

SESLHD PROCEDURE COVER SHEET



Health
South Eastern Sydney
Local Health District

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EXECUTIVE SPONSOR or EXECUTIVE CLINICAL SPONSOR	Director, Clinical Governance and Medical Services
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FUNCTIONAL GROUP(S)	Nursing and Midwifery Medicine Cardiac and Respiratory
KEY TERMS	Heparin Intravenous Intravenous Heparin Heparin Infusion
SUMMARY	<p>The procedure provides instructions on how to initiate, adjust the infusion rate and monitor a therapeutic heparin sodium infusion for optimal patient outcomes and safety. This document contains <u>updated IV Heparin Protocols</u> based on the Intravenous Unfractionated Heparin Recommended Standard – Clinical Excellence Commission 2018.</p> <p>Protocols updated</p> <ul style="list-style-type: none"> • <u>VTE ATE AF & other conditions protocol by the Standard Risk protocol</u> • <u>STEMI (in conjunction with thrombolysis) protocol by the Higher Bleeding Risk protocol</u>

COMPLIANCE WITH THIS DOCUMENT IS MANDATORY

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1. POLICY STATEMENT

Patients requiring therapeutic anticoagulation with intravenous heparin sodium (IV heparin) will be managed safely according to evidence based research. The treatment of patients requiring anticoagulation with IV heparin must be in accordance with the [NSW Ministry of Health Policy Directive PD2020_045 - High Risk Medicines Management](#) and [NSW Ministry of Health Policy Directive PD2013_043 - Medication Handling in NSW Public Health Facilities](#) and one of the approved SESLHD IV heparin infusion protocols.

The approved IV Heparin infusion protocols in SESLHD are:

- Standard Risk Protocol – used in conditions such as atrial fibrillation, venous or arterial thromboembolic disease and prosthetic heart valves where intravenous heparin therapy is indicated.
- Higher Bleeding Risk Protocol – used in conditions where risk of bleeding needs to be minimised such as acute coronary syndrome when intravenous heparin therapy is indicated.
- Acute Stroke Protocol - only used following consultation with the Attending Medical Neurologist.

The SESLHD IV heparin infusion protocols include:

- Dosing calculated by measured body weight¹ and
- Infusion rate adjustments according to Activated Partial Thromboplastin Time (APTT) and clinical condition.

Only nurses/ midwives, who have successfully completed the SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Learning Package* and medical officers, can titrate a heparin infusion.

2. BACKGROUND

Anticoagulants including IV heparin are high risk medicines with a narrow therapeutic index. Over or under coagulation may result in significant adverse patient outcomes.^{2 3}

The use of specific protocols, which include evidence based instruction on heparin dose calculation, will ensure consistency of practice and protect against risks associated with over or under anticoagulation.

3. AIM

The therapeutic APTT range will be reached within optimal time and then be maintained while the patient requires continuation of IV heparin therapy.

Therapeutic anticoagulation with IV heparin should only be commenced where the benefits clearly outweigh the risks of therapy.

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Standardisation documentation related to IV heparin, on the SESLHD *Intravenous Heparin Sodium* chart, will improve management of IV heparin therapy.

4. DEFINITIONS

Anticoagulant	Any agent used to prevent the formation of blood clots including oral agents such as warfarin or a non-vitamin K oral antagonist anticoagulant (NOAC), and other medications which are injected into the vein or under the skin such as heparin
APTT	Activated Partial Thromboplastin Time Clotting time performed to monitor the anticoagulant effect of IV heparin
Clinician	Refers to medical or nursing staff administering intravenous heparin to patients within a SESLHD facility
HIT	Heparin-Induced Thrombocytopenia is an uncommon but serious complication of heparin therapy. It is characterised by the development of thrombocytopenia typically after five to ten days of IV heparin therapy and the unexpected development of arterial and/or venous thromboembolism. The mortality of HIT is approximately 30%. ²
Must	Indicates a mandatory action required by a NSW Health policy directive, law or industrial instrument
Premixed heparin sodium solution	A manufactured preparation of heparin sodium ready for infusion without further dilution, with full labelling and expiry dating
Should	Indicates an action that should be followed unless there are sound reasons for taking a different course of action

5. RESPONSIBILITIES

5.1 Medical Officers (MO) will:

- Include an IV Heparin overview/update during clinical handover (high risk medicine alert)
- Understand and implement the principles of safe use of IV heparin. This includes understanding the contraindications and precautions, interactions with other medications and the patient's clinical condition.
- Undertake a risk assessment approach to anticoagulation with IV heparin which includes patient specific factors such as age, contraindications, renal function, bleeding risk, falls risk and other medications or disease factors.
- Specify the *clinical indication* and the *name* of the IV heparin infusion protocol to be used on the SESLHD *Intravenous Heparin Sodium* chart.
- Ensure mandatory baseline bloods are ordered and the results are reviewed.

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- Prescribe the initial infusion rate according to measured body weight as specified in the relevant protocol.
- Order ongoing APTT blood tests as per the relevant protocol.
- Check APTT blood results within one to two hours of collection and adjust infusion rate as per the relevant protocol in conjunction with the responsible Registered Nurse (RN)/Registered Midwife (RM).
- Repeat platelet count every three days to check for development of HIT. ²
- Review the patient at least once every 24 hours for efficacy of treatment and/or adverse outcome i.e. abnormal bleeding or bruising or clot extension. See Management of Bleeding 7.10
- Escalate any adverse events occurring to patients receiving IV heparin
- Admitting Medical Officers (AMO), or Registrar acting on their behalf, may only deviate from the approved protocol if clinically appropriate. The reason for deviation and specific instructions for the administration of the altered regimen must be documented by the AMO in the patient's health care record and explained to nursing and medical staff caring for the patient.

5.2 Registered Nurses (RN)/Registered Midwives (RM) will:

- Include an IV Heparin overview/update during clinical handover (high risk medicine alert)
- Understand and implement the principles of safe use of anticoagulants and IV heparin
- Ensure blood samples for APTT monitoring are collected within the time limit specified on the protocol.
- Check APTT results within one to two hours of collection and action any infusion adjustment in conjunction with the MO.
- Review the patient for abnormal bleeding or bruising or thrombosis extension. See Management of Bleeding 7.10
- Achieve competency in managing IV heparin before titrating an IV heparin infusion
- Escalate any adverse events occurring to patients receiving IV heparin to treating team.

5.3 Enrolled Nurses (ENs) will:

- Include an IV Heparin overview/update during clinical handover (high risk medicine alert)
- Understand and implement the principles of safe use of anticoagulants and IV heparin
- ENs without a notation who have completed the board approved additional units of study required for administration of intravenous medication and who have completed the *SESLHD Anticoagulation with Intravenous Heparin Sodium Infusion Learning Package* can witness the checking of an IV heparin infusion.
- Refer to and adhere with [SESLHDPD/160 - Medication: Administration by Enrolled Nurses](#) –for the EN scope of practice.

5.4 Pharmacists will:

- Understand and implement the principles of safe use of anticoagulants and IV heparin
- Clinically review IV heparin treatment and provide appropriate advice to the clinical team as required

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- Assist with appropriate patient education regarding anticoagulation
- Report any adverse events occurring to patients receiving IV heparin
- Perform ward/unit audits in relation to the storage of heparin ampoules.

5.5 SESLHD Facilities will:

- Ensure the prescription and administration of IV heparin is documented on the SESLHD *Intravenous Heparin Sodium* chart
- Implement education and competency assessment of medical, nursing and pharmacy staff in relation to clinical use of IV heparin
- Audit and review the clinical practice of IV heparin in their facility
- Comply with the process to capture and review any adverse clinical outcome of IV heparin
- Establish a clinical governance structure to ensure safe use of IV heparin in accordance with [NSW Ministry of Health Policy Directive PD2020_045 - High Risk Medicines Management](#).

6. EDUCATION

Relevant HETI education includes Safe Use of Anticoagulants CSK 237 965 997 (Medical, Nursing and Pharmacy staff)

7. PROCEDURE

7.1 Verify Actual Body Weight

- Body weight must be measured and recorded in kilograms.
 - Estimated body weight is only to be used in exceptional circumstances (i.e. unconscious, intubated patient). If an estimated weight is used, the patient must be weighed at the earliest opportunity.

7.2 Order baseline tests

- Full blood count (FBC), including haemoglobin and platelet count
- Activated Partial Thromboplastin time (APTT)
- Prothrombin time / International Normalised Ratio (INR)
- Prothrombin time
- Renal function tests: urea, electrolytes and creatinine (and creatinine clearance calculated)
- Liver function tests. ²

7.3 Use the SESLHD *Intravenous Heparin Sodium* chart to:

- Document the clinical indication for heparin infusion and prescribe the relevant IV heparin protocol
- Record patient's allergies, patient's weight, baseline APTT and platelet count, and target APTT
- Prescribe and administer IV heparin bolus if required (not all patients will require a bolus)

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- For stroke patients a bolus is rarely required. Seek advice of attending Neurologist
- For neurosurgical patients do not give a bolus unless requested by attending Neurosurgeon and with guidance from a Haematologist. (see 7.6 for information regarding bolus doses)
- Prescribe the infusion rate
- Record APTT results, action and infusion rate adjustments
- Record signatures as per double checking requirement for any heparin infusion rate adjustment
- Record / sign daily MO review.

7.4 Prescribe the relevant protocol

- Prescribe the relevant protocol according to clinical indication. Tables for prescribing the initial bolus and infusion rates and subsequent adjustment according to APTT results are included in the appendix of this document for Standard Risk ([Appendix A](#)), Higher Bleeding Risk ([Appendix B](#)) and Acute Stroke ([Appendix C](#)).
- The acute stroke protocol applies to patients with ischaemic stroke. Management of other neurological presentations (e.g. cerebral venous thrombosis) should be guided by the attending Neurologist.
- The SESLHD IV Heparin Protocols are compliant with the Clinical Excellence Commission Intravenous Unfractionated Heparin Recommended Standard.
- If a patient has two or more indications for anticoagulation with IV heparin the AMO must specify which protocol is to be used. The rationale should be documented in the patient's Health Care Record.

7.5 Review Concomitant Medications

- Check if the patient is prescribed antiplatelet agents or other anticoagulants.
- The continued use of anti-platelet medications (e.g. aspirin, clopidogrel) should be reviewed and ceased when clinically appropriate to minimise bleeding risk. The decision to cease antiplatelet therapy is to be made by the patient's AMO and must be documented in the patient's health care record.²
 - Anti-platelet medications should **NOT** be ceased in patients with acute coronary syndromes (NSTEMI and STEMI)^{4,5}
- The commencement of IV heparin therapy in patients already anticoagulated with low molecular weight heparins, warfarin or other oral anticoagulant medications (e.g. rivaroxaban, danaparoid, apixaban) requires considerable caution.
- Heparin bolus may cause bleeding in patients already therapeutically anticoagulated – Guidance from a Haematology Consultant should be sought whenever switching anticoagulant drugs.

7.6 Prescribe and Administer IV Heparin Bolus

- Refer to the relevant protocol for instruction regarding bolus dose prescription
- Heparin bolus may cause bleeding in patients already therapeutically anticoagulated – seek Haematology advice when switching anticoagulant drugs

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- Prescribe and administer IV heparin bolus if required (not all patients will require a bolus)
 - For stroke patients a bolus is rarely required. Seek advice of attending Neurologist
 - For neurosurgical patients do not give a bolus unless requested by attending Neurosurgeon and with guidance from a Haematologist
- Administer via a designated port, lumen or cannula
- Flush with 5 to 10 mL Sodium Chloride 0.9% pre and post injection.

7.7 Prescribe and Administer IV Heparin Infusion

- Prescribe initial IV heparin infusion rate in accordance with the relevant SESLHD protocol, patient's clinical condition and weight ¹
- Use a designated port, lumen or cannula for all heparin infusions
- Commercially prepared premixed infusion bags of **Heparin Sodium 25,000 units in 250 mL Sodium Chloride 0.9% (100 units per mL)** will be used throughout facilities in SESLHD unless contraindicated
- Use a volumetric infusion pump for all IV heparin infusions.

7.8 Monitoring APTT Levels and Infusion Rate Adjustments

- Order and take blood sample for APTT:
 - Four to six hours after the start of the IV heparin infusion (according to urgency of treatment)
 - Four to six hours after every infusion rate adjustment. ⁶
 - When therapeutic range reached, check APTT every six hours until two consecutive results are within the therapeutic range
 - Then daily while results are within therapeutic range
- The APTT sample should not be collected from the same limb as the intravenous access point for the unfractionated heparin infusion
- Mark the request with "urgent IV heparin" to ensure a 60 minute turnaround time
- Check for the APTT result within one to two hours of APTT collection and record on *SESLHD Intravenous Heparin Sodium* chart
- Check APTT result with relevant protocol to determine if infusion rate adjustment is required
- Any rate adjustment must be in accordance with the relevant protocol, checked with and signed by a second clinician (an appropriately trained MO, RN/RM, EN or pharmacist) on the *SESLHD Intravenous Heparin Sodium* chart. Record the date and time of the infusion rate adjustment on the *Intravenous Heparin Sodium* chart.

