SESLHD PROCEDURE COVER SHEET

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POSITION RESPONSIBLE FOR THE DOCUMENT	Quality Use of Medicines, Lead Pharmacist SESLHD-DrugCommittee@health.nsw.gov.au
FUNCTIONAL GROUP(S)	Cardiac and Respiratory Care, Medicine, Nursing and Midwifery, Pharmacy / Pharmaceutical, Medicines and Therapeutics
KEY TERMS	Heparin Intravenous, Intravenous Heparin, Heparin Infusion, Therapeutic Heparin, Unfractionated Heparin, Anticoagulant, Bleeding, High-Risk Medicine,
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.

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 aged over 18 years requiring anticoagulation with IV heparin must be in accordance with Ministry of Health Policy Directive PD2024_006 – 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.

Decisions regarding bleeding risk should be made by clinicians experienced in anticoagulation management, typically cardiologists or senior medical officers.

The approved IV Heparin infusion protocols in SESLHD are:

- Standard Bleeding 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.

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 nurse practitioners (NP), registered nurses/ midwives (RN / RM), who have successfully completed the SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* and medical officers, are accredited to titrate a heparin infusion in accordance with the relevant IV Heparin Infusion Nomogram.

Heparin like other anticoagulants has a narrow therapeutic window, therefore meticulous attention to monitoring APTT for heparin is required due to the significant risks associated with suboptimal anticoagulation.

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.

IV heparin due to its intensive requirements for APTT monitoring and rate adjustments should be used for specific indications or when oral and subcutaneous anticoagulants are not clinically suitable. In broad terms IV heparin is used for heart valve patients, bypass and vascular procedures, patients with higher risk of bleeding (as heparin is rapidly reversible), patients where rapid offset of anticoagulant activity is required (surgery) or when other anticoagulants maybe contraindicated (severe renal impairment).

There may be other acceptable indications for the use of heparin infusion e.g., continuous renal replacement therapy (CRRT), extracorporeal membrane oxygenation (ECMO) and some interventional procedures involving insertion of intravenous or intraarterial catheters. While acceptable indications, these interventions require specialist advice and oversight in terms of dosing and monitoring requirements and are out of scope for this document.

Standardised documentation related to IV heparin, on the appropriate 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:

- Recommended to complete the HETI module 'Safe Use of Anticoagulants' (Course code: 237965997) and the SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* before managing or titrating IV heparin.
- If not familiar and/or no clinical experience should defer to the admitting team registrar or consult Haematology.
- Determine and prescribe the appropriate heparin protocol, if unsure contact the senior medical officer, (e.g., higher bleeding risk or standard), (if indicated) chart the heparin bolus dose, and obtain and record baseline aPTT on the *Intravenous Heparin Sodium* chart when initiating IV heparin.
- Ensure baseline bloods are ordered, reviewed and prescribe the initial infusion rate based on the patient's **measured** actual body weight as outlined in the protocol.
- Adjust the aPTT therapeutic range or infusion rate as necessary, document the reasons in the patient's medical records, and MUST communicate changes to the nursing staff and document on the *Intravenous Heparin Sodium* chart.
- Provide an overview of IV heparin therapy during clinical handover (high-risk medicine alert).
- Conduct a thorough risk assessment for anticoagulation, considering patient-specific factors such as age, renal function, bleeding risk, falls risk, contraindications, and interactions with other medications or conditions.
- Order and monitor aPTT tests according to the protocol, ensuring results are reviewed within two hours, adjust the infusion rate, document on the *Intravenous Heparin Sodium* chart, and MUST communicate changes to the nursing staff.
- Monitor platelet counts every three days to detect potential heparin-induced thrombocytopenia (HIT).
- Review the patient daily, check the aPTT and treatment efficacy and adverse outcomes (e.g., abnormal bleeding, bruising, or clot extension) and escalate any adverse events promptly. Document in the medical records.
- Deviation from the approved protocol by the Admitting Medical Officer (AMO) or Registrar is permissible only if clinically justified, with clear documentation of the reason for deviation, specific administration instructions, and communication with the care team.

5.2 Nurse Practitioners (NP) / Registered Nurses (RN) / Registered Midwives (RM) will:

- Complete the HETI module 'Safe Use of Anticoagulants' (Course code: 237965997) before managing IV heparin.
- Complete the SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* before titrating IV heparin.
- Provide an IV heparin overview/update during clinical handover (high-risk medicine alert).
- Understand and apply the principles of safe anticoagulant and IV heparin use, ensuring compliance with protocols.
- Ensure timely collection of blood samples for aPTT monitoring as per protocol.
- Review aPTT results within two hours of collection, notify the MO if outside the therapeutic range, and adjust infusion rates accordingly. Document discussion with the MO in the patient's electronic medical record.

