HEPARIN SODIUM FOR INTRAVENOUS ADMINISTRATION

INTRODUCTION
Heparin prevents the conversion of prothrombin to thrombin and fibrinogen by increasing the activity of antithrombin III. This action prevents the formation of fibrin clot thus prevents the extension of already formed clots and the formation of fresh clot. The effect of standard heparin is measured by the APTT.

INDICATIONS:
- Atrial Fibrillation
- Pulmonary embolism
- Deep venous thrombosis
- Ventricular thrombi
- Valvular replacement
- Acute coronary syndromes
- Control of DIC

CONTRAINDICATIONS:
- Recent cerebral haemorrhage
- Recent trauma or surgery to brain, spinal cord or eyes
- Active peptic ulceration
- Bleeding disorders
- Uncontrolled hypertension
- Renal or Hepatic disease
- Bacterial endocarditis
- Previous heparin induced thrombocytopenia

PRECAUTIONS:
- Hypersensitivity reactions
- Heparin induced thrombocytopenia and thrombosis syndrome: see HITS guideline. Measure platelets 24 hours after commencing heparin and every second day thereafter. A fall of 15% or 20,000 whichever is lesser should be discussed with haematology and the platelet count repeated in 12 hours.
- Epidural/spinal anaesthesia (confirm with anaesthetic team if current or recent epidural/spinal therapy involved)
- Severe renal or hepatic disease.
- Avoid intramuscular injection.

PREGNANCY
Heparin does not cross the placenta during pregnancy. Care should be taken when using weight based protocols, taking into account the weight of the conceptus. A reduction from actual weight of 5–10 kg may be appropriate for calculating the heparin loading and starting dose.

Anticoagulation in the immediate post-partum period is associated with a significant risk of bleeding. Close clinical observation is required and all such patients should be managed in the ACC.
HEPARIN SODIUM FOR INTRAVENOUS ADMINISTRATION  cont’d

OVERDOSAGE
The usual sign of overdose is bleeding or haemorrhage eg bleeding from venepuncture sites or recent surgical sites, nosebleeds, vaginal bleeding, bruising, haematuria and melaena.
If bleeding occurs: Turn off infusion. Contact MO. Check APTT urgently. Protamine sulfate is used to neutralise the anticoagulant effects of heparin.

INCOMPATIBLE DRUGS- Heparin is incompatible with several drugs refer to Australian Injectable Drug Handbook via CIAP for details. Do not administer any other intravenous medications via the infusion line whilst a heparin infusion is in progress.

COMPATIBLE FLUIDS- Sodium chloride 0.9%, Glucose 5% and Hartmanns solution.

PROTOCOL
Depending on the indications for heparin, less or more intensive anticoagulation may be required. For venous thromboembolism (VTE) and atrial fibrillation (AF), a higher therapeutic range is required compared with arterial thromboembolism eg angina, myocardial infarction, TIA or stroke.

The following protocols are used for:
Protocol 1: Venous thromboembolism, atrial fibrillation requiring full anticoagulation
Protocol 2A: ST elevated myocardial infarction (STEMI)
Protocol 2B: Non-ST elevated myocardial infarction (non-STEMI) or cerebrovascular accident with atrial fibrillation (CVA with AF).

PRESCRIBING PROCEDURE:
Obtain patient weight and document on Intravenous Heparin Chart.
The MO must order the baseline APTT and FBC.
MO is to document the protocol to be followed, prescribe the bolus dose and initial heparin infusion rate on the Intravenous Heparin Chart. NB prescribing heparin infusions on the fluid chart using the abbreviation APP is not adequate.

BOLUS
Select appropriate protocol 1, 2A or 2B.
To administer an intravenous bolus of heparin, calculate the bolus dosage per body weight as specified in column 2 of the relevant table. Use heparin 5000 units in 1mL amps for bolus dosing.
Flush the line with 5-10mL sodium chloride 0.9% pre and post injection.
Up to 10000 units of heparin sodium can be delivered as a bolus, undiluted over 3 minutes.