7.9 Monitor for possible Heparin Induced Thrombocytopenia

- Check the platelet count prior to commencing IV heparin and then every three days while on therapy ²
- Consult the Haematology Consultant or Registrar if thrombocytopenia develops or the platelet count falls more than 20% of baseline.

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7.10 Patient Monitoring and Management of Bleeding

- Monitor patient for bleeding or new or extending thrombosis. Vigilance and monitoring should be ongoing during the infusion and continue after therapy cessation. Include an inspection of cannulas, drains, surgical or wound sites.
- Minor bleeding (such as bruising, epistaxis, microscopic haematuria, gum bleeding) requires review of the IV heparin dose, APTT results and risk factors for bleeding (concomitant anti-platelet or anti-coagulant therapy)
- A retroperitoneal bleed should be considered in the absence of another identified cause of pain in the back, leg or abdomen
- If major bleeding is suspected immediately cease IV heparin infusion and escalate via the Between the Flags system
- Collect blood for urgent FBC, APTT and Blood Group and Antibody Screen (“Group and Hold”)
- Fresh frozen plasma and/or platelets may be indicated and can assist in reversing the heparin effect
- If reversal of heparin therapy with IV protamine sulphate is considered, **consultation with a Haematologist must occur prior to use** ⁷
- Any unexpected symptom or clinical event occurring in a patient receiving IV heparin should be considered an adverse event of heparin therapy. Medical review should be immediately requested.

7.11 Advice for Ceasing and Recommencing IV Heparin

7.11.1 Surgical Patients

- Surgical patients receiving IV heparin require a pre and post-operative plan for their anticoagulant therapy which is formulated and documented in the patient’s Health Care Record. This will generally require consultation with Haematology or Cardiology as appropriate.
- Cease IV heparin four to six hours prior to surgery
- Generally patients with a very high risk of thromboembolism (i.e. prosthetic heart valves) should recommence the heparin infusion (without bolus) six to eight hours post-operatively
- Generally patients not at very high risk of thromboembolism should recommence the heparin infusion after 24 to 48 hours post-operatively depending on surgical assessment.

7.11.2 Procedures (e.g. insertion of a CVC, biopsy)

- Cease infusion four to six hours prior to the procedure
- Recommence the heparin infusion (without bolus) two hours after procedure provided haemostasis is ensured.

7.11.3 Lumbar Puncture

- Cease infusion ≥ 6 hours prior to procedure
- Recommence the heparin infusion (without bolus) > 2 hours after procedure provided no blood on needle

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- If it is a traumatic lumbar puncture anticoagulation may need to be delayed for up to 24 hours depending on the clinical context.

7.11.4 Insertion or Removal of Spinal or Epidural Catheters

- Generally the use of indwelling spinal or epidural catheters is contraindicated in patients receiving IV heparin. Therefore,
 - Cease IV heparin infusion \geq 6 hours prior to procedure
 - Recommence IV heparin infusion (without bolus) $>$ 2 hours after removal of needle or catheter provided no bleeding is evident
 - If blood is apparent upon insertion or removal of catheter, anticoagulation may need to be delayed for up to 24 hours depending on clinical context.

7.12 Management of Patients who Fall while on IV Heparin Therapy

- Patients on IV heparin who have had a fall (witnessed or unwitnessed) require immediate medical review
- If there is evidence of head injury, immediately cease heparin infusion and discuss with the patient's MO
- Arrange for urgent CAT scan
- Arrange for urgent FBC, APTT (and PT/INR if concurrent warfarin) and Group and Hold
- See [SESLHDPR/380 - Falls prevention and management for people admitted to acute and sub-acute care](#) policy for information on the management of patients following a fall.

8. DOCUMENTATION

- SESLHD *Intravenous Heparin Sodium* chart SES130.030
- Document in the health care record any actions not captured on the *Intravenous Heparin Sodium* chart i.e. signs and symptoms of bleeding, management (including appropriate escalation of concerns)
- Report any patient adverse events related to IV heparin administration in the Incidence Management System Plus (IMS+).

9. AUDIT

- Review incidence reports (IMS+) pertaining to IV heparin
- Stock and storage of ward/unit heparin ampoules.
- IV heparin storage audits in QARS

10. REFERENCE DOCUMENTS

1.	Raschke RA, Reilly BM, Guidry JR, Fontana JR, Srinivas S. The weight- based heparin dosing nomogram compared with a “standard care” nomogram. A randomized controlled trial. <i>Annals of Internal Medicine</i> 1993; 119(9): 874 – 881.
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4.	O’Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: Executive Summary: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines . Circulation December 2012.
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NSW Clinical Excellence Commission Intravenous unfractionated heparin recommended standard. Released December 2018.
NSW Ministry of Health Policy Directive PD2020_045 - High Risk Medicines Management
NSW Ministry of Health Policy Directive PD2013_043 - Medication Handling in NSW Public Health Facilities
SESLHDPD/160 Medication: Administration by Enrolled Nurses

10. ACKNOWLEDGEMENTS

Prince of Wales Hospital and Community Health Services Anticoagulation with Intravenous Heparin Sodium Infusion Clinical Business rule, developed by Dr Tim Brighton Staff Specialist / Haematologist, Haematology Department.

11. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
June 2015	1	Document reviewed by Heparin Working Party
September 2015	1	Endorsed by SESLHD Clinical and Quality Council 16/9/2015
November 2015	2	Minor changes made in relation to enrolled nurses. Amendments approved by the IV Heparin working party out of session.
May 2016	3	Points 6.3, 6.5, 6.6 updated to provide additional guidance around IV bolus doses, in particular for stroke and neurosurgical pts and for therapeutically anticoagulated patients changing to IV Heparin. Protocol VTE / ATE / AF and other indications updated to include No bolus for neurosurgical patients unless requested by attending Neurosurgeon and with guidance from a Haematology consultant Protocol title for STEMI amended throughout document to STEMI (with Thrombolysis)
June 2016	3	Minor changes approved by Drug and Quality Use of Medicines Committee
July 2016	3	Minor changes endorsed by Executive Sponsor. Approved to publish.
March 2018	4	Minor review - changes in relation to updating links
April 2018	4	Approved by Drug and Quality Use of Medicines Committee

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January 2020	5	Protocols updated to align with Clinical Excellence Commission Intravenous unfractionated heparin recommended standard 2018 including replacing the <ul style="list-style-type: none"> VTE ATE AF & other conditions protocol with the Standard Risk protocol infusion STEMI (in conjunction with thrombolysis) protocol with the Higher Bleeding Risk protocol infusion
August 2020	6	Draft for comment period.
September 2020	6	Major review. Final version approved by Executive Sponsor. Formatted by Executive Services for tabling at October Quality Use of Medicines Committee.
October 2020	6	Deferred, to be tabled at November Quality Use of Medicines Committee.
November 2020	6	Suggested changes to be tabled at Stroke Committee for review and approval.
February 2021	7	Stroke Committee reviewed and supported the changes. To be tabled at March Quality Use of Medicines Committee.
March 2021	7	Approved at Quality Use of Medicines Committee. To be tabled at Clinical and Quality Council.
May 2021	7	Approved at April Clinical and Quality Council.
June 2022	8	Minor review: Hyperlinks updated. Approved by Executive Sponsor. To be tabled at Quality Use of Medicines Committee.
July 2022	8	Formatted by SESLHD Policy and hyperlinks updated.
August 2022	8	Endorsed by SESLHD Quality Use of Medicines Committee.

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APPENDICES

A – C SESLHD IV Heparin Protocols

- Standard Risk Protocol – used in conditions such as atrial fibrillation, venous or arterial thromboembolic disease, prosthetic heart valves where intravenous heparin therapy is indicated
- Higher Bleeding Risk Protocol – used in conditions where risk of bleeding needs to be minimised such as acute coronary syndrome intravenous when heparin therapy is indicated
- Acute Stroke Protocol - only used following consultation with the Attending Medical Neurologist

CONTRAINDICATIONS TO ANTICOAGULATION WITH IV HEPARIN ²

- Known hypersensitivity to heparin or pork products
- History of heparin induced thrombocytopenia (HIT)
- Severe thrombocytopenia or patient for whom suitable blood coagulation tests cannot be performed at appropriate intervals
- Patients in an uncontrollable active bleeding state except when this condition is the result of disseminated intravascular coagulation.

