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

<table>
<thead>
<tr>
<th>Medication</th>
<th>(n)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxycodone</td>
<td>220</td>
<td>4.9</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>184</td>
<td>4.1</td>
</tr>
<tr>
<td>Insulin</td>
<td>174</td>
<td>4.0</td>
</tr>
<tr>
<td>Enoxaparin sodium</td>
<td>121</td>
<td>2.7</td>
</tr>
<tr>
<td>Heparin</td>
<td>107</td>
<td>2.3</td>
</tr>
<tr>
<td>Morphine</td>
<td>103</td>
<td>2.3</td>
</tr>
<tr>
<td>Warfarin sodium</td>
<td>85</td>
<td>1.9</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>77</td>
<td>1.7</td>
</tr>
<tr>
<td>Amoxycillin</td>
<td>70</td>
<td>1.5</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>64</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1205</strong></td>
<td><strong>26.8</strong></td>
</tr>
</tbody>
</table>

- 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.
The front page

- **Pre-preservation screen**
- **Once only and telephone**
- **Regular dose prophylactic doses**
- **Regular dose orders**
- **Treatment doses**
- **Variable dose orders - warfarin**
<table>
<thead>
<tr>
<th>Recommendations for LMWH (enoxaparin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendations for warfarin</td>
</tr>
<tr>
<td>Updated Warfarin Reversal Guidelines</td>
</tr>
</tbody>
</table>
The middle pages -prescribing and administering IV heparin

- Prescription order
- Initial bolus and infusion rate
- Maintenance infusion rate and bolus dose
- Infusion bag changes
The middle pages-dosing recommendations

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

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

**Subcutaneous** unfractionated heparin

**Subcutaneous** enoxaparin or daltagarin 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).

---

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

<table>
<thead>
<tr>
<th>Regular Dose Orders - Prophylactic Doses (Subcutaneous and fixed dose oral anticoagulants)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YEAR 20</strong></td>
</tr>
<tr>
<td><strong>Date</strong></td>
</tr>
<tr>
<td><strong>CrCl mL/min</strong></td>
</tr>
<tr>
<td><strong>Indication:</strong> <strong>VTE PROPHYLAXIS</strong></td>
</tr>
<tr>
<td><strong>Prescriber Sign</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regular Dose Orders - Treatment Doses (Subcutaneous and fixed dose oral anticoagulants)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Date</strong></td>
</tr>
<tr>
<td><strong>CrCl mL/min</strong></td>
</tr>
<tr>
<td><strong>Indication:</strong> <strong>TREATMENT</strong></td>
</tr>
<tr>
<td><strong>Prescriber Sign</strong></td>
</tr>
</tbody>
</table>

Calculate and record Creatinine Clearance.

Record creatinine and platelets results.
### Example of Correct Use of Regular Dose Order Section

<table>
<thead>
<tr>
<th>REGULAR DOSE ORDERS - PROPHYLACTIC DOSES (Subcutaneous and fixed dose oral anticoagulants)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YEAR 2014</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication (Print generic name)</th>
<th>CrCl mL/min</th>
<th>Route</th>
<th>Dose Frequency NOW enter times</th>
<th>Indication: VTE PROPHYLAXIS</th>
<th>Prescriber Sign</th>
<th>Print name</th>
<th>Contact No.</th>
<th>Creatinine</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/4/14</td>
<td>Heparin (unfractionated)</td>
<td>68 mL/min</td>
<td>subcut</td>
<td>5000 Units BD</td>
<td>Pharmacy</td>
<td>D. Medic</td>
<td>D. medic</td>
<td>5555</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>27/4/14</td>
<td>Enoxaparin</td>
<td>66 mL/min</td>
<td>subcut</td>
<td>40 mg daily</td>
<td>Pharmacy</td>
<td>D. Medic</td>
<td>D. medic</td>
<td>5555</td>
<td>87</td>
<td>208</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication (Print generic name)</th>
<th>CrCl mL/min</th>
<th>Route</th>
<th>Dose Frequency NOW enter times</th>
<th>Indication: VTE PROPHYLAXIS</th>
<th>Prescriber Sign</th>
<th>Print name</th>
<th>Contact No.</th>
<th>Creatinine</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/4/14</td>
<td>Enoxaparin</td>
<td>66 mL/min</td>
<td>subcut</td>
<td>80 mg bd</td>
<td>Pharmacy</td>
<td>D. Medic</td>
<td>D. medic</td>
<td>5555</td>
<td>90</td>
<td>33</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication (Print generic name)</th>
<th>CrCl mL/min</th>
<th>Route</th>
<th>Dose Frequency NOW enter times</th>
<th>Indication: DVT TREATMENT</th>
<th>Prescriber Sign</th>
<th>Print name</th>
<th>Contact No.</th>
<th>Creatinine</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>30/4/14</td>
<td>Enoxaparin</td>
<td>66 mL/min</td>
<td>subcut</td>
<td>80 mg bd</td>
<td>Pharmacy</td>
<td>D. Medic</td>
<td>D. medic</td>
<td>5555</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Delivering a Healthy WA
Recommendations for Low Molecular Weight Heparin (LMWH)

- Dosing of LMWH (ie enoxaparin and dal塔parin) 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.

