SESLHD PROCEDURE COVER SHEET

NAME OF DOCUMENT	Anticoagulation with Intravenous Heparin Sodium Infusion
TYPE OF DOCUMENT	Procedure
DOCUMENT NUMBER	SESLHDPR/402
DATE OF PUBLICATION	April 2018
RISK RATING	Extreme – High Risk Medication
LEVEL OF EVIDENCE	NSQHS standard – 4 - Medication Safety
REVIEW DATE	April 2019
FORMER REFERENCE(S)	Facility Clinical Business Rules (anticoagulation with IV Heparin sodium infusion)
EXECUTIVE SPONSOR or EXECUTIVE CLINICAL SPONSOR	Director of Clinical Governance
AUTHOR	SESLHD IV Heparin Working Party
POSITION RESPONSIBLE FOR THE DOCUMENT	Cardiac Respiratory / Intensive Care Stream Manager
KEY TERMS	Heparin Intravenous Intravenous Heparin Heparin Infusion
SUMMARY	The procedure provides instructions on how to initiate, dose adjust and monitor a therapeutic heparin sodium infusion for optimal patient outcomes and safety.

Feedback about this document can be sent to seslhd-executiveservices@health.nsw.gov.au

Anticoagulation with Intravenous Heparin Sodium Infusion

SESLHDPR/402

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 - PD2015_029 High-Risk Medicines Management Policy, NSW Ministry of Health PD2013_043 - Medication Handling in NSW Public Health Facilities and one of the approved SESLHD IV heparin infusion protocols.

IV Heparin infusion protocols in SESLHD are indication specific. The indications and approved IV heparin Infusion protocols in SESLHD are:

- **NSTEMI -** Non ST Elevation Myocardial Infarction
- **STEMI -** ST Elevation Myocardial Infarction (in conjunction with Thrombolysis**)**
- **VTE / ATE / AF -** Venous Thromboembolism / Arterial Thromboembolism / Atrial Fibrillation and other indications for therapeutic anticoagulation where a specific protocol does not exist such i.e. prosthetic heart valves
- **Acute Stroke** –only use protocol following consultation with the Attending Medical Neurologist (No bolus unless requested by Attending Neurologist)

IV heparin infusion protocols:

- include dosing calculated by measured body weight and [1]
- 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 indication specific protocols, which include evidenced 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.

Centralised 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, 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 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.
- escalate any adverse events occurring to patients receiving IV heparin
- an Admitting Medical Officer (AMO), or Registrar acting on his/her 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.
- achieve competency in managing IV heparin before titrating an IV heparin infusion
- escalate any adverse events occurring to patients receiving IV heparin.

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 IV heparin.

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 PD 2015_029 High- Risk Medicines Management policy and Anticoagulation Policy Standard.* NSW PD2015_029 High Risk Medicines Management Policy

6. PROCEDURE

6.1 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.

6.2 Order baseline tests

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

6.3 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)
    - No bolus for stroke patients unless requested by admitting Neurologist
    - No bolus for neurosurgical patients unless requested by attending Neurosurgeon and with guidance from a Haematologist. (see 6.6 for information regarding bolus doses)
- Prescribe 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.

6.4 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 NSTEMI (Appendix 1), STEMI with thrombolysis (Appendix 2), AF/VTE/ATE (Appendix 3) and Acute Stroke (Appendix 4).
- If a patient has two or more indications for anticoagulation with IV heparin (e.g. STEMI with thrombolysis and AF) the AMO must specify which protocol is to be used. The rationale should be documented in the patient's Health Care Record.

6.5 Review Concomitant Medications

- 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 intravenous heparin therapy in patients already anticoagulated with low molecular weight heparins, warfarin or other oