalteparin sodium (Fragmin®) and
- warfarin.

Fixed dose oral anticoagulants are also available:

- dabigatran (Pradaxa®)
- rivaroxaban (Xarelto®)
- apixaban (Eliquis®).

Factors that increase the potential for error and harm include:

- Low margin for error
  - over-dose → bleeding
  - under-dose or omission → thrombosis
- Wide variation in individual patient response
  - multiple indications
  - wide range and complexity of dosage
  - frequent dose adjustment/monitoring
  - interaction with other medicines, herbals, over-the-counter products, food and alcohol.

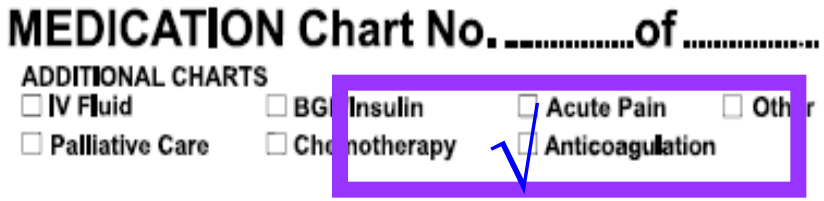
Benefits of the WA Anticoagulation Chart

- 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.
- Enable the effective achievement of therapeutic levels.
- Minimise the risk of bleeding events due to supra-therapeutic levels.
- To achieve this the chart includes:
  - Optimal dosing guidelines and monitoring requirements
  - important information required for dosing including test results, weight and renal function

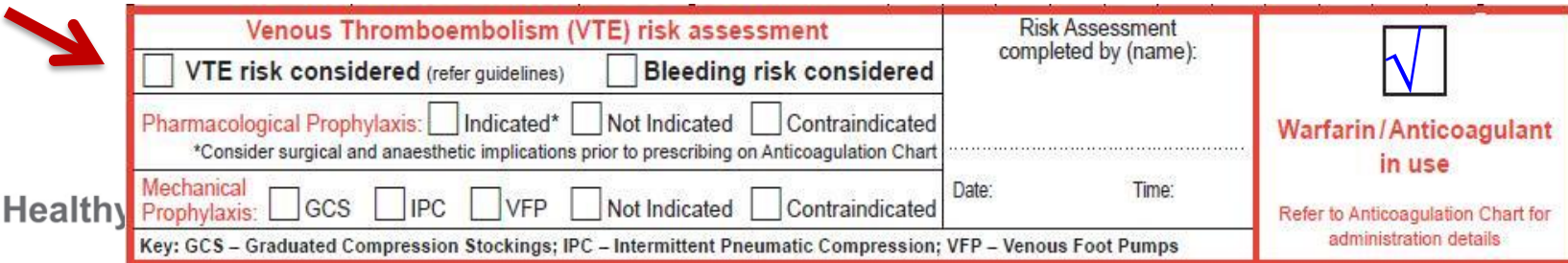
Importance of Cross-Referencing Anticoagulation Chart with NIMC

- The main medication chart (NIMC) MUST be annotated to identify when the anticoagulation chart is in use to reduce the risk of duplicated orders or dose omissions.

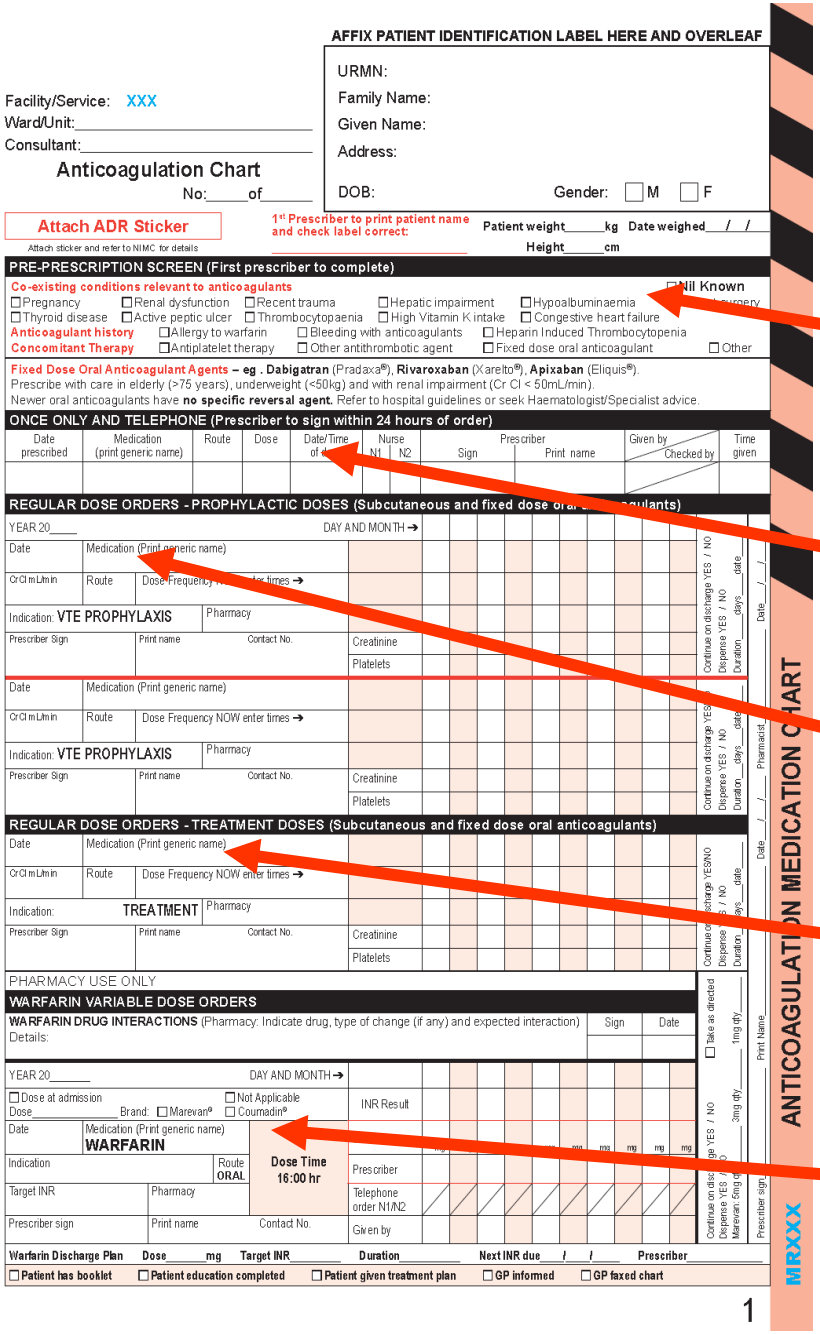
Front of NIMC



Inside NIMC



The front page



AFFIX PATIENT IDENTIFICATION LABEL HERE AND OVERLEAF

URMN:
Family Name:
Given Name:
Address:
DOB: Gender: ☐M ☐F

Facility/Service: XXX
Ward/Unit:
Consultant:

Anticoagulation Chart
No:_____of_____

Attach ADR Sticker
Attach sticker and refer to NIMC for details

1st Prescriber to print patient name and check label correct:

Patient weight_____kg Date weighed___/___/___
Height_____cm

PRE-PRESCRIPTION SCREEN (First prescriber to complete)

Co-existing conditions relevant to anticoagulants ☐Nil Known
☐Pregnancy ☐Renal dysfunction ☐Recent trauma ☐Hepatic impairment ☐Hypoalbuminaemia
☐Thyroid disease ☐Active peptic ulcer ☐Thrombocytopaenia ☐High Vitamin K intake ☐Congestive heart failure
Anticoagulant history ☐Allergy to warfarin ☐Bleeding with anticoagulants ☐Heparin Induced Thrombocytopenia
Concomitant Therapy ☐Antiplatelet therapy ☐Other antithrombotic agent ☐Fixed dose oral anticoagulant ☐Other

Fixed Dose Oral Anticoagulant Agents – eg . Dabigatran (Pradaxa®), Rivaroxaban (Xarelto®), Apixaban (Eliquis®).
Prescribe with care in elderly (>75 years), underweight (<50kg) and with renal impairment (Cr Cl < 50mL/min).
Newer oral anticoagulants have no specific reversal agent. Refer to hospital guidelines or seek Haematologist/Specialist advice.

ONCE ONLY AND TELEPHONE (Prescriber to sign within 24 hours of order)

Date prescribed	Medication (print generic name)	Route	Dose	Date/Time of	Nurse N1	Nurse N2	Prescriber Sign	Prescriber Print name	Given by / Checked by	Time given

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

YEAR 20____ DAY AND MONTH →

Date | Medication (Print generic name)
CrCl mL/min | Route | Dose Frequency NOW enter times →
Indication: VTE PROPHYLAXIS | Pharmacy
Prescriber Sign | Print name | Contact No.
Creatinine
Platelets

Continue on discharge YES / NO
Dispense YES / NO Duration____days____date
Date___/___/___
Pharmacist

Date | Medication (Print generic name)
CrCl mL/min | Route | Dose Frequency NOW enter times →
Indication: VTE PROPHYLAXIS | Pharmacy
Prescriber Sign | Print name | Contact No.
Creatinine
Platelets

Continue on discharge YES/NO
Dispense YES / NO Duration____days____date
Date___/___/___
Pharmacist

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

Date | Medication (Print generic name)
CrCl mL/min | Route | Dose Frequency NOW enter times →
Indication: TREATMENT | Pharmacy
Prescriber Sign | Print name | Contact No.
Creatinine
Platelets

Continue on discharge YES/NO
Dispense YES / NO Duration____days____date
Date___/___/___
Pharmacist

PHARMACY USE ONLY

WARFARIN VARIABLE DOSE ORDERS

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

YEAR 20_____ DAY AND MONTH →

☐Dose at admission ☐Not Applicable
Dose_____ Brand: ☐Marevan® ☐Coumadin®

Date | Medication (Print generic name) WARFARIN
Indication | Route ORAL
Target INR | Pharmacy
Prescriber sign | Print name | Contact No.

Dose Time 16:00 hr

INR Result
Prescriber
Telephone order N1/N2
Given by

☐Take as directed
1mg qty____
3mg qty____
Print Name____

Continue on discharge YES / NO
Dispense YES / NO
Marevan: 5mg qty____

Prescriber sign

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

ANTICOAGULATION MEDICATION CHART
MRXXX

XXX
12/12

1

- Pre-prescription screen
- Once only and telephone
- Regular dose prophylactic doses
- Regular dose orders
  Treatment doses
- Variable dose orders - warfarin

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

RECOMMENDATIONS FOR LOW MOLECULAR WEIGHT HEPARIN (LMWH)

Preferred administration times for twice daily dosing are 0800 and 2000 hr. Daily thromboprophylaxis should be given in the evening.

ENOXAPARIN DOSAGE DOSE 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.

Monitoring	• 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, renally impaired and frail elderly patients.
Withholding LMWH prophylaxis and treatment prior and post invasive procedures	• Interventional (surgical) procedure: may commence prophylactic doses 4-6 hours after 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 12 hours of a prophylactic dose of LMWH, or 24 hours within 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.
Reversing Overtreatment	• Seek specialist advice. • As a guide: Give 1mg protamine sulfate per 1mg enoxaparin. Give half of the protamine dose as a slow IV push (10minutes) and the remainder as an infusion (5% glucose or 0.9% sodium chloride) over 6-8 hours.

RECOMMENDATIONS FOR WARFARIN

Warfarin brands are NOT equivalent and cannot be used interchangeably.

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)

(ADULT) INITIATION DOSING FOR WARFARIN – TARGET INR 2-3 – For Guidance Only

Day	INR	Suggested dose
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 1.6-1.9 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.
■ For younger patients consider 7-10mg on day 1 and day 2.
■ Consider smaller starting doses if 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.

DOSING WITH ONGOING WARFARIN THERAPY

■ 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.

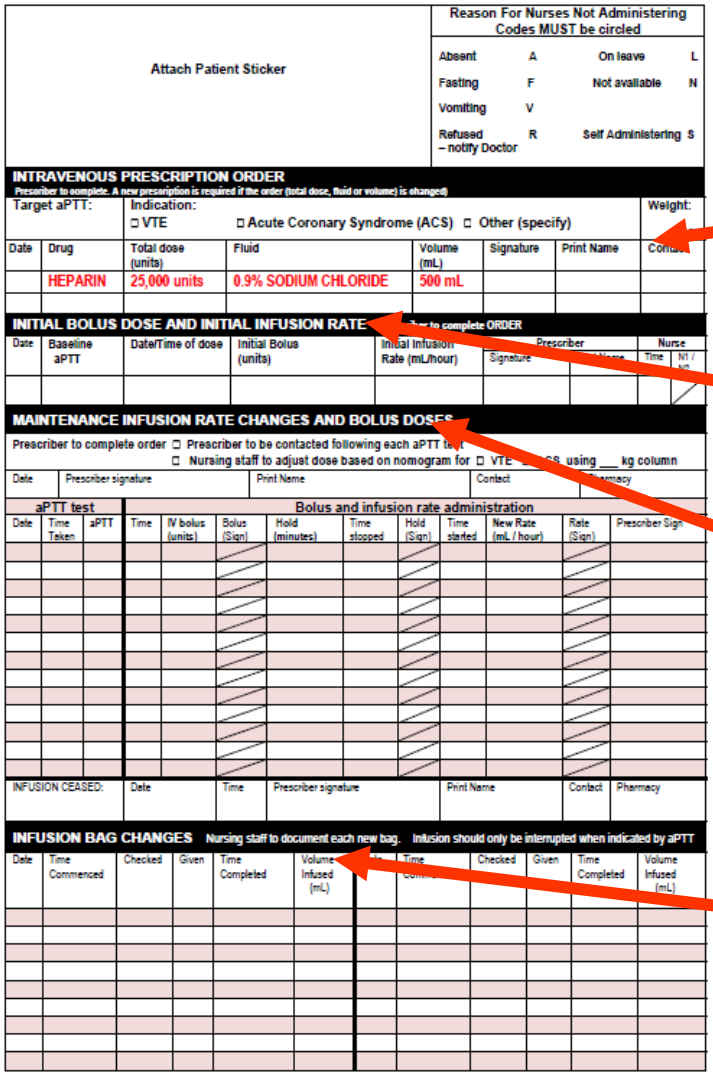
REVERSING WARFARIN OVER-TREATMENT (bleeding risk increases exponentially from INR 5 to 9. Monitor closely INR ≥ 6)