- Ensure all infusion rate adjustments are witnessed and checked and documented on the *Intravenous Heparin Sodium* chart.
- Monitor patients for signs of abnormal bleeding, bruising, or thrombosis extension, referring to the Management of Bleeding section (7.10).
- Escalate any concerns or adverse events related to IV heparin therapy to the treating team.

5.3 Enrolled Nurses (ENs) will:

- Only **witness** the checking of an IV heparin infusion with an NP / RN / RM or MO.
- 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 HETI module 'Safe Use of Anticoagulants' (Course code: 237965997) and the SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* can only **witness** the checking of an IV heparin infusion with an NP/RN/RM or MO.
- Refer to and adhere with SESLHDPD/160 - Medication: Administration by Enrolled Nurses – for the EN scope of practice.

5.4 Pharmacists will:

- Recommended to complete the HETI module 'Safe Use of Anticoagulants' (Course code: 237965997) and the SESLHD IV Heparin Infusion Knowledge Assessment Package.
- Understand and implement the principles of safe use of anticoagulants and IV heparin
- Routinely conduct medication reviews for IV heparin treatment and provide appropriate advice to the NP / RN / RM or MO 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 SESLHD IV Heparin Infusion Knowledge Assessment Package 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 PD2024_006 - High Risk Medicines Management.

6. EDUCATION

- HETI module 'Safe Use of Anticoagulants' (Course code: 237965997)
- SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* (yet to be reviewed and updated).

7. PROCEDURE

Quick Access – click on the heading below to jump to the relevant section of the procedure.

Medical Officer Review, Prescribing and Monitoring Requirements

A: Prior to Commencing Treatment

Verify Actual Body Weight

- Body weight must be measured and recorded in kilograms on both the SESLHD *Intravenous Heparin Sodium* chart and in the electronic medical record.
    - 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.

Order and Review Laboratory Tests

The following baseline laboratory tests should be performed prior to commencing treatment. The patient should be further investigated if results are abnormal:

- Full blood count (FBC), including haemoglobin and platelet count
- Activated Partial Thromboplastin time (aPTT)[2]
- Prothrombin time (PT)
- Renal function tests: urea, electrolytes and creatinine (and creatinine clearance calculated)
- Liver function tests

RED FLAG
Either a **LOW** platelet count or a **HIGH** activated partial thromboplastin time (aPTT) level, MUST be reviewed by a **Medical Officer** and the decision to proceed with IV heparin infusion documented in the patient's health care record.

Adjustment of heparin doses based on anti-Xa levels instead of aPTT may be warranted in certain patient groups where the aPTT may indicate an unpredictable anticoagulant effect. ***Discuss with a Consultant Haematologist.***
Anti-Xa monitoring instead of aPTT monitoring may be considered for patients with the following:

- *Lupus anticoagulant positive (LAC)*
- *antiphospholipid antibody syndrome (APS)*
- *inherited or acquired antithrombin deficiency*
- *factor XII deficiency with elevated baseline aPTT*
- *if the patient is not responding as expected to heparin doses based on the aPTT.*

Review Concomitant Medicines

- 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 the following patients without consulting a cardiologist:
        - acute coronary syndromes (NSTEMI and STEMI)[4, 5]
        - patients with stents
- 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. Seek advice from

Consultant Haematologist or pharmacist if unsure on how to transition between anticoagulants.
- Heparin bolus may cause bleeding in patients already therapeutically anticoagulated. Seek advice from Consultant Haematologist or pharmacist if unsure on how to transition between anticoagulants.

Identify Risk Factors for Haemorrhagic Complications

- Elderly
- High risk of falls
- Reduced renal or hepatic function
- Bleeding disorders
- Malignancy
- Alcoholism
- Underweight patients
- History of gastrointestinal bleeding or ulceration

Advice may be sought from a Haematology Consultant regarding a reduced bolus dose and / or weight based dosing regimen.

B: Select the Relevant Protocol

- The MO prescribes the relevant protocol according to clinical indication. If unsure, escalate to the senior medical officer.
  - Standard Bleeding Risk (Appendix A), 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 (Appendix B) used in conditions where risk of bleeding needs to be minimised such as acute coronary syndrome when intravenous heparin therapy is indicated.
- If a patient has two or more indications for anticoagulation with IV heparin the MO must specify which protocol is to be used. The rationale should be documented in the patient's Health Care Record.