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**RECOMMENDATIONS FOR LOW MOLECULAR WEIGHT HEPARIN (LMWH)**

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

<table>
<thead>
<tr>
<th>INDICATION</th>
<th>Normal renal function*</th>
<th>Impaired renal function (CrCl &lt; 30 mL/min)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE prophylaxis</td>
<td>40 mg once daily</td>
<td>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>
<td>1 mg/kg once daily</td>
</tr>
<tr>
<td>Acute Coronary Syndrome/VTE treatment</td>
<td>1 mg/kg twice daily</td>
<td>1 mg/kg once daily</td>
</tr>
</tbody>
</table>

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

Seek advice on Dal塔parin (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, renal 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 Overdose**
- Seek specialist advice.
- As a guide: Give 1 mg protamine sulfate per 1 mg enoxaparin. Give half of the protamine dose as a slow IV push (10 minutes) 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 thrombocytopenia (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

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**WARFARIN VARIABLE DOSE ORDERS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Time</th>
<th>Brand</th>
<th>Dose</th>
<th>INR Result</th>
<th>Prescriber</th>
<th>Phone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>12/1</td>
<td>16:00</td>
<td>Morevan</td>
<td>5</td>
<td>1.1</td>
<td>AP</td>
<td>4152</td>
</tr>
</tbody>
</table>

Ciprofloxacin increasing INR

A. Prescriber 4152

Delivering a Healthy WA
Variable dose orders - Warfarin

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
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

<table>
<thead>
<tr>
<th>INTRAVENOUS PRESCRIPTION ORDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriber to complete. A new</td>
</tr>
<tr>
<td>prescription is required if</td>
</tr>
<tr>
<td>the order (total dose, fluid</td>
</tr>
<tr>
<td>or volume) is changed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Target aPTT:</th>
<th>Indication:</th>
<th>Weight:</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-105</td>
<td>VTE</td>
<td>74 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</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>31.8.12</td>
<td>HEPARIN</td>
<td>25,000 units</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500 mL</td>
<td>A.Doctor</td>
<td>A.Doctor</td>
<td>4025</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INITIAL BOLUS DOSE AND INITIAL INFUSION RATE</th>
<th>Prescriber to complete ORDER</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Baseline aPTT</th>
<th>Date/Time of dose</th>
<th>Initial Bolus (units)</th>
<th>Initial Infusion Rate (mL/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.8.12</td>
<td>42</td>
<td>31.8.12 0200</td>
<td>6000 units</td>
<td>27mL/hr</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAINTENANCE INFUSION RATE CHANGES AND BOLUS DOSES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Prescriber signature</th>
<th>Print Name</th>
<th>Contact</th>
<th>Pharmacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.8.12</td>
<td>A. Doctor</td>
<td>A. Doctor</td>
<td>4025</td>
<td>P.Harmacist</td>
</tr>
</tbody>
</table>
## VTE Nomogram

### Initial Order

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>&lt;40 kg</th>
<th>45 kg</th>
<th>50 kg</th>
<th>55 kg</th>
<th>60 kg</th>
<th>65 kg</th>
<th>70 kg</th>
<th>75 kg</th>
<th>80 kg</th>
<th>85 kg</th>
<th>90 kg</th>
<th>≥95 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>3200</td>
<td>3600</td>
<td>4000</td>
<td>4400</td>
<td>4800</td>
<td>5200</td>
<td>5600</td>
<td>6000</td>
<td>6400</td>
<td>6800</td>
<td>7200</td>
<td>7200</td>
</tr>
<tr>
<td>Rate (mL/hr)</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>23</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

