1.0 OUTCOME
The patient requiring an intravenous (IV) Heparin infusion will be safely and effectively managed and a therapeutic activated partial thromboplastin time (APTT), usually 60-85 seconds, will be achieved in an optimal timeframe.

2.0 POLICY
2.1 An IV Heparin infusion is to be administered in accordance with the Intravenous Medicines Policy, CP/Pol/M1.1.

2.2 This policy does not include Heparin Infusions used for the for Management of Intra Aortic Balloon Pumps, Renal Replacement Therapy (eg. CVVHD), and Atrial and Ventricular Assist Devices.

2.3 An IV heparin infusion is ONLY to be administered following the written order of a Medical Officer (MO) on the Medication Chart (13130/N60/P430) and 24 Hour Fluid Record and Intravenous Order Chart (P460/B140).

2.4 An infusion pump is to be used for the administration of an IV heparin infusion.

2.5 An IV heparin infusion is to be administered via a dedicated peripheral or central IV administration set with the following exception only.

In the following areas, ICU, CCU, ED and Operating Theatres, a Heparin infusion does not require a dedicated line if the Heparin infusion is administered in conjunction with a compatible fluid +/- additive. However the administration of a bolus dose of medicine is not permitted through a Heparin infusion line.

2.6 If the IV Heparin infusion is in progress for more than three (3) days, the platelet count of the patient is to be checked 3 times a week (Monday/Wednesday/Friday).

2.7 When Heparin is adjunctive therapy with Tenecteplase (thrombolysis) refer to the
product information for prescription details.

- For patients already receiving Heparin treatment, an initial bolus should not be given.
- For patients weighing less than 67kg, an initial intravenous Heparin bolus not exceeding 4,000IU is recommended, followed by not more than an 800IU/hour infusion.
- For patients weighing 67kg or more, an initial intravenous Heparin bolus not exceeding 5,000IU is recommended, followed by not more than a 1000IU/hour infusion.
- The product information on Tenecteplase recommends an APTT of 50-75 seconds when Heparin is used as adjunctive therapy.

3.0 SCOPE OF POLICY
This policy covers the responsibilities of MOs, Registered Nurses (RNs) and Pharmacists in the management of the patient with an IV heparin infusion.

4.0 DEFINITION
4.1 A dedicated IV administration set is used solely for the administration of the fluid/medicine being infused, which in this case is heparin. No bolus injections of fluids/medicines are to be made into the set. No secondary (piggyback) IV administration sets are to be connected to the dedicated IV administration set.

4.2 APTT is an abbreviation for Activated Partial Thromboplastin Time.

5.0 INDICATIONS
5.1 Venous thrombosis {Deep vein thrombosis (DVT)}
5.2 Venous thromboembolism {Pulmonary embolism (PE)}
5.3 Arterial thrombosis {Unstable angina pectoris, AMI (selected), incomplete non-haemorrhagic cerebral infarction, peripheral arterial thrombosis}
5.4 Arterial thromboembolism
5.5 Atrial Fibrillation
5.6 Thromboembolic episodes with patients with Mitral Valve Disease

6.0 RESPONSIBILITY
6.1 The MO is responsible for ordering the IV heparin infusion and reconfirming the IV heparin infusion order each morning.
- The order is to be written on the Variable Dose section of the Medication Chart. The desired therapeutic APTT range is to be stated beside the order. The starting rate of the infusion is to be specified in ml/hr.
- The order is to be written on the 24-Hour Fluid Record and Intravenous Order Chart. In the designated ml/hr section, the starting rate of the infusion is to be...
specified followed by 'Then titrate rate as per protocol' to enable the ml/hr to be adjusted according to APTT results as per Table 2 overleaf. (Eg. '7ml/hr, then titrate rate as per protocol')

6.2 The MO is responsible for ensuring that APTTs are attended, as indicated, according to this policy.

6.3 The MO is responsible for acting as a second person in estimating patient weight, if patient is non-weight bearing.

6.4 When any of the following actions are attended by a RN, a second person, either a RN or a MO, is to check and record the action/s:
   - Starting the IV heparin infusion
   - Checking the APTT result
   - Changing the IV Heparin infusion rate
   - Changing the IV Heparin infusion flask (fluid bag)

6.5 The RN is responsible for adjusting the rate of the IV heparin infusion, as indicated, as per Table 2 or as per the MO's order.

6.6 The RN is to follow-up APTT results according to laboratory turnaround times and act upon APTT results as per 9.0 or the MO's order.

6.7 The RN is to notify the MO if the IV heparin infusion rate exceeds 11mL/hr and/or the APPT is greater than 100 seconds.

6.8 The clinical pharmacist is responsible for reviewing heparin orders with regard to legality, dosage, adverse drug reactions and compatibility’s during normal working hours.

7.0 PRESCRIBING OF IV HEPARIN INFUSION

7.1 The MO is to consider a lower desired therapeutic range in the following circumstances:
   - Age over 80 years
   - Haemoglobin less than 100
   - Serum creatinine greater than 0.15
   - Thrombocytopenia
   - Severe liver disease and/or prolonged prothrombin time (PT)
   - Risk of haemorrhage in Cerebral Vascular accident.
   - Moderate sized embolic cerebral infarction.

7.2 The MO is to consider that PE is usually associated with an increased heparin requirement during the acute phase.

8.0 COMMENCEMENT OF IV HEPARIN INFUSION

8.1 15,000 units of heparin sodium is to be added to 100mL 5% dextrose or 100mL 0.9% sodium chloride, as prescribed.
8.2 The starting rate of the infusion is to be determined according to the patient's weight as per Table 1 overleaf or as otherwise ordered by the MO if a lower therapeutic APTT range is desired.

8.3 If the patient is unable to be weighed, eg. the non-weight-bearing patient, the patient's weight is to be estimated. Two people, a RN and a MO, are to concur on an estimate of the patient's weight and document the estimated weight, including initialling the documentation and identifying it as an estimate.

8.4 The patient's weight (actual or estimated) is to be documented in whole numbers (round up or down to the nearest figure) on the Fluid Summary Urinalysis Chart (B150/P500).

8.5 For the patient admitted to the hospital with an IV heparin infusion in progress, at the time of admission the infusion is to be changed, so that it complies with this policy. The rate is to be calculated by the MO to give the equivalent dose according to this policy.

8.6 The commencement of an IV heparin infusion is to be recorded on the Variable Dose section of the Medication Chart. The starting date and time and starting rate are to be recorded. The starting rate is to be recorded in the row titled 'DOSE'.

Following a written order from a MO, if a RN is commencing the IV Heparin infusion the commencement is to be checked and recorded by a second person, either a RN or a MO. The two people are to initial the recordings in the row titled 'GIVEN BY'.

8.7 The commencement of an IV heparin infusion is to be recorded on the 24-Hour Fluid Record and Intravenous Order Chart.

**Table 1: Starting Rate of IV Heparin Infusion Based on Weight of the Patient**

<table>
<thead>
<tr>
<th>Patient Weight</th>
<th>Starting Rate of Infusion</th>
<th>Units Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-54 kg</td>
<td>5mL/hr</td>
<td>18,000</td>
</tr>
<tr>
<td>55-64 kg</td>
<td>6mL/hr</td>
<td>21,600</td>
</tr>
<tr>
<td>65-74 kg</td>
<td>7mL/hr</td>
<td>25,200</td>
</tr>
<tr>
<td>75-84 kg</td>
<td>8mL/hr</td>
<td>28,800</td>
</tr>
<tr>
<td>85-94 kg</td>
<td>9mL/hr</td>
<td>32,400</td>
</tr>
<tr>
<td>94+ kg</td>
<td>10mL/hr</td>
<td>36,000</td>
</tr>
</tbody>
</table>

9.0 CHECKING APTT

9.1 Until the patient reaches a therapeutic dose as per Table 2 all APTT samples are to be sent as urgent specimens to the laboratory

- The turnaround time for interpretation of urgent APTT results is 75 minutes
- The turnaround time for interpretation of non urgent APTT results is 2 hours

9.2 Initial APTT check is to be attended four (4) hours after the commencement of IV Heparin Infusion (send as an urgent sample)

9.3 Until APTT is therapeutic, APTTs are to be checked as per Table 2 or as per MO's order (send as urgent samples).
9.4 When APTT is therapeutic, APTT is to be routinely checked daily (non-urgent sample).

9.5 When the APTT result is checked on the computer (see 9.1 for turnaround times for interpreting APTT results):

9.5.1 The result is to be recorded on the Variable Dose section of the Medication chart. The APTT result and time result interpreted are to be recorded in the row titled 'LAB RESULT' and the infusion rate is to be recorded in the row titled 'DOSE'.

9.5.2 If a change of IV heparin infusion rate is required, the APTT result and time of action are to be recorded as per 9.5.1. The rate change is to be recorded in the row titled 'DOSE'. An (↑ arrow or ↓ arrow) is to be used to identify rate increase or decrease and the new rate of the infusion is to be recorded.

9.5.3 If a RN is checking the APTT result on the computer, a second person, either a RN or a MO, must also check the result and any change of IV Heparin infusion rate and both persons are to initial in the row titled 'GIVEN BY'.

10.0 ACTIONS BASED ON APTT RESULT

10.1 If APTT is between 60-85 seconds, the IV heparin infusion is to continue at the current rate.

10.2 If APTT is not within the range of 60-85 seconds, actions are to be taken as per Table 2, with the exceptions of patients on the Intra Aortic Balloon Pump (IABP) and when a lower therapeutic APTT range is specified.

10.3 For patients on the IABP:
- If APTT > 85 seconds, do NOT turn off the IV heparin infusion. Decrease the rate of infusion by 1mL/hr and notify the Physician/Registrar. Specific APTTs may need to be ordered on the Variable Dose section of the Medication Chart.
- If APTT < 60 seconds, alter infusion rate as per Table 2.

<table>
<thead>
<tr>
<th>APTT (Seconds)</th>
<th>Action to be Taken by RN</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100</td>
<td>Cease IV heparin and inform MO immediately</td>
</tr>
<tr>
<td>86-100</td>
<td>Cease IV heparin for 2 hours. Then restart infusion at 1mL/hr less than previous rate. Recheck APTT in 4 hours.</td>
</tr>
<tr>
<td>60-85</td>
<td>Therapeutic dose. Continue at the same rate as when APTT collected. Patient needs daily APTT.</td>
</tr>
<tr>
<td>40-59</td>
<td>Increase infusion rate by 1mL/hr and repeat APTT in 4 hours.</td>
</tr>
<tr>
<td>&lt; 40</td>
<td>Increase infusion rate by 2mL/hr and repeat APTT in 4 hours. After 4 hours, if APTT is still less than 50 seconds, inform MO.</td>
</tr>
</tbody>
</table>
11.0 CHANGING IV HEPARIN INFUSION RATE
11.1 If a RN is changing the IV Heparin infusion rate, a second person, either a RN or a MO, is to check the fluid bag, dose of heparin in the fluid bag, patient identification and the infusion rate change. This change is to be recorded as per 9.5.2.

12.0 CROSS REFERENCES
- Clinical Practice Manual: Infusion Pumps, NP/Pol/I3; NP/Proc/I3.1, St Vincent's Hospital Sydney (1999)
- Clinical Practice Manual: Intravenous Medicines, CP/Pol/M1.1, St Vincent's Hospital Sydney (2001)
- Coronary Care Unit Policy and Procedure Manual, Thrombolysis, St Vincent's Hospital Sydney (2001)

13.0 REFERENCES

14.0 ENDORSED BY
- Director of Vascular Medicine, St Vincent's Hospital Sydney
- Director of Cardiology, St Vincent's Hospital Sydney
- Director of Haematology, St Vincent's Hospital Sydney
- Drug Committee, St Vincent's Hospital Sydney
- Director of Neurology, St Vincent’s Hospital Sydney