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Disclaimer:
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Contents

1 Introduction 3
   1.1 Preamble 3
   1.2 When Should This Chart Be Used? 3
   1.3 Recommendations for Use of Anticoagulants 4
   1.4 Patient Information 4
   1.5 Adverse Drug Reactions 4

2 Relevant Medical History 5

3 Subcutaneous Orders 6
   3.1 Best Practice in the Use of LMWH 6
   3.2 Timing of VTE prophylaxis in the peri-operative/invasive procedures setting 6
   3.3 Timing of VTE/ACS treatment in the peri-operative/invasive procedures setting: 6
   3.4 Once Only and Telephone Subcutaneous Orders 7
   3.5 Regular Dose Orders: Prophylaxis and Treatment 7

4 Variable Dose Oral Anticoagulant Orders 9
   4.1 Best practice 9
   4.2 Reversal of Over-treatment 10
   4.3 Warfarin-Drug Interactions 11
   4.4 Variable Dose Orders 11
   4.5 Discharge Treatment Plan 12
   4.6 Discharge Process 13
   4.7 Discharge Supply 13

5 Intravenous Unfractionated Heparin 14
   5.1 Best practice 14
   5.2 Initial bolus dose Initial infusion rate 14
   5.3 Reversing Heparin Treatment 15
   5.4 Intravenous injection/infusion orders 16
   5.5 Initial dose order and administration 16
   5.6 Maintenance infusion rate and bolus doses 17
   5.7 Infusion change and bolus dose 18
   5.8 Infusion bag changes 19
1. INTRODUCTION

1.1 Preamble

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

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

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

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

1.2 When should this chart be used?

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

1.3 Important – Cross-referencing with NIMC

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

This can be done by

i) Cross-reference chart on front of NIMC

Examples:

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

iii) Tick the “warfarin/anticoagulant in use” box on the inside of the NIMC
Or with VTE Risk Assessment Tool in NIMC – tick “warfarin/anticoagulant in use” box

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

1.4 Recommendations for use of anticoagulants

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

1.5 Patient Information

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

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

1.6 Adverse Drug Reactions

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

2.1 Best practice

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

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

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

2.2 Completing the chart

<table>
<thead>
<tr>
<th>PRE-PRESCRIPTION SCREEN (First prescriber to complete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-existing conditions relevant to anticoagulants</td>
</tr>
<tr>
<td>Pregnancy                                         ☐ Nil Known</td>
</tr>
<tr>
<td>Renal dysfunction                                  ☐ Recent surgery</td>
</tr>
<tr>
<td>Recent trauma                                      ☐ Hepatic impairment</td>
</tr>
<tr>
<td>Hepatic impairment                                 ☐ Hypoalbuminaemia</td>
</tr>
<tr>
<td>Hypoalbuminaemia                                   ☐ Recent surgery</td>
</tr>
<tr>
<td>Thyroid disease                                    ☐ Active peptic ulcer</td>
</tr>
<tr>
<td>Active peptic ulcer                                ☐ Thrombocytopenia</td>
</tr>
<tr>
<td>Thrombocytopenia                                   ☐ High Vitamin K intake</td>
</tr>
<tr>
<td>High Vitamin K intake                              ☐ Congestive heart failure</td>
</tr>
<tr>
<td>Anticoagulant history                              ☐ Allergy to warfarin</td>
</tr>
<tr>
<td>Allergy to warfarin                                ☐ Bleeding with anticoagulants</td>
</tr>
<tr>
<td>Bleeding with anticoagulants                       ☐ Heparin Induced Thrombocytopenia</td>
</tr>
<tr>
<td>Heparin Induced Thrombocytopenia                   ☐ Other antithrombotic agent</td>
</tr>
<tr>
<td>Concomitant Therapy                                ☐ Antiplatelet therapy</td>
</tr>
<tr>
<td>Antiplatelet therapy                               ☐ Other antithrombotic agent</td>
</tr>
<tr>
<td>Other antithrombotic agent                         ☐ Fixed dose oral anticoagulant</td>
</tr>
<tr>
<td>Fixed dose oral anticoagulant                      ☐ Other</td>
</tr>
</tbody>
</table>

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

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

---

3. SUBCUTANEOUS ORDERS

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

3.1 Best practice in the use of LMWH

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

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>ENOXAPARIN DOSAGE AND FREQUENCY (Seek specialist advice in patients weighing &lt;40kg or &gt;150kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE prophylaxis</td>
<td>Normal renal function* 20 mg once daily</td>
</tr>
<tr>
<td>DVT treatment</td>
<td>1.5 mg/kg once daily OR 1 mg/kg twice daily</td>
</tr>
<tr>
<td>Acute Coronary Syndromes/VTE treatment</td>
<td>1 mg/kg twice daily 1 mg/kg once daily</td>
</tr>
</tbody>
</table>

*Creatinine Clearance (CrCl) = [(140-age) x Ideal Body Weight(kg)/Serum Creatinine(umol/L)][1.2 for males]

Seek advice on Dalteparin (LMWH) doses, adjustment in renal failure, monitoring and reversal from your clinical pharmacist or specialist.

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

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

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

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

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

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

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

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

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

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

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

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

---

3.4 Once Only and Telephone Subcutaneous Orders

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

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

3.5 Regular Dose Orders: Prophylaxis and Treatment

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

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

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

The period of prescription should NOT exceed 10 days.

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

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

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication (Print generic name)</th>
<th>Clearance</th>
<th>Route</th>
<th>Dose Frequency NOW enter times</th>
<th>Indication: VTE PROPHYLAXIS</th>
<th>Pharmacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/1/14</td>
<td>Heparin (unfractionated)</td>
<td>68 mL/min</td>
<td>Subcut</td>
<td>5000 Units BD</td>
<td></td>
<td>Pharmacy</td>
</tr>
<tr>
<td></td>
<td>Enoxaparin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Date:**
- Date the medication order was commenced in hospital.
  - Medication: Enoxaparin is pre-printed. If not appropriate strike out and print generic name.

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

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

**Times:**
- Preferred administration times for twice daily dosing are 0600 and 1800.
  - Daily thromboprophylaxis should be given in the evening.

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

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

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

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

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

**Contact:** A contact number (i.e. page number) for the prescriber should be provided.
4. VARIABLE DOSE ORAL ANTICOAGULANT ORDERS

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

4.1 Best practice

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

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

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

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

| (ADULT) INITIATION DOSING FOR WARFARIN – TARGET INR 2-3 – For Guidance Only |
|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|
| Day | INR | Suggested dose | |
| 1 | 1.0-1.4 | 5 mg | |
| 2 | No INR | 5 mg | |
| 3 | <1.8 | 1 mg | |
| 4-8 | | 7 mg | |
| 1 | 1.5-1.8 | 5 mg | |
| 2 | 2.0-2.5 | 4 mg | |
| 3 | 2.6-3.5 | 3 mg | |
| 4 | 3.6-4.0 | 2 mg | |
| >4.5 | | 1 mg | |

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

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

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

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

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

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

INR testing is recommended at morning blood round.

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

All patients should receive warfarin education, including written information prior to discharge. This should be documented. It is recognised that education may be completed by pharmacy, nursing or medical staff.
The dose modifications made to warfarin therapy should be communicated to the primary care practitioner to assist further dose modification in the early post-discharge phase.

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

4.2 Reversal of Over-treatment

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

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

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

<table>
<thead>
<tr>
<th>INR</th>
<th>Bleeding</th>
<th>Warfarin</th>
<th>Vitamin K</th>
<th>Prothrombinex VF</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than therapeutic range but &lt;5</td>
<td>Absent</td>
<td>Reduce dose or omit next dose</td>
<td></td>
<td></td>
<td>Resume warfarin at reduced dose when INR approaches therapeutic range. If INR &lt;10% above therapeutic level, dose reduction may not be necessary.</td>
</tr>
<tr>
<td>5 – 9</td>
<td>Absent (Low risk)</td>
<td>Stop</td>
<td></td>
<td></td>
<td>Measure INR in 24 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
<tr>
<td></td>
<td>Absent (High Risk)*</td>
<td>Stop</td>
<td>1–2 mg (oral)¹</td>
<td>0.5–1mg IV²</td>
<td>Measure INR within 24 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
<tr>
<td>&gt;9</td>
<td>Absent (Low risk)</td>
<td>Stop</td>
<td>2.5–5mg (oral)¹</td>
<td>Or 1 mg (IV)²</td>
<td>Measure INR in 6–12 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
<tr>
<td></td>
<td>Absent (High Risk)*</td>
<td>Stop</td>
<td>1 mg (IV)²</td>
<td>Consider 25 IU/kg ³,⁴ See weight based nomogram</td>
<td>Measure INR in 6–12 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
</tbody>
</table>

**NOTES:**

2. IV Vitamin K: use undiluted as slow IV bolus over at least 30 seconds.
3. Prothrombinex VF should be dosed to deliver 25-50 units of factor IX/kg at a rate of 3mL/min.
4. Prothrombinex VF and fresh frozen plasma are available from transfusion service.

**High Bleeding Risk**

- Recent surgery / trauma / bleed
- Renal Failure
- Alcohol abuse
- Antiplatelet therapy
- Other relevant co-morbidity

---

4.3 Warfarin-Drug Interactions

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

At The Time of Admission

List all concomitant therapy that has a significant warfarin interaction.

During the Hospital Episode

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

Each entry should be signed and dated.

4.4 Variable Dose Orders

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

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

**Date:** Date medication order was started in hospital.

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

Warfarin brands are not equivalent and cannot be used interchangeably.

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

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

**Indication:** Indication for oral anticoagulant therapy.
**Target INR:** Document the target INR.

<table>
<thead>
<tr>
<th>INR Range</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0-3.0</td>
<td>- Therapy for DVT or PE</td>
</tr>
<tr>
<td></td>
<td>- Preventing DVT: high risk patients e.g. hip or knee surgery</td>
</tr>
<tr>
<td></td>
<td>- Preventing systemic embolism: AF, valvular heart disease, post MI, prosthesis heart valves (first 3 months)</td>
</tr>
<tr>
<td>2.5-3.5</td>
<td>- Bilateral mechanical heart valve (aortic)</td>
</tr>
<tr>
<td>3.0-4.0</td>
<td>- Mechanical prosthesis valve (high risk)</td>
</tr>
</tbody>
</table>

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

**Prescriber Sign** 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.

**Print name,** **Contact:**

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

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

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

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

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

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

**Given by:** Initials of the nurse administering the daily dose.
4.5 Discharge Treatment Plan

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

<table>
<thead>
<tr>
<th>Warfarin Discharge Plan</th>
<th>Dose</th>
<th>mg</th>
<th>Target INR</th>
<th>Duration</th>
<th>Next INR due</th>
<th>Prescriber</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Target INR: as above

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

Next INR: Date the next INR test is due.

