SESLHD PROCEDURE COVER SHEET

NAME OF DOCUMENT	Anticoagulation with Intravenous Heparin Sodium Infusion
TYPE OF DOCUMENT	Procedure
DOCUMENT NUMBER	SESLHDPR/402
DATE OF PUBLICATION	November 2023
RISK RATING	Extreme – High Risk Medication
LEVEL OF EVIDENCE	National Safety and Quality Health Service Standards: Standard 4 - Medication Safety
REVIEW DATE	November 2024
FORMER REFERENCE(S)	Facility Clinical Business Rules (anticoagulation with IV Heparin sodium infusion)
EXECUTIVE SPONSOR or EXECUTIVE CLINICAL SPONSOR	Director, Clinical Governance and Medical Services
AUTHOR	SESLHD IV Heparin Working Party
POSITION RESPONSIBLE FOR THE DOCUMENT	Medicine Clinical Stream Manager Carolyn.Smith1@health.nsw.gov.au
FUNCTIONAL GROUP(S)	Cardiac and Respiratory Medicine Nursing and Midwifery
KEY TERMS	Heparin Intravenous Intravenous Heparin Heparin Infusion
SUMMARY	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 updated IV Heparin Protocols based on the Intravenous Unfractionated Heparin Recommended Standard – Clinical Excellence Commission 2018.

Feedback about this document can be sent to SESLHD-Policy@health.nsw.gov.au

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 Ministry of Health Policy Directive PD2020_045 – High-Risk Medicines Management, NSW Ministry of Health Policy Directive Medication Handling PD2022_032 - Medication Handling 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.
- Acute Coronary Syndrome and 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 weight[1] 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.

IV heparin is *not* contraindicated in pregnancy and breastfeeding and may be used in certain circumstances under the guidance of the Obstetric Medicine and (as appropriate) relevant physician specialty team.

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.

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.
- 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.
- In conjunction with the MO check APTT results within one to two hours of collection and action any infusion adjustment in conjunction with the MO.
- Ensure any infusion rate adjustment is checked/witnessed
- 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
- 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) [2]
- Prothrombin time / International Normalised Ratio (INR)
- Prothrombin time
- Renal function tests: urea, electrolytes and creatinine (and creatinine clearance calculated)
- Liver function tests.

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)
    - 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), Acute Coronary Syndrome and Higher Bleeding Risk Protocol (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.
    - 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
- 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 (HIT)

- 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.

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** [6]
- 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
- 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 ≥ 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. Annals of Internal Medicine 1993; 119(9): 874 – 881.
2.	Therapeutic Guidelines: Practical information on using unfractionated heparin Topic | Therapeutic Guidelines (hcn.com.au) June 2023
3.	Douketis JD, Foster GA, Crowther MA, et al. Clinical risk factors and timing of recurrent VTE during the initial 3 months of anticoagulant therapy. Arch Int Med 2000; 160(22): 3431-3436.
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.
5.	Jneid H, Anderson JL, Wright RS, Adams CD, et al. 2012 ACCF/AHA Focused Update of the Guideline for the Management of Patients With Unstable Angina/Non–ST-Elevation Myocardial Infarction (Updating the 2007 Guideline and Replacing the 2011 Focused Update): A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation 2012; 126 (7):875-910.

6.	Garcia DA, Baglin TP, Weitz JI, & Samama MM. 2012. Parenteral Anticoagulants : Antithrombotic Evidence-Based Clinical Practice Guidelines 9th ed: American College of Chest Physicians Therapy and Prevention of Thrombosis. Chest 2012; 141; e 24S-e43S.

Related Documents

Amsterdam EA, Wenger NK, Brindis RG, Casey DE Jr, Ganiats TG, Holmes DR Jr, Jaffe AS, Jneid H, Kelly RF, Kontos MC, Levine GN, Liebson PR, Mukherjee D, Peterson ED, Sabatine MS, Smalling RW, Zieman SJ. 2014. AHA/ACC Guideline for the Management of Patients with Non-ST-Elevation Acute Coronary Syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2014 Dec 23;64(24):e139-e228. doi: 10.1016/j.jacc.2014.09.017. Epub 2014 Sep 23. Erratum in: J Am Coll Cardiol. 2014 Dec 23;64(24):2713-4. Dosage error in article text. PMID: 25260718.
Roffi M, Patrono C, Collet JP, Mueller C, Valgimigli M, Andreotti F, Bax JJ, Borger MA, Brotons C, Chew DP, Gencer B, Hasenfuss G, Kjeldsen K, Lancellotti P, Landmesser U, Mehilli J, Mukherjee D, Storey RF, Windecker S; ESC Scientific Document Group. 2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: Task Force for the Management of Acute Coronary Syndromes in Patients Presenting without Persistent ST-Segment Elevation of the European Society of Cardiology (ESC). Eur Heart J. 2016 Jan 14;37(3):267-315. doi: 10.1093/eurheartj/ehv320. Epub 2015 Aug 29. PMID: 26320110.
Chew DP, Scott IA, Cullen L, French JK, Briffa TG, Tideman PA, Woodruffe S, Kerr A, Branagan M, Aylward PE; NHFA/CSANZ ACS Guideline 2016 Executive Working Group:. National Heart Foundation of Australia & Cardiac Society of Australia and New Zealand: Australian Clinical Guidelines for the Management of Acute Coronary Syndromes 2016. Heart Lung Circ. 2016 Sep;25(9):895-951. doi: 10.1016/j.hlc.2016.06.789. Epub 2016 Jun 16. Erratum in: Heart Lung Circ. 2017 Oct;26(10):1117. [Dosage error in article text]. PMID: 27476580.
Australian Commission on Safety and Quality in Health Care (ACSQHC) National Safety and Quality Health Service Standards: Medication Safety Standard
Anticoagulants - Clinical Excellence Commission
NSW Ministry of Health Policy Directive PD2020_045 - High Risk Medicines Management
NSW Ministry of Health Policy Directive Medication Handling PD2022_032 - Medication Handling
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. VERSION AND APPROVAL HISTORY