NB: Patients with contraindications requiring anticoagulation: Alternative anticoagulation should be discussed via specialist consultation (e.g. Haematology)

PRECAUTIONS TO ANTICOAGULATION WITH IV HEPARIN ²

Heparin Sodium should be used with extreme caution in conditions where there is an increased risk of haemorrhage such as:

- **Gastrointestinal:** Gastric or duodenal ulcers; continuous tube drainage of the stomach or small intestine
- **Cardiovascular:** Subacute bacterial endocarditis; severe hypertension
- **Surgical:** During and immediately after (a) spinal tap or spinal/epidural anaesthesia; Or (b) major surgery, especially those involving the brain, eye or spinal cord
- **Neurological:** recent intracerebral haemorrhage
- **Haematological:** conditions associated with increased bleeding tendencies, e.g. haemophilia, thrombocytopenia, von Willebrand's Disease, platelet dysfunction and some vascular purpuras
- **Other:** Macroscopic haematuria and patient conditions such as menstruation, liver disease with impaired haemostasis and renal disease should be taken into consideration when IV heparin is administered
- Heparin Sodium increases the risk of localised haemorrhage during and following oral surgical (dental) procedures. Temporary IV heparin dosage reduction or withdrawal may therefore be advisable prior to oral surgery
- Epidural catheter insertion/removal.

This list is not exhaustive, for further information please consult full product information or alternatively, consult Haematology Consultant/Registrar.

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Appendices	<p>Approved Intravenous Heparin Administration Protocols in SESLHD are:</p> <ul style="list-style-type: none"> • Standard Risk Protocol – used in conditions such as atrial fibrillation, venous or arterial thromboembolic disease, prosthetic heart valves where intravenous heparin therapy is indicated • Higher Bleeding Risk Protocol – used in conditions where risk of bleeding needs to be minimised such as acute coronary syndrome where intravenous heparin therapy is indicated • Acute Stroke Protocol - only used following consultation with the Attending Medical Neurologist (No bolus unless requested by attending Neurologist)
Section Number	Procedure Overview
7.1	Verify Actual Body Weight (measured)
7.2	Order & take baseline tests
7.3	Use the SESLHD Intravenous Heparin Sodium Chart (SES130.030) to: prescribe the relevant protocol, Heparin bolus and infusion, record APTT results, titration changes, confirm MO 24 hour order check, and record administration of infusions (double person check required)
7.6	<p>Prescribe & Administer IV Heparin Bolus (only if required)</p> <ul style="list-style-type: none"> ➔ Prescribe according to the relevant protocol and patient's measured weight ➔ Administer via a designated port, lumen or cannula ➔ Flush with 5 to 10 mL Sodium Chloride 0.9% pre and post injections <ul style="list-style-type: none"> • No bolus for stroke patients unless requested by attending Neurologist. • No bolus for neurosurgical patients unless requested by attending Neurosurgeon with guidance from a Haematologist. • Bolus injection may cause bleeding in patients already therapeutically anticoagulated – seek Haematology advice when switching anticoagulant drugs
7.7	<p>Prescribe & Administer IV Heparin Infusion</p> <ul style="list-style-type: none"> • Via a designated port, lumen or cannula • Use premixed Heparin Sodium 25,000 units in 250 mL Sodium Chloride 0.9% • Prescribe initial infusion rate in accordance to the relevant protocol and patient's measured weight • Use a volumetric infusion pump
7.8	Order APTT tests (to be collected 6 hours after the start of the IV heparin infusion)
7.8	Collect blood for APTT 6 hours after the start of the IV heparin infusion and then 6 hours after every rate adjustment . When therapeutic range reached, check APTT every 6 hours until two consecutive results are within the therapeutic range. Then check daily while results are within therapeutic range.
7.8	Check for APTT results within 2 hours of taking sample
7.8	<p>Review APTT result in conjunction with the nomogram</p> <ul style="list-style-type: none"> • Determine if a rate change is required • Titrate infusion as per the nomogram <p>NB high risk medications require a two person check of the APTT result and to titrate the infusion pump</p>
7.8	Continue to order blood for APTT, check APTT and titrate infusion as per the nomogram until patient reaches therapeutic range
7.9	Monitor for possible Heparin Induced Thrombocytopenia (HIT) - ongoing
7.9	<p>Monitor patient for Bleeding</p> <ul style="list-style-type: none"> • Inspect cannulas, drains, surgical or wound sites • Check for bruising, epistaxis, microscopic haematuria (urinalysis), gum bleeding • Escalate concerns

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APPENDIX A – Standard Risk Protocol ¹

IV HEPARIN STANDARD RISK PROTOCOL (i.e. VTE / ATE/ AF, prosthetic heart valves & Other Conditions)	STANDARD RISK PROTOCOL
<p>Initial IV bolus dosage:</p> <ul style="list-style-type: none"> Use Heparin Sodium 5,000 unit in 5 mL ampoules/concentration Administer bolus up to the maximum dose of 5,000 units based on 80 units /kg (calculated below) unless AMO orders a HIGHER weight based bolus <ul style="list-style-type: none"> For acute thrombosis a higher weight based bolus may be required, calculated below. Seek specialist haematology advice for this patient cohort There may be circumstances where the bolus dose is omitted, e.g. patients transitioning from another anticoagulant agent or a delayed onset of anticoagulant effect is required No bolus should be administered for stroke or neurosurgical patients unless requested by Attending Neurologist/ Neurosurgeon with guidance from a Haematology consultant 	