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 <1.0% 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)* in addition to vitamin K. ***FFP (10-15mL/kg)* 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 ***For reversal prior to a procedure – Refer to hospital guidelines or seek specialist advice.***		[3] at a rate of 3mL/min. 500 Units of factor IX in 1 vial of Prothrombinex VF [4] available from transfusion service	
*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			

The back page

- Recommendations for LMWH (enoxaparin)
- Recommendations for warfarin
- Updated Warfarin Reversal Guidelines

The middle pages -prescribing and administering IV heparin



Attach Patient Sticker

Reason For Nurses Not Administering Codes MUST be circled

Absent	A	On leave	L
Fasting	F	Not available	N
Vomiting	V		
Refused – notify Doctor	R	Self Administering	S

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:

Date	Drug	Total dose (units)	Fluid	Volume (mL)	Signature	Print Name	Contact
	HEPARIN	25,000 units	0.9% SODIUM CHLORIDE	500 mL			

INITIAL BOLUS DOSE AND INITIAL INFUSION RATE ... to complete ORDER

Date	Baseline aPTT	Date/Time of dose	Initial Bolus (units)	Initial Infusion Rate (mL/hour)	Prescriber Signature	Prescriber Print Name	Nurse Time	Nurse N1 / N2

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 ... CS using ___ kg column

Date | Prescriber signature | Print Name | Contact | Pharmacy

aPTT test | Bolus and infusion rate administration

Date	Time Taken	aPTT	Time	IV bolus (units)	Bolus (Sign)	Hold (minutes)	Time stopped	Hold (Sign)	Time started	New Rate (mL / hour)	Rate (Sign)	Prescriber Sign

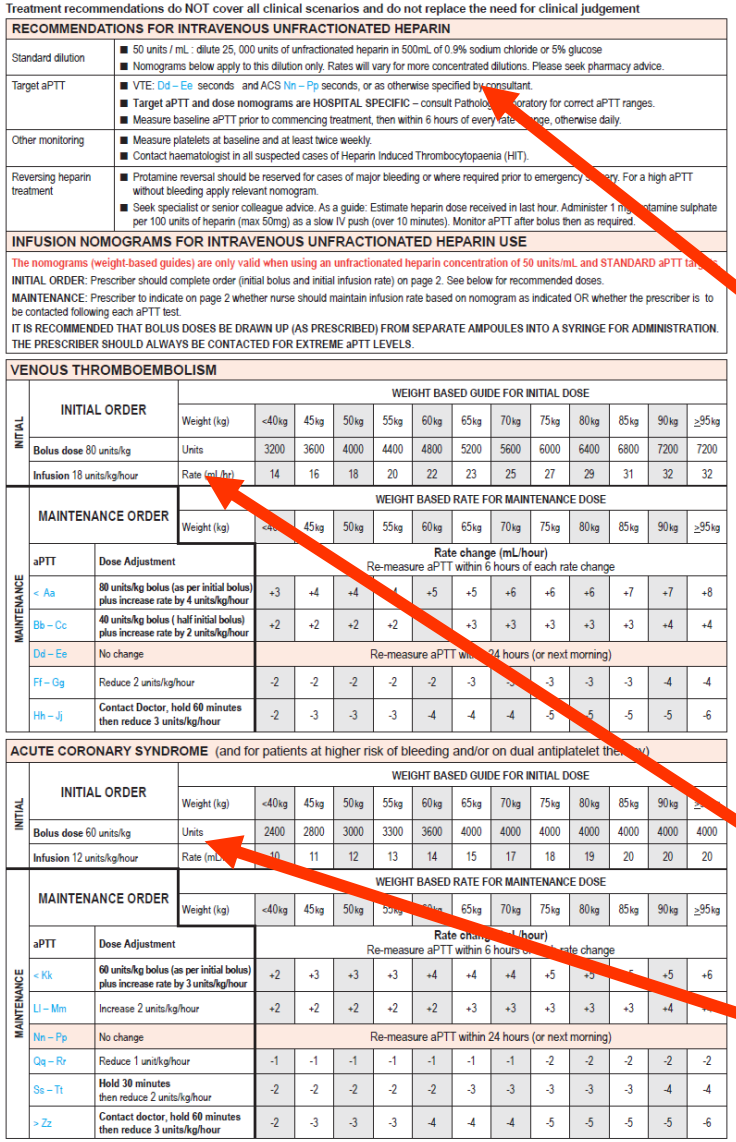
INFUSION CEASED: Date | Time | Prescriber signature | Print Name | Contact | Pharmacy

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)	Time ...	Checked	Given	Time Completed	Volume Infused (mL)

- Prescription order
- Initial bolus and infusion rate
- Maintenance infusion rate and bolus dose
- Infusion bag changes

The middle pages-dosing recommendations



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

RECOMMENDATIONS FOR INTRAVENOUS UNFRACTIONATED HEPARIN

Standard dilution	■ 50 units / mL : dilute 25, 000 units of unfractionated heparin in 500mL of 0.9% sodium chloride or 5% glucose ■ Nomograms below apply to this dilution only. Rates will vary for more concentrated dilutions. Please seek pharmacy advice.
Target aPTT	■ VTE: Dd – Ee seconds and ACS Nn – Pp seconds, or as otherwise specified by consultant. ■ **Target aPTT and dose nomograms are HOSPITAL SPECIFIC** – consult Pathology laboratory for correct aPTT ranges. ■ Measure baseline aPTT prior to commencing treatment, then within 6 hours of every rate change, otherwise daily.
Other monitoring	■ Measure platelets at baseline and at least twice weekly. ■ Contact haematologist in all suspected cases of Heparin Induced Thrombocytopaenia (HIT).
Reversing heparin treatment	■ Protamine reversal should be reserved for cases of major bleeding or where required prior to emergency surgery. For a high aPTT without bleeding apply relevant nomogram. ■ Seek specialist or senior colleague advice. As a guide: Estimate heparin dose received in last hour. Administer 1 mg protamine sulphate per 100 units of heparin (max 50mg) as a slow IV push (over 10 minutes). Monitor aPTT after bolus then as required.