Date	Version No.	Author and approval notes
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
January 2020	5	Protocols updated to align with Clinical Excellence Commission Intravenous unfractionated heparin recommended standard 2018 including replacing the • VTE ATE AF & other conditions protocol with the Standard Risk protocol infusion • STEMI (in conjunction with thrombolysis) protocol with the Acute Coronary Syndrome and 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.
15 November 2023	8.1	Minor review. The title of the Higher Bleeding Risk Protocol has been amended to *Acute Coronary Syndrome and Higher Bleeding Risk* Protocol to improve clarity. Inclusion of a statement to indicate IV heparin is *not* contraindicated in pregnancy and breastfeeding added to Section 2 Background. Endorsed by SESLHD Drug and Therapeutics Committee.

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
- Acute Coronary Syndrome and 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.

Appendices	Approved Intravenous Heparin Administration Protocols in SESLHD are: • **Standard Risk Protocol** – used in conditions such as atrial fibrillation, venous or arterial thromboembolic disease, prosthetic heart valves where intravenous heparin therapy is indicated • **Acute Coronary Syndrome and 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	**Prescribe & Administer** IV Heparin Bolus (only if required) ➔ 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 • 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	**Prescribe & Administer** IV Heparin Infusion • 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	**Review APTT** result in conjunction with the nomogram • Determine if a rate change is required • Titrate infusion as per the nomogram **NB** high risk medications require a two person check of the APTT result and to titrate the infusion pump
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	**Monitor patient for Bleeding** • Inspect cannulas, drains, surgical or wound sites • Check for bruising, epistaxis, microscopic haematuria (urinalysis), gum bleeding • Escalate concerns

APPENDIX A – Standard Risk Protocol [1]

IV HEPARIN STANDARD RISK PROTOCOL
(i.e. VTE / ATE/ AF, prosthetic heart valves & Other Conditions)

STANDARD RISK PROTOCOL

Initial IV bolus dosage:

- 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
  - 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		

Anticoagulation with Intravenous Heparin Sodium Infusion

SESLHDPR/402

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	• **Increase** rate by 1 mL/hr from current rate	4-6 hours
40 to 44.9	Nil	No	• **Increase** rate by 1 mL/hr from current rate	4-6 Hours
45 to 90	**Therapeutic Range** **No change from current rate**			• **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	• **Decrease** rate by 1 mL/hr from current rate	4-6 hours
95.1 to 105	Nil	No	• **Decrease** rate by 2 mL/hr from current rate	4-6 hours
Greater than 105	Nil	• **Stop** for 90 minute • MO to assess patient for bleeding	• **Restart** infusion after 90 minutes & **reduce previous rate** by 2 mL/hr	4-6 hours after recommencing infusion

STANDARD RISK PROTOCOL

APPENDIX B – Acute Coronary Syndrome and Higher Bleeding Risk Protocol (Where bleeding risk needs to be minimised) [5]

IV HEPARIN ACUTE CORONARY SYNDROME AND HIGHER BLEEDING RISK PROTOCOL

Acute Coronary Syndrome and Higher Bleeding Risk

Initial IV bolus dosage:

- 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 60 units/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

Weight (kg)	BOLUS (Units)
40 kg	2400
45 kg	2700
50 kg	3000
55 kg	3300

IV HEPARIN ACUTE CORONARY SYNDROME & HIGHER BLEEDING RISK PROTOCOL

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 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) ⬇
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**

Acute Coronary Syndrome and Higher Bleeding Risk

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	• **Increase** rate by 1 mL/hr from current rate	4-6 hours
45-70	**Therapeutic Range** **No change from current rate**			• **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	• **Decrease** rate by 1 mL/hr from current rate	4-6 hours
90.1 to 105	Nil	No	• **Decrease** rate by 2 mL/hr from current rate	4-6 hours
Greater than 105	Nil	• **Yes - Stop** for 90 minutes • MO to assess patient for bleeding	• **Restart** infusion after 90 minutes & **reduce previous rate** by 2 mL/hr	4-6 hours after recommencing infusion

ACUTE CORONARY SYNDROME AND HIGHER BLEEDING RISK PROTOCOL

APPENDIX C - Acute Stroke Protocol

Protocol only to be used in consultation with the Attending Neurologist

IV Heparin Initiation Protocol Acute Stroke

Initial IV bolus dosage: Bolus RARELY required – seek advice of Attending Neurologist

Infusion:

- 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 ***initial*** 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**

ACUTE STROKE

IV Heparin Adjustment Nomogram (adjust infusion rate according to the APTT)

APTT (seconds)	Stop Infusion	IV Rate Change (mL/hr)	Repeat APTT
Less than 40	No	• **Increase** rate by 1 mL/hr from current rate	4-6 hours
40 to 44.9	No	• **Increase** rate by 0.5 mL/hr from current rate	4-6 hours
45 to 60	**Therapeutic Range No change from current rate**		• **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	• **Decrease** rate by 0.5 mL/hr from current rate	4-6 hours
65.1 to 70	No	• **Decrease** rate by 1 mL/hr from current rate	4-6 hours
70.1 to 80	No	• **Decrease** rate by 2 mL/hr from current rate	4-6 hours
Greater than 80	• **Stop** for 120 minutes • MO review	• **Restart** infusion after 2 hours and **reduce previous rate** by 2 mL/hr	6 hours after recommencing infusion

ACUTE STROKE