Standard bolus doses		Standard bolus doses	
WEIGHT (kg)	BOLUS (Units)	WEIGHT (kg)	BOLUS (Units)
40	3000	55	4500
45	3500	60	5000
50	4000	More than 60	5000 (Maximum dose)

Higher weight-based bolus doses (if required, in consultation with haematology)			
WEIGHT (kg)	Higher Weight based BOLUS (Units)	WEIGHT (kg)	Higher Weight based BOLUS (Units)
70	5500	125	10,000
75	6000	130	10,500
80	6500	135	11,000
85	7000	140	11,000
90	7000	145	11,500
95	7500	150	12,000
100	8000	155	12,500
105	8500	160	13,000
110	9000	165	13,000
115	9000	170	13,500
120	9500		

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Anticoagulation with Intravenous Heparin Sodium Infusion

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Infusion Initiation Protocol:

- Use Premixed Solution of Heparin Sodium 25,000 units in 250 mL Sodium Chloride 0.9% (100 units per mL)
- **Initial infusion rate based on 18 units/kg/hr**, rounded to nearest 1 mL per hour (calculated below)

WEIGHT (kg)	Units per Hour	INFUSION STARTING RATE (mL/hr) ↓	WEIGHT (kg)	Units per Hour	INFUSION STARTING RATE (mL/hr) ↓	WEIGHT (kg)	Units per Hour	INFUSION STARTING RATE (mL/hr) ↓
40	720	7	85	1530	15	130	2340	23
45	810	8	90	1620	16	135	2430	24
50	900	9	95	1710	17	140	2520	25
55	990	10	100	1800	18	145	2610	26
60	1080	11	105	1890	19	150	2700	27
65	1170	12	110	1980	20	155	2790	28
70	1260	13	115	2070	21	160	2880	29
75	1350	14	120	2160	22	165	2970	30
80	1440	14	125	2250	23	170	3060	31

IV HEPARIN ADJUSTMENT NOMOGRAM (adjust infusion rate according to the APTT)

APTT (seconds)	Bolus Dose	Stop Infusion	IV Rate Change (mL/hr)	Repeat APTT
Less than 40	5,000 units	No	<ul style="list-style-type: none"> • Increase rate by 1 mL/hr from current rate 	4-6 hours
40 to 44.9	Nil	No	<ul style="list-style-type: none"> • Increase rate by 1 mL/hr from current rate 	4-6 Hours
45 to 90	Therapeutic Range No change from current rate			<ul style="list-style-type: none"> • Repeat at 6 Hours • After 2 consecutive therapeutic APTTs, check APTT in 24 hours • Daily APTT while results are within therapeutic range
90.1 to 95	Nil	No	<ul style="list-style-type: none"> • Decrease rate by 1 mL/hr from current rate 	4-6 hours
95.1 to 105	Nil	No	<ul style="list-style-type: none"> • Decrease rate by 2 mL/hr from current rate 	4-6 hours
Greater than 105	Nil	<ul style="list-style-type: none"> • Stop for 90 minute • MO to assess patient for bleeding 	<ul style="list-style-type: none"> • Restart infusion after <u>90 minutes</u> & reduce previous rate by 2 mL/hr 	4-6 hours after recommencing infusion

STANDARD RISK PROTOCOL

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APPENDIX B – Higher Bleeding Risk Protocol (bleeding risk needs to be minimised) ⁵

IV HEPARIN <u>HIGHER BLEEDING RISK</u> PROTOCOL (e.g. ACUTE CORONARY SYNDROME)		HIGHER
Initial IV bolus dosage: <ul style="list-style-type: none"> Use Heparin Sodium 5,000 units in 5 mL ampoules/ concentration For patients weighing 60 kg and over administer a bolus dose of 4000 units For patients weighing less than 60 kg administer a weight based bolus of 60units/kg (calculated below) There may be circumstances where the bolus dose is omitted, for example if the patient is receiving another anticoagulant agent and a delayed onset of anticoagulant effect is required 		
Bolus Dose for Patients weighing 60 kg and over		
Weight (kg)	Bolus (Units)	
60 kg and over	4000	