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	+3	+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

- Recommendations for intravenous unfractionated heparin
- Infusion nomograms for intravenous unfractionated heparin
- VenousThromboembolism (VTE) nomogram
- Acute Coronary Syndromes (ACS) nomogram

Patient details: Pre-Prescription Screen

- **When prescribing anticoagulant agents it is important to first check for:**
  - co-existing conditions,
  - past history of anticoagulant related adverse events and
  - concomitant therapy

- These may influence the decision to prescribe a particular anticoagulant or indicate a need for closer monitoring and/or dose adjustment.

PRE-PRESCRIPTION SCREEN (First prescriber to complete)

Co-existing conditions relevant to anticoagulants ☐ Nil Known

☐ Pregnancy ☐ Renal dysfunction ☐ Recent trauma ☐ Hepatic impairment ☐ Hypoalbuminaemia ☐ Recent surgery

☐ Thyroid disease ☐ Active peptic ulcer ☐ Thrombocytopaenia ☐ High Vitamin K intake ☐ Congestive heart failure

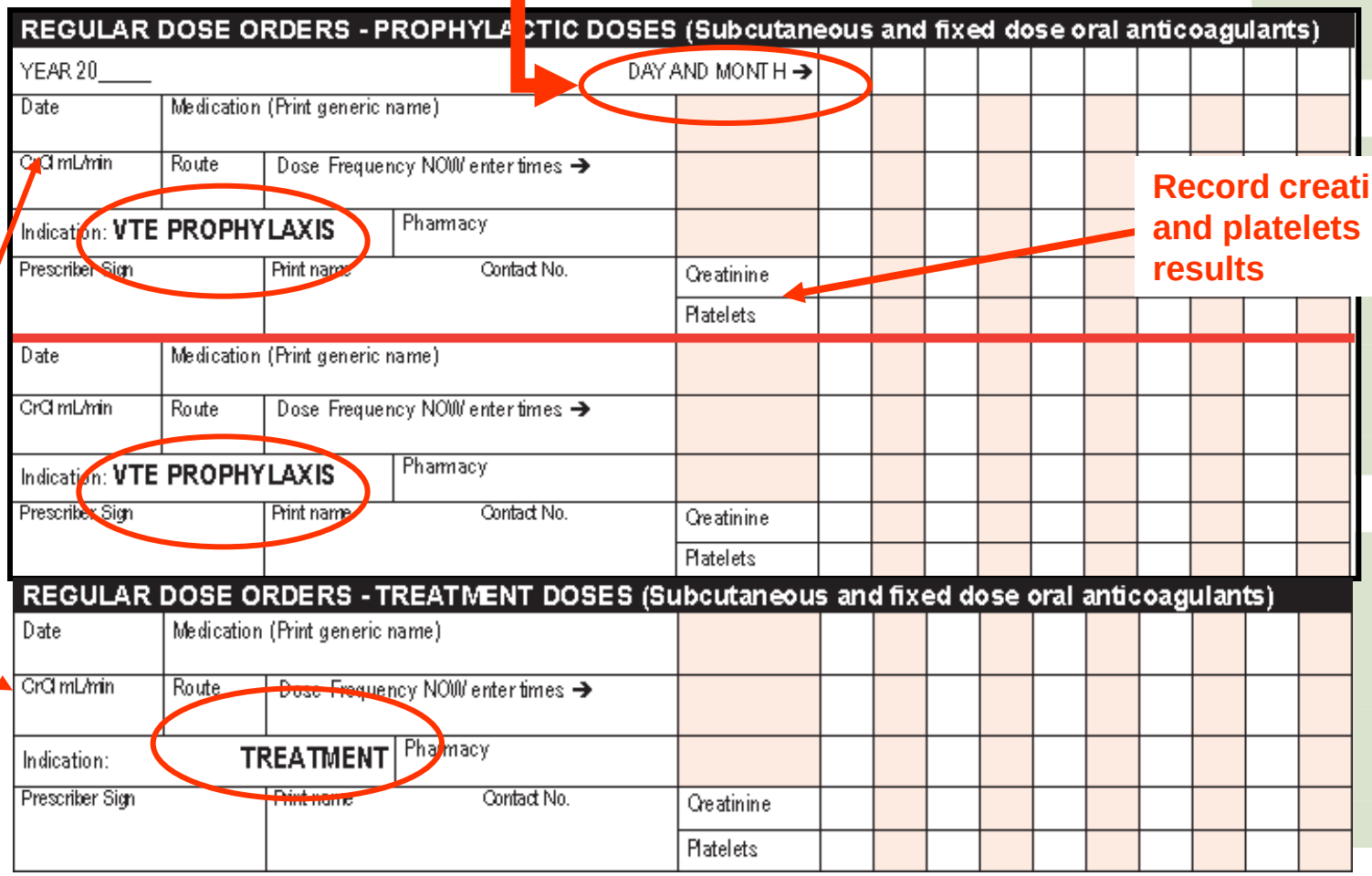
Anticoagulant history ☐ Allergy to warfarin ☐ Bleeding with anticoagulants ☐ Heparin Induced Thrombocytopenia

Concomitant Therapy ☐ Antiplatelet therapy ☐ Other antithrombotic agent ☐ Fixed dose oral anticoagulant ☐ Other

- At least one box SHOULD be ticked.
- If there are no coexisting conditions, no history of anticoagulant related adverse events and no antiplatelet or antithrombotic therapy then tick the “Nil Known” box.
- The prescriber should complete this section.

Regular dose orders

DATE AND MONTH for 10 days only (for all regular dose orders) -designed if change from UFH to LMWH is required for VTE prophylaxis.