### Maintenance Order

<table>
<thead>
<tr>
<th>aPTT</th>
<th>Dose Adjustment</th>
<th>Rate change (mL/hour)</th>
<th>Re-measure aPTT within 6 hours of each rate change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; Aa</td>
<td>80 units/kg bolus (as per initial bolus) plus increase rate by 4 units/kg/hour</td>
<td>+3</td>
<td>+4</td>
</tr>
<tr>
<td>Bb – Cc</td>
<td>40 units/kg bolus (half initial bolus) plus increase rate by 2 units/kg/hour</td>
<td>+2</td>
<td>+2</td>
</tr>
<tr>
<td>Dd – Ee</td>
<td>No change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fr – Gg</td>
<td>Reduce 2 units/kg/hour</td>
<td>-2</td>
<td>-2</td>
</tr>
<tr>
<td>Hh – Jj</td>
<td>Contact Doctor, hold 60 minutes then reduce 3 units/kg/hour</td>
<td>-2</td>
<td>-3</td>
</tr>
</tbody>
</table>
Maintaining the infusion regimen using the weight based nomogram and weight based guide

<table>
<thead>
<tr>
<th>Date</th>
<th>Time Taken</th>
<th>aPTT</th>
<th>Time</th>
<th>IV bolus (units)</th>
<th>Bolus (Sign)</th>
<th>Hold (minutes)</th>
<th>Time stopped</th>
<th>Hold (Sign)</th>
<th>Time started</th>
<th>New Rate (mL/hour)</th>
<th>Rate (Sign)</th>
<th>Prescriber Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>31/8</td>
<td>0800</td>
<td></td>
<td></td>
<td>6000</td>
<td>AL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0800</td>
<td>27</td>
<td>KC</td>
</tr>
<tr>
<td>31/8</td>
<td>1400</td>
<td>110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1430</td>
<td>27</td>
<td>KF</td>
</tr>
<tr>
<td>31/8</td>
<td>0800</td>
<td>62</td>
<td>0830</td>
<td>3000</td>
<td>DA</td>
<td>SW</td>
<td></td>
<td></td>
<td></td>
<td>0830</td>
<td>30</td>
<td>DA</td>
</tr>
<tr>
<td>31/8</td>
<td>2000</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2030</td>
<td>27</td>
<td>KW</td>
</tr>
</tbody>
</table>

**27 + 3**

**30 - 3**
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 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.
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
Minimising Risks with Anticoagulants

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

- 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
  
  ![Marevan tablets](image1)

- Multiple strengths of heparin available
  
  ![Heparin injection](image2)

- Confusion with other medications
  
  ![Medication bottles](image3)
# Warfarin Reversal (Over-treatment)

## Reversing Warfarin Over-treatment

(bleeding risk increases exponentially from INR 5 to 9. Monitor closely INR ≥ 6)

<table>
<thead>
<tr>
<th>Clinical Setting</th>
<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></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 (Low risk)</td>
<td>Absent</td>
<td>Stop</td>
<td></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>Absent (High Risk)*</td>
<td>Stop</td>
<td>1–2 mg (oral)¹</td>
<td></td>
<td></td>
<td></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 (Low risk)</td>
<td>Stop</td>
<td>2.5–5 mg (oral)¹</td>
<td>Or 0.5-1 mg IV²</td>
<td></td>
<td></td>
<td>Measure INR in 6–12 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
<tr>
<td>Absent (High Risk)*</td>
<td>Stop</td>
<td>1 mg (IV)</td>
<td></td>
<td>Consider 25 IU/kg ³, ⁴ See weight based nomogram</td>
<td></td>
<td>Measure INR in 6–12 hours. Resume warfarin at reduced dose when INR is within the therapeutic range.</td>
</tr>
<tr>
<td>Clinically significant bleeding where warfarin is a contributing factor.</td>
<td>Stop</td>
<td>5 – 10 mg (IV)²</td>
<td>25 IU/kg ³, ⁴ See weight based nomogram</td>
<td></td>
<td></td>
<td>Assess patient continuously until INR &lt; 5 and bleeding stops. Reassess need for warfarin therapy with supervising team. If Prothrombinex VF is unavailable, give FFP (10–15mL/kg)⁵ in addition to vitamin K. FFP (10–15mL/kg)⁵ should be considered in addition to Prothrombinex VF for high risk bleeding e.g. ICH or massive haemorrhage.</td>
</tr>
</tbody>
</table>

**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
- Alcohol abuse
- Antiplatelet therapy
- Other relevant co-morbidity
Reversal of Heparin Over-treatment

Information found on page 3 of chart

Unfractionated heparin for subcutaneous or infusion

<table>
<thead>
<tr>
<th>Reversing heparin treatment</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Reversing Over-treatment</th>
<th>Seek specialist advice.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As a guide: Give 1mg protamine sulfate per 1mg enoxaparin. Give half of the protamine dose as a slow IV push (10 minutes) and the remainder as an infusion (5% glucose or 0.9% sodium chloride) over 6-8 hours.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Withholding LMWH prophylaxis and treatment prior and post invasive procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>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).</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Consider longer exclusion periods in the presence of complications or high risk of bleeding.</td>
</tr>
</tbody>
</table>
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
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- 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