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

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

4.6 Discharge Process

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

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

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

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

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

4.7 Discharge Supply

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

5.1 Best practice

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

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

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

5.2 Initial bolus dose Initial infusion rate

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>aPTT</th>
<th>Action required</th>
<th>Rate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;AA</td>
<td>80 units/kg bolus</td>
<td>Increase 4 units/kg/h</td>
</tr>
<tr>
<td>AA-BB</td>
<td>40 units/kg bolus</td>
<td>Increase 2 units/kg/h</td>
</tr>
<tr>
<td>BB-DD (Therapeutic range)</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>&gt;DD-EE</td>
<td>No change</td>
<td>Decrease 2 units/kg/h</td>
</tr>
<tr>
<td>&gt;EE</td>
<td>Hold infusion for 60 minutes</td>
<td>Decrease 3 units/kg/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>aPTT</th>
<th>Action required</th>
<th>Rate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;AA</td>
<td>60 units/kg bolus</td>
<td>Increase 3 units/kg/h</td>
</tr>
<tr>
<td>AA-BB</td>
<td>No change</td>
<td>Increase 2 units/kg/h</td>
</tr>
<tr>
<td>BB-CC (Therapeutic range)</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>&gt;CC-DD</td>
<td>No change</td>
<td>Decrease 1 units/kg/h</td>
</tr>
<tr>
<td>&gt;DD-EE</td>
<td>Hold infusion for 30 minutes</td>
<td>Decrease 2 units/kg/h</td>
</tr>
<tr>
<td>&gt;EE</td>
<td>Hold infusion for 60 minutes</td>
<td>Decrease 3 units/kg/h</td>
</tr>
</tbody>
</table>
Medical responsibilities include –

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

or

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

Nursing responsibilities include –

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

or

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

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

Measure platelets at baseline and at least twice weekly.

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

5.3 Reversing Heparin Treatment

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

5.4 Intravenous injection/infusion orders

<table>
<thead>
<tr>
<th>Target aPTT:</th>
<th>Indication:</th>
<th>Drug</th>
<th>Total dose (units)</th>
<th>Fluid</th>
<th>Volume (mL)</th>
<th>Signature</th>
<th>Print name</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Drug</td>
<td>Total dose (units)</td>
<td>Fluid</td>
<td>Volume (mL)</td>
<td>Signature</td>
<td>Print name</td>
<td>Contact</td>
<td></td>
</tr>
<tr>
<td>HEPARIN</td>
<td>25,000 units</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500 mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

**Indication:** Tick appropriate box.

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

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

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

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

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

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

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

5.5 Initial dose order and administration

<table>
<thead>
<tr>
<th>INITIAL BOLUS DOSE AND INITIAL INFUSION RATE</th>
<th>Prescriber to complete ORDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Baseline aPTT</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The prescriber should document:

**Date:** Date of order.

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

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

**Bolus dose (units):** Total number of units to be given by bolus. This should be based on the patient weight and indication.
Infusion rate (mL/hr): mL of prepared solution to be infused each hour. This should be based on the patient weight and indication.

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

The nurse administering the initial dose then documents:

Time: The time the therapy commenced.

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

5.6 Maintenance infusion rate and bolus doses

This section should be completed following each aPTT test.

Indication and weight based nomograms are provided on the chart. These allow nursing staff to make appropriate adjustments. These nomograms are only valid for 50 units/mL concentration.
The prescriber should complete the information on page 3:

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

**Date:** Date of the order.

**Prescriber:** Signature, Print name, Contact

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

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

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

### aPTT test

<table>
<thead>
<tr>
<th>aPTT test</th>
<th>Bolus and infusion rate administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Time Taken</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
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<td></td>
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</tbody>
</table>

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

### 5.7 Infusion change and bolus dose

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

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

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

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

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

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

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

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

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

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

**Dr Sign:** Each aPTT test result and subsequent action should be reviewed by the responsible prescriber.
### 5.8 Infusion bag changes

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

- **Date:** Date the bag was hung.
- **Time commenced:** Time infusion commenced.
- **Checked:** Name/signature of nurse checking infusion.
- **Given:** Name/signature of nurse putting up infusion.
- **Time completed:** Time the bag was removed.
- **Volume infused:** Total volume infused.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time Commenced</th>
<th>Checked</th>
<th>Given</th>
<th>Time Completed</th>
<th>Volume Infused (mL)</th>
<th>Date</th>
<th>Time Commenced</th>
<th>Checked</th>
<th>Given</th>
<th>Time Completed</th>
<th>Volume Infused (mL)</th>
</tr>
</thead>
</table>