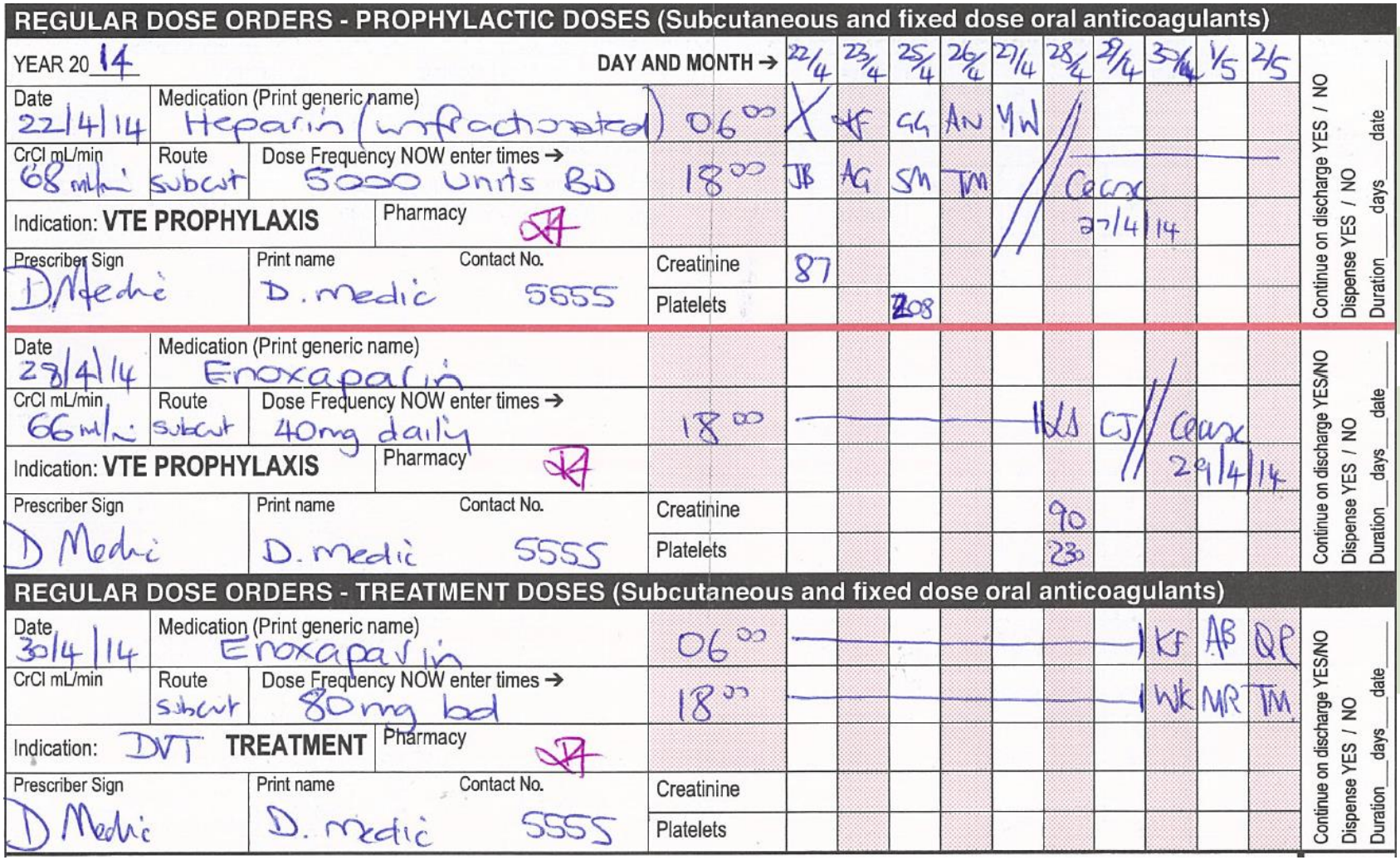


Record creatinine and platelets results

Calculate and record Creatinine Clearance

- Subcutaneous unfractionated heparin
- Subcutaneous enoxaparin or daltaparin dosing based on indication and the patient's renal function and weight.
- Fixed Dose Oral anticoagulant (eg. rivaroxaban and dabigatran are to be prescribed in this section of the chart depending on indication).

Example of Correct Use of Regular Dose Order Section



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

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

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						

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

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)

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

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									

Recommendations for Low Molecular Weight Heparin (LMWH)

- Dosing of LMWH (ie enoxaparin and daltaparin) is based on the indication, risk of bleeding risk and modifying factors (eg renal function and patient weight).

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

RECOMMENDATIONS FOR LOW MOLECULAR WEIGHT HEPARIN (LMWH)		
Preferred administration times for twice daily dosing are 0800 and 2000 hr. Daily thromboprophylaxis should be given in the evening.		
ENOXAPARIN DOSAGE DOSE 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.		
Monitoring	▪ 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, renally impaired and frail elderly patients.	
Withholding LMWH prophylaxis and treatment prior and post invasive procedures	▪ Interventional (surgical) procedure: may commence prophylactic doses 4-6 hours after 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 12 hours of a prophylactic dose of LMWH, or 24 hours within 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.	
Reversing Overtreatment	▪ Seek specialist advice. ▪ As a guide: Give 1mg protamine sulfate per 1mg enoxaparin. Give half of the protamine dose as a slow IV push (10minutes) and the remainder as an infusion (5% glucose or 0.9% sodium chloride) over 6-8 hours.	

Recommendations for low molecular weight heparin (LMWH)

- 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 or obese patients on high doses, 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.

Warfarin

- The following is to be documented:
  - INR results
  - daily warfarin dose & prescriber's initials prior to 1600hrs according to the most recent INR
  - indication & target INR range
  - brand of warfarin to be used
  - initials of administering and checking nurses/midwives

WARFARIN VARIABLE DOSE ORDERS

WARFARIN DRUG INTERACTIONS (Pharmacy: Indicate drug, type of change (if any) and expected interaction) Sign: KF Date: 13/1/13

Details: Ciprofloxacin increasing INR

YEAR 20 13 DAY AND MONTH → 12/1

☐ Dose at admission ☑ Not Applicable

Dose _____ Brand: ☐ Marevan® ☐ Coumadin®

INR Result: 1.1

Date: 12/1/13

Medication (Print generic name): WARFARIN

DOSE: 5 mg

Indication: AF

Route: ORAL

Dose Time 16:00 hr

Prescriber: AP

Target INR: 2-3

Pharmacy: KF

Telephone order N1/N2:

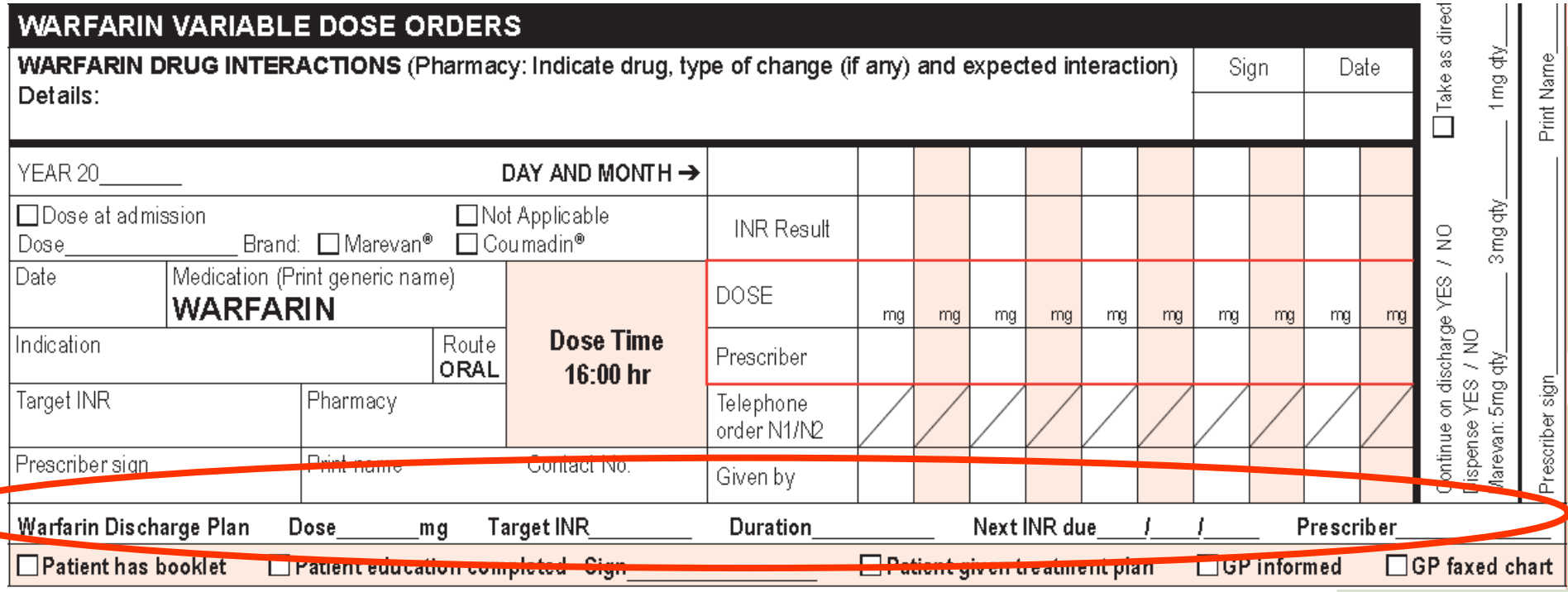
Prescriber sign: A.Prescriber

Print name: A.Prescriber

Contact No.: 4152

Given by: SW

Variable dose orders- Warfarin



WARFARIN VARIABLE DOSE ORDERS

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

YEAR 20_____ **DAY AND MONTH →**

☐ Dose at admission ☐ Not Applicable
Dose_____ Brand: ☐ Marevan® ☐ Coumadin®

Date | Medication (Print generic name) **WARFARIN** | **Dose Time 16:00 hr**
Indication | Route **ORAL**
Target INR | Pharmacy
Prescriber sign | Print name | Contact No.

INR Result | DOSE | Prescriber | Telephone order N1/N2 | Given by

DOSE: mg mg mg mg mg mg mg mg mg mg

☐ Take as direct
Continue on discharge YES / NO
Dispense YES / NO 1mg qty_____ 3mg qty_____
Marevan: 5mg qty_____

Print Name_____
Prescriber sign_____

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

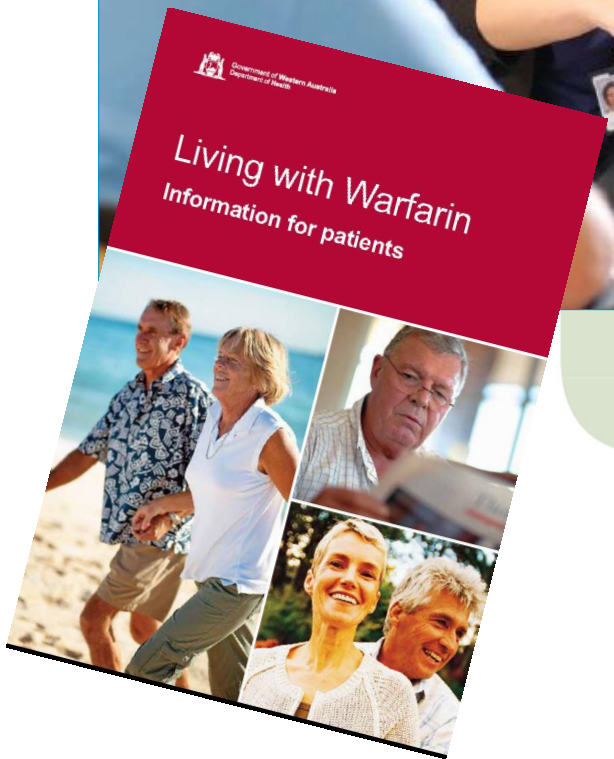
Doctor to complete warfarin discharge plan prior to patient discharge

Patient Information Warfarin

- Engage the patient and family in self-management of warfarin
  - highlight the importance of identifying & reporting signs of bleeding
  - provide verbal counselling and education booklets
  - highlight the importance of:
    - regular INR monitoring
    - Medicines and food/alcohol that interfere with the way warfarin works.

WATAG Website

http://www.watag.org.au/wamsg/high-risk-drugs.cfm



Best practice when initiating warfarin

- Measure baseline INR prior to starting therapy.
- For the majority of patients > 60 years a starting dose of 5 mg for Day 1 and Day 2 is recommended, with dose modification tailored to INR on Day 3.
- Consider smaller starting doses for high risk patients (elderly, low body weight, abnormal liver function or is at high bleeding risk)
- Warfarin doses should be modified based on the INR result.
- Bridging with heparin is recommended until warfarin stabilised.

  Acute treatment of venous thromboembolism (DVT or PE) should be treated with heparin (unfractionated or low molecular weight) for at least of 5 days and/or until the INR is > 2 for TWO consecutive days.

Ongoing warfarin therapy:

- Brand substitution is not allowed

  : Marevan® preferred brand for initiation (Operational Circular 1755/04)

- 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.

- Ensure patient has been given "**Living with Warfarin**" Booklet and has been counselled on warfarin

- Medical team to provide patient and GP with a treatment plan.