Anticoagulation in the immediate post-partum period is associated with a significant risk of bleeding. Close clinical observation is required and all such patients should be managed in the ACC.

INFUSION
Obtain a prefilled bag of heparin 25,000 units in 250mL sodium chloride 0.9% from the below locations:
- Pharmacy
- After hours drug cupboard
- Acute care
HEPARIN SODIUM FOR INTRAVENOUS ADMINISTRATION  cont’d

Administer heparin via an infusion pump through a peripheral or central venous access. Heparin must have its own designated line and lumen if CVL used and cannula if peripheral line used. The APTT must be ordered and checked by the MO 4 or 6 hours (depending on the protocol) after commencement of the infusion. Phlebotomy is performed on opposite limb to the infusion.

The heparin infusion rate is adjusted according to the nomogram which also indicates when further APTT estimations should be ordered and performed. Ensure the correct dosage adjustment nomogram is followed for the correct protocol 1, 2A or 2B. All changes in the heparin infusion rate must be documented on the Intravenous Heparin Chart and both the chart and infusion pump must be checked by two RNs. The MO is responsible for ordering and checking results of all APTTs at least once every 24 hours. This should be documented on the Intravenous Heparin Chart under the “IV heparin infusion rate order record”. Heparin infusions are discontinued without weaning.

REFERENCES
POWH Intravenous Heparin Infusion policy.

RELATED GUIDELINES
1. Warfarin
2. Anticoagulation in the perioperative period (bridging anticoagulation)
3. HITS

Risk rating: Extreme- review in 12 months

REVISION & APPROVAL HISTORY
Reviewed and Endorsed Therapeutic & Drug Utilisation Committee 14/10/14
Approved Quality & Patient Safety Committee 15/7/10
Reviewed and Endorsed Therapeutic & Drug Utilisation Committee 20/4/10
Approved Quality Council 18/7/05

FOR REVIEW : OCTOBER 2015
PROTOCOL 1: HEPARIN PROTOCOL FOR VTE OR AF REQUIRING FULL ANTICOAGULATION

- Administer bolus dose using heparin 5000 units in 1mL amps (if required)
- Obtain a prefilled bag of heparin 25,000 units in 250mL sodium chloride 0.9%. Commence as per Table 1.

Table 1.

<table>
<thead>
<tr>
<th>WEIGHT (kg)</th>
<th>BOLUS (units)</th>
<th>Infusion rate (units per hour)</th>
<th>Infusion pump rate (mL per hour)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3500</td>
<td>900</td>
<td>9</td>
</tr>
<tr>
<td>55</td>
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</tr>
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<td>5000</td>
<td>1350</td>
<td>13</td>
</tr>
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<td>1530</td>
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<td>90</td>
<td>5000</td>
<td>1620</td>
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<td>95</td>
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<tr>
<td>100</td>
<td>7500</td>
<td>1800</td>
<td>18</td>
</tr>
<tr>
<td>110</td>
<td>7500</td>
<td>1980</td>
<td>20</td>
</tr>
<tr>
<td>&gt;120</td>
<td>7500</td>
<td>2100</td>
<td>21</td>
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</tbody>
</table>

*Perform APTT after 6 hours and adjust dose as per Table 2.

DOSAGE ADJUSTMENTS FOR PROCOTOL 1

Based on infusion of heparin 25,000 units in 250mL of sodium chloride 0.9%

Table 2.