Weight Based Bolus Dose		BLEEDING RISK
Weight (kg)	BOLUS (Units)	
40 kg	2400	
45 kg	2700	
50 kg	3000	
55 kg	3300	

IV HEPARIN <u>HIGHER BLEEDING RISK</u> PROTOCOL (e.g. ACUTE CORONARY SYNDROME)		BLEEDING RISK
Infusion Initiation Protocol: <ul style="list-style-type: none"> Use Premixed Solution of Heparin Sodium 25,000 units in 250 mL Sodium Chloride 0.9% (100 units per mL) Initial infusion rate based on 12 units/kg/hr, rounded to nearest 1 mL per hour (calculated below) The initial infusion rate should not exceed 1,000 units/hr 		

Weight (kg)	Units per Hour	Infusion Pump Starting Rate (mL/hr)	PROTOCOL
40	480 Units	5	
45	540 Units	5	
50	600 Units	6	
55	660 Units	7	
60	720 Units	7	
65	780 Units	8	
70	840 Units	8	
75	900 Units	9	
80 and over	960 Units	10	

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IV HEPARIN INFUSION RATE ADJUSTMENT NOMOGRAM (adjust infusion rate according to the APTT)				
APTT (seconds)	Bolus Dose	Stop Infusion	IV Rate Change (mL/hr)	Repeat APTT
Less than 45	Nil	No	<ul style="list-style-type: none"> Increase rate by 1 mL/hr from current rate 	4-6 hours
45-70	<p align="center">Therapeutic Range No change from current rate</p>		<ul style="list-style-type: none"> Repeat at 6 Hours After 2 consecutive therapeutic APTTs, check APTT in 24 hours Daily APTT while results are within therapeutic range 	
70.1 to 90	Nil	No	<ul style="list-style-type: none"> Decrease rate by 1 mL/hr from current rate 	4-6 hours
90.1 to 105	Nil	No	<ul style="list-style-type: none"> Decrease rate by 2 mL/hr from current rate 	4-6 hours
Greater than 105	Nil	<ul style="list-style-type: none"> Yes - Stop for 90 minutes MO to assess patient for bleeding 	<ul style="list-style-type: none"> Restart infusion after 90 minutes & reduce previous rate by 2 mL/hr 	4-6 hours after recommencing infusion

Higher Bleeding Risk Protocol

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APPENDIX C - Acute Stroke Protocol

Protocol only to be used in consultation with the Attending Neurologist

IV Heparin Initiation Protocol Acute Stroke			ACUTE STROKE
Initial IV bolus dosage: Bolus RARELY required – seek advice of Attending Neurologist			
Infusion: <ul style="list-style-type: none"> Use premixed solution of Heparin Sodium 25,000 units in 250 mL Sodium Chloride 0.9% (100 units per mL) Initial infusion rate based on 15 units/kg/hr, rounded to nearest 0.1 mL/hour The <i>initial</i> infusion rate should not exceed 1,000 units/hr 			
WEIGHT (kg)	Units per Hour	INFUSION PUMP RATE (mL per hour) ↓	
40	600	6	
45	675	6.7	
50	750	7.5	
55	825	8.2	
60	900	9	
65	975	9.7	
70	1050	10	
Greater than 70	1050	10	

IV Heparin Adjustment Nomogram (adjust infusion rate according to the APTT)				ACUTE STROKE
APTT (seconds)	Stop Infusion	IV Rate Change (mL/hr)	Repeat APTT	
Less than 40	No	<ul style="list-style-type: none"> Increase rate by 1 mL/hr from current rate 	4-6 hours	
40 to 44.9	No	<ul style="list-style-type: none"> Increase rate by 0.5 mL/hr from current rate 	4-6 hours	
45 to 60	Therapeutic Range No change from current rate		<ul style="list-style-type: none"> Repeat at 6 hours. After 2 consecutive therapeutic APTTs, check in 24 hours. Daily APTT while results are within therapeutic range 	
60.1 to 65	No	<ul style="list-style-type: none"> Decrease rate by 0.5 mL/hr from current rate 	4-6 hours	
65.1 to 70	No	<ul style="list-style-type: none"> Decrease rate by 1 mL/hr from current rate 	4-6 hours	
70.1 to 80	No	<ul style="list-style-type: none"> Decrease rate by 2 mL/hr from current rate 	4-6 hours	
Greater than 80	<ul style="list-style-type: none"> Stop for 120 minutes MO review 	<ul style="list-style-type: none"> Restart infusion after 2 hours and reduce previous rate by 2 mL/hr 	6 hours after recommencing infusion	