Intravenous infusions

Eg: for patient with Venous Thromboembolism

INTRAVENOUS PRESCRIPTION ORDER

Prescriber to complete. A new prescription is required if the order (total dose, fluid or volume) is changed)

Target aPTT: 70-105

Indication: ☑ VTE ☐ Acute Coronary Syndrome (ACS) ☐ Other (specify)

Weight: 74 kg

Date	Drug	Total dose (units)	Fluid	Volume (mL)	Signature	Print Name	Contact
31.8.12	HEPARIN	25,000 units	0.9% SODIUM CHLORIDE	500 mL	A. Doctor	A.Doctor	4025

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
31.8.12	42	31.8.12 0200	6000 units	27mL/hr	A. Doctor	A.Doctor	1430	SR / DA

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 75 kg column

Date	Prescriber signature	Print Name	Contact	Pharmacy
31.8.12	A. Doctor	A.Doctor	4025	P.Harmacist

VTE Nomogram

VENOUS THROMBOEMBOLISM

INITIAL

INITIAL ORDER

		WEIGHT BASED GUIDE FOR INITIAL DOSE											
	Weight (kg)	<40 kg	45 kg	50 kg	55 kg	60 kg	65 kg	70 kg	75 kg	80 kg	85 kg	90 kg	≥95 kg
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)	<40 kg	45 kg	50 kg	55 kg	60 kg	65 kg	70 kg	75 kg	80 kg	85 kg	90 kg	≥95 kg
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

Maintaining the infusion regimen using the weight based nomogram and weight based guide

aPTT test			Bolus and infusion rate administration									
Date	Time Taken	aPTT	Time	IV bolus (units)	Bolus (Sign)	Hold (minutes)	Time stopped	Hold (Sign)	Time started	New Rate (mL / hour)	Rate (Sign)	Prescriber Sign
31/8			0800	6000	AL MC				0800	27	KC JK	
31/8	1400	110							1430	27	KF MG	
31/8	0800	62	0830	3000	DA SW				0830	30	DA SW	
31/8	2000	85							2030	27	KW SU	

27 + 3

30 - 3

INFUSION CEASED:	Date	Time	Prescriber signature	Print Name	Contact	Pharmacy

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)

Maintenance regimen
Continuous infusion – should only be stopped when indicated by nomogram

- aPTT should be checked
  - within 6 hours of every rate change or
  - within 24 hours (next morning) – when aPTT within target range
- There should be a timely dose adjustment to each aPTT measurement
- The infusion should be continuous– only stop when indicated by aPTT (nomogram)
- Prescriber should always be contacted for EXTREME aPTT levels
- In all cases the prescriber should check the aPTT result and subsequent infusion rate changes in a timely manner.
- It is recommended that bolus doses be drawn up (as prescribed) from a separate ampoule into a syringe for administration.

Fixed Dose Oral Anticoagulants

Fixed Dose Novel Oral Anticoagulants (NOACs) – eg . Dabigatran (Pradaxa®), **Rivaroxaban** (Xarelto®), **Apixaban** (Eliquis®).
Prescribe with care in elderly (>75 years), underweight (<50kg) and with renal impairment (Cr Cl < 50mL/min).
Newer oral anticoagulants have **no specific reversal agent.** Refer to hospital guidelines or seek Haematologist/Specialist advice.

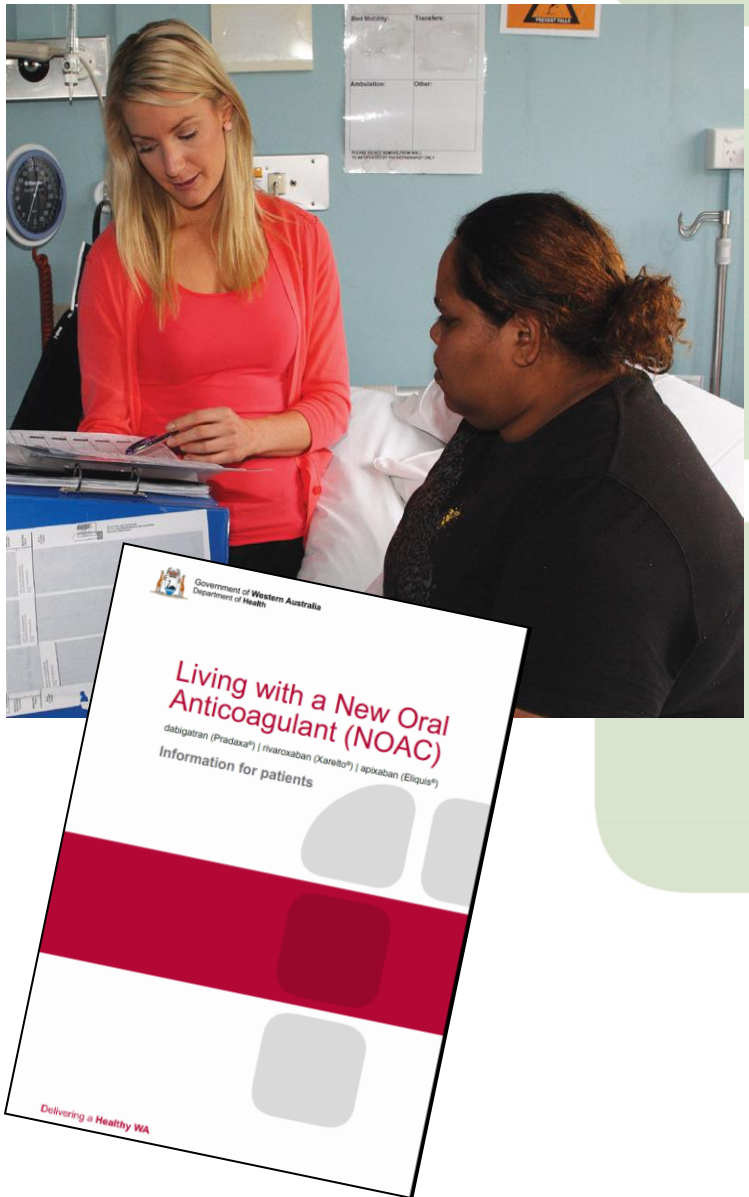
- Fixed Dose Novel Oral Anticoagulants NOACs) are to be prescribed on the WA AMC.
- Prescribe in the Regular Dose Order section (either prophylaxis or treatment depending on indication)
- Prescribe with care in patients with poor renal function and elderly or underweight patients.
- No Specific Reversal Agents – Contact Haematology for advice if serious bleeding occurs.