C: Commence Protocol

Prescribe on the relevant SESLHD *Intravenous Heparin Sodium* chart

- **STEP 1:** MO to record patient details, including measured body weight, and authorise that baseline results (e.g., FBC, PT, aPTT, urea, electrolytes, and platelet count) have been reviewed with signature.
- **STEP 2:** MO to prescribe initial IV heparin bolus loading dose as per protocol and authorise with signature. *Note: Acute Stroke RARELY requires an IV heparin bolus. Seek advice of Attending Neurologist.*
- **STEP 3:** MO to prescribe continuous IV infusion order, indicating starting infusion rate and authorise with signature.
  STEP 4: A completed and signed continuous IV infusion order by a MO gives authority for the accredited NP / RN / RM to adjust heparin infusion rate based on the heparin nomogram. Infusion order valid for 7 days unless otherwise ceased. Responsible MO to review aPTT and confirm and sign titration record at least once every 24 hours.

Infusion Preparation and Administration Requirements

STEP 1: Confirm that patient details, including measured actual body weight, have been recorded and that the MO has signed for baseline results review (e.g., FBC, PT, aPTT, urea, electrolytes, and platelet count).

STEP 2: Prepare intravenous bolus

- Bolus to be prepared using **Heparin Sodium 5,000unit in 5 mL ampoules ONLY**. Bolus **MUST NOT** be given using pre-mixed infusion bag.
- Administer via a designated port, lumen or cannula.
- Flush with 5 to 10 mL Sodium Chloride 0.9% pre and post injection.

STEP 3: Prepare intravenous infusion

- 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 SESLHD facilities.
- Use a volumetric infusion pump for all IV heparin infusions.

STEP 4: A completed and signed continuous IV infusion order by a MO gives authority for the accredited NP / RN / RM to adjust heparin infusion rate based on the heparin nomogram. Infusion order valid for 7 days unless otherwise ceased. Responsible MO to review aPTTs and confirm and sign titration record at least once every 24 hours.

Checking: Record signatures as per double checking requirement (i.e., Administering NP / RN / RW and Checker) for IV heparin bolus administration, commencing infusion, bag changes, and infusion rate adjustments. The pump MUST be double checked for administering an IV heparin infusion.

Monitoring: Review monitoring requirements and times for aPTT collection. It is the MO responsibility to co-ordinate aPTT level to be attended as per protocol (e.g., between 4– 6 hours post commencement of infusion).

Patient Monitoring and Management of Bleeding

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 requested immediately, and an incident report (IMS+) completed, when appropriate.

aPTT Levels

- MO to order and take blood sample for aPTT:
  - Between 4-6 hours after the start of the IV heparin infusion (according to urgency of treatment)
  - Between 4-6 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 always be collected from the opposite arm to the intravenous access point for the IV heparin infusion.
- Mark the request with “urgent IV heparin” to ensure a 60 minute turnaround time

Heparin Induced Thrombocytopenia (HIT)

- MO to 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.
- Refer to SESLHDGL/123 Heparin Induced Thrombocytopaenia - Diagnosis and Management for further information on diagnosis of HIT including laboratory testing, management, anticoagulation availability and choices.

Patient for Bleeding or New or Extending Thrombosis

It is the responsibility of **all clinicians** to monitor patient receiving IV heparin for bleeding or new or extending thrombosis.
Vigilance and monitoring should be ongoing during the infusion and continue after therapy cessation. Including 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, NP / RN / RM to immediately cease IV heparin infusion and escalate via the Between the Flags system.

Medical Officer:

- 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]

Infusion Rate Adjustments

Only nurse practitioners (NP) / registered nurses / midwives (RN / RM), who have successfully completed the HETI module 'Safe Use of Anticoagulants' (Course code: 237965997) and SESLHD *Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package* and medical officers, are accredited to titrate a heparin infusion in accordance with the relevant IV Heparin Infusion Nomogram.

Check for the aPTT result within 2 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,
- discussed with the MO and the conversation documented in the patient's electronic medical record,
- checked with and signed by a second clinician (an appropriately trained MO, NP / RN / RM, EN or pharmacist) on the SESLHD *Intravenous Heparin Sodium* chart.
- Documented on the *Intravenous Heparin Sodium* chart.

Review and document monitoring requirements and times based on adjustment on the *Intravenous Heparin Sodium* chart. Ensure MO and pathology are aware of the next aPTT requirement.

CAUTION

If aPTT is **subtherapeutic**, before increasing the rate or giving a bolus dose, check if there has been an interruption in heparin therapy in the last 6 hours, including the infusion being withheld or omitted.

If aPTT collected whilst the infusion was interrupted, repeat aPTT before adjusting the dose.

RED FLAG

If aPTT is not therapeutic within 24 hours a **Medical Officer** MUST review the rate and document the decision to proceed with IV heparin infusion in the patient's health care record.

Continue to order blood for aPTT, check aPTT and titrate infusions as per the nomogram for required duration of therapy.

Perioperative management and other considerations for Ceasing and Recommencing IV Heparin – prescribing and management

Instructions to cease/recommence IV heparin needs to be as directed by the MO.

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 medical record. This will generally require consultation with Haematology or Cardiology as appropriate.

Pre-procedure or surgery	Recommencing following surgery
• Cease IV heparin 6 hours prior to surgery (if the aPTT is within the therapeutic range). • If the aPTT is above the therapeutic range, a longer delay may be required before the procedure. • Check that the aPTT is within the normal range immediately prior to procedure.	The surgeon should advise when the IV heparin infusion can be recommenced. General guidance is: • 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. • Patients with a **high bleeding risk** should recommence (without bolus) the heparin infusion after 24 to 48 hours post-operatively (depending on surgical assessment). • The infusion rate chosen is that previously used to achieve therapeutic range aPTT.

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

Pre-procedure	Post-procedure
• Cease infusion 4-6 hours prior to the procedure.	• Recommence the heparin infusion (without bolus) 2 hours after procedure provided haemostasis is ensured.

Lumbar Puncture

Specialist haematology advice should be sought for patients receiving intravenous unfractionated heparin therapy requiring therapeutic or diagnostic lumbar puncture. General guidance is:

Pre-procedure	Post-procedure

• Cease infusion 6 hours prior to procedure (if the aPTT is within the therapeutic range). • Repeat aPTT immediately prior to the procedure to ensure that the aPTT is within the normal range before proceeding to procedure. If the aPTT is above the therapeutic range, a longer delay may be required before the procedure.	• Recommence the heparin infusion (without bolus) 2 hours (minimum) after procedure provided no evidence of bleeding or a bloody tap (i.e. 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.

Insertion or Removal of Spinal or Epidural Catheters

Specialist anaesthetic advice should be sought for patients receiving IV heparin who require epidural or spinal anaesthesia as the use of indwelling spinal or epidural catheters is generally contraindicated in patients receiving IV heparin. General guidance is:

Pre-procedure	Post-procedure
• The insertion of catheter in a patient currently on therapeutic heparin will be ceased and not re-started whilst catheter in situ. • Cease infusion 6 hours prior to the procedure (assuming the aPTT is within the therapeutic range). • Repeat aPTT immediately prior to the procedure to ensure that the aPTT is within the normal range before proceeding to surgery. If the aPTT is above the therapeutic range, a longer delay may be required before the procedure.	• The timing of recommencement of IV heparin after the catheter is removed should be a minimum of 4 hours after the removal of the catheter, and in consultation with the inserting anaesthetist.

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 an urgent CT 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.

Transitioning to or from IV Heparin

- Bridging with IV heparin should be reserved for ONLY those patients for whom bridging with enoxaparin is contraindicated.
- Information on transitioning to a DOAC (direct oral anticoagulant, e.g., dabigatran, apixaban, rivaroxaban) can be found in the CEC DOAC Guidelines.
- The CEC Guidelines on Perioperative Management of Anticoagulant and Antiplatelet Agents, include details on managing patient on warfarin who require bridging therapy.

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 (IMS+).

9. AUDIT

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

10. REFERENCE DOCUMENTS

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Related Documents

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NSW Health Policy Directive PD2024_006 - High Risk Medicines Management
NSW Health Policy Directive PD2022_032 - Medication Handling
SESLHDPD/160 - Medication: Administration by Enrolled Nurses

11. 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.

12. VERSION AND APPROVAL HISTORY

Date	Version	Version 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.
31 January 2025	9	Major review to address identified risks and in response to clinician feedback. Appendix C – Acute Stroke Protocol removed. Endorsed by SESLHD Drug and Therapeutics Committee, Patient Safety and Quality Committee and Chief Executive..

APPENDIX A – Standard Bleeding Risk Protocol [1]

IV HEPARIN STANDARD BLEEDING 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 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		

Infusion Initiation Protocol:

- Use Premixed Solution of Heparin Sodium 25,000 units in 250mL 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 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

STANDARD RISK PROTOCOL

APPENDIX B –Higher Bleeding Risk Protocol

(Where bleeding risk needs to be minimised) [5]

IV HEPARIN HIGHER BLEEDING RISK PROTOCOL

HIGHER BLEEDING RISK PROTOCOL

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 HIGHER BLEEDING RISK PROTOCOL

HIGHER BLEEDING RISK PROTOCOL

Infusion Initiation Protocol:

- Use Premixed Solution of Heparin Sodium 25,000 units in 250mL 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	960 Units	10
84 and over	1000 units	10

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	

HIGHER BLEEDING RISK PROTOCOL