<table>
<thead>
<tr>
<th>APTT (seconds)</th>
<th>Bolus Dose IV</th>
<th>Stop Infusion</th>
<th>IV Rate Change (mL/hr)</th>
<th>Repeat APTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 35</td>
<td>5,000 units</td>
<td>NO</td>
<td>Increase rate by 1mL/hr from current rate</td>
<td>6 hours</td>
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<tr>
<td>35-44</td>
<td>Nil</td>
<td>NO</td>
<td>Increase rate by 1mL/hr from current rate</td>
<td>6 hours</td>
</tr>
<tr>
<td>45-90</td>
<td>Therapeutic Range – No Change from current rate</td>
<td>Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91-95</td>
<td>Nil</td>
<td>NO</td>
<td>Increase rate by 1mL/hr from current rate</td>
<td>6 hours</td>
</tr>
<tr>
<td>96-105</td>
<td>Nil</td>
<td>NO</td>
<td>Increase rate by 2mL/hr from current rate</td>
<td>6 hours</td>
</tr>
<tr>
<td>&gt; 105</td>
<td>Nil</td>
<td>Stop infusion for 90 minutes (then repeat APTT) Inform RMO</td>
<td>Restart after 2 hours at 2mL/h less than previous rate until APTT is available, then as per nomogram.</td>
<td>90 min after stopping and 6 hrs after recommencing</td>
</tr>
</tbody>
</table>
PROTOCOL 2A: HEPARIN PROTOCOL FOR STEMI

- Administer bolus dose using heparin 5000 units in 1mL amps (if required)
- Obtain a prefilled bag of heparin 25,000 units in 250mL sodium chloride 0.9%. Commence as per Table 3

**Table 3.**

<table>
<thead>
<tr>
<th>WEIGHT (kg)</th>
<th>BOLUS (units)</th>
<th>Infusion rate (units per hour)</th>
<th>Infusion pump starting rate (mL per hour)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3000</td>
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<td>10</td>
</tr>
<tr>
<td>&gt;80</td>
<td>4000</td>
<td>1000</td>
<td>10</td>
</tr>
</tbody>
</table>

*Perform APTT after 6 hours and adjust dose as per following Table 5.

PROTOCOL 2B: HEPARIN PROTOCOL FOR NON-STEMI OR CVA WITH AF

- Administer bolus dose using heparin 5000 units in 1mL amps (if required)
- Obtain a prefilled bag of heparin 25,000 units in 250mL sodium chloride 0.9%. Commence as per Table 4.

**Table 4.**

<table>
<thead>
<tr>
<th>WEIGHT (kg)</th>
<th>BOLUS (units)</th>
<th>Infusion rate (units per hour)</th>
<th>Infusion pumps starting rate (mL per hour)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3000</td>
<td>750</td>
<td>7</td>
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<tr>
<td>55</td>
<td>3300</td>
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<td>3600</td>
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<tr>
<td>75</td>
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<td>1000</td>
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<td>4800</td>
<td>1000</td>
<td>10</td>
</tr>
<tr>
<td>&gt;80</td>
<td>5000</td>
<td>1000</td>
<td>10</td>
</tr>
</tbody>
</table>

*Perform APTT after 6 hours and adjust dose as per Table 5.
Table 5.

<table>
<thead>
<tr>
<th>APTT (seconds)</th>
<th>Bolus Dose IV</th>
<th>Stop Infusion</th>
<th>IV Rate Change (mL/hr)</th>
<th>Repeat APTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;45</td>
<td>Nil</td>
<td>NO</td>
<td>Increase rate by 1mL/hr from current rate</td>
<td>6 hours</td>
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<tr>
<td>45-70</td>
<td>Therapeutic Range - No Change from current rate</td>
<td>Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71-90</td>
<td>Nil</td>
<td>NO</td>
<td>Decrease rate by 1mL/hr from current rate</td>
<td>6 hours</td>
</tr>
<tr>
<td>91-105</td>
<td>Nil</td>
<td>NO</td>
<td>Decrease rate by 2mL/hr from current rate</td>
<td>6 hours</td>
</tr>
<tr>
<td>&gt; 105</td>
<td>Nil</td>
<td>Stop infusion for 90 minutes (then repeat APTT) Inform RMO</td>
<td>Restart after 2hours at 2mL/h less than previous rate until APTT is available, then as per nomogram</td>
<td>90 mins after stopping and 6 hrs after recommencing</td>
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