Patient Information
New Oral Anticoagulant Agents (NOACs)

- Engage the patient and family in self-management of NOACs
  - Including
    - Dabigatran
    - Apixaban
    - Rivaroxaban
  - highlight the importance of identifying & reporting signs of bleeding
  - provide verbal counselling and education booklets

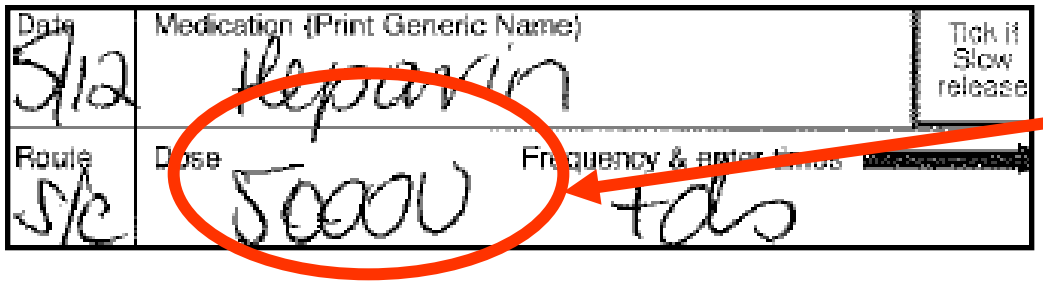
WATAG Website

http://www.watag.org.au/wamsg/high-risk-drugs.cfm



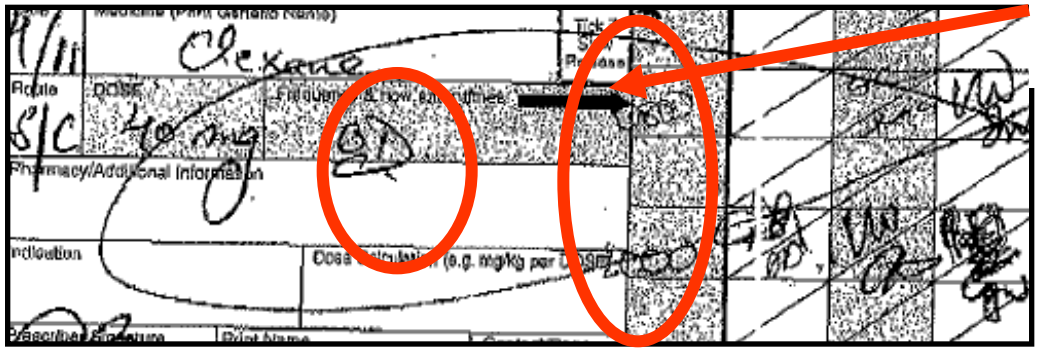
Minimising Risks with Anticoagulants

- Careful prescribing
  - Use Standardised abbreviations- write “Units”



Mistaken for

50 000 units



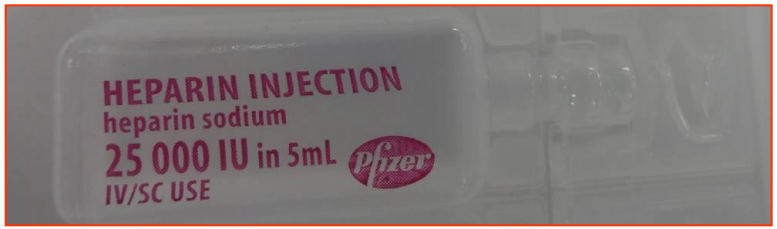
Once daily or twice daily ???

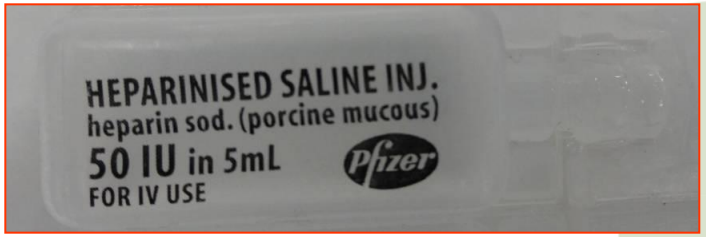
  - Brand specification for warfarin
    - Marevan® preferred unless patient previous stabilised on Coumadin ®

Minimising Risks with Anticoagulants

- Choosing the correct product for administration
  - Correct brand and strength of warfarin chosen

  - Multiple strengths of heparin available





  - Confusion with other medications

Warfarin Reversal (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**	**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**

Reversal of Heparin Over-treatment

Information found on page 3 of chart

Unfractionated heparin for subcutaneous or infusion

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

Low molecular weight heparins (e.g. enoxaparin and daltaparin)

Reversing Overtreatment	▪ Seek specialist advice. ▪ As a guide: Give 1mg protamine sulfate per 1mg enoxaparin. Give half of the protamine dose as a slow IV push (10minutes) and the remainder as an infusion (5% glucose or 0.9% sodium chloride) over 6-8 hours.

Adverse Effects of Anticoagulants

- The major side effect of anticoagulants is bleeding

- All symptoms must be followed up and appropriate action implemented according to the severity of the bleed

- Bleeds may be:
  - minor
  - major
  - critical

Adverse Effects of Anticoagulants

Minor bleeds:

- bleeding from gums after brushing teeth
- bruising easily
- nose bleeds
- prolonged bleeding from cuts/wounds
- excessive menstrual or vaginal bleeding

Major bleeds:

- blood in stools (melena):
  - bright red blood-stained stools
  - black tarry stools
  - rectal bleeding
- vomiting blood (hematemesis)
  - may have a 'coffee ground' appearance
- passing blood in urine (hematuria):
  - bright red urine
  - dark brown, rusty coloured urine
- coughing up blood (hemoptysis)
  - pink or blood streaked sputum
- painful, swollen, hot joints
- patient feeling tired and looking pale (anaemia)

Intracranial Haemorrhage

- An intra-cerebral bleed is a clinically critical bleed

- Symptoms may include:
  - sudden, severe headache
  - change in vision, speech
  - difficulty in walking, dizziness
  - confusion
  - weakness or numbness in one arm/leg or side of face.

Add Local Data/Information Here

Safe management of anticoagulants Pre and Post Invasive Procedures

- A protocol for withholding or resuming anticoagulants pre and post invasive procedures should be readily accessible to staff.

Withholding LMWH prophylaxis and treatment prior and post invasive procedures	▪ Interventional (surgical) procedure: may commence prophylactic doses 4-6 hours after 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 12 hours of a prophylactic dose of LMWH, or 24 hours within 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.

Summary

Anticoagulants are high risk medications.

They:

- have complex dosing regimens
- require monitoring for safe management

- The WA Anticoagulation Medication Chart is designed to enable appropriate dose selection and monitoring.

Risk Register

- Medication Safety
  - Quality Improvement and Change Management Unit, Performance, Activity and Quality Directorate. WA Department of Health

    Kerry.Fitzsimons@health.wa.gov.au

- Local Risk Register
  - Contact:_____

WA Anticoagulation Steering Group

The Quality Improvement and Change Management Unit would like to acknowledge the contribution of the WA Anticoagulation Steering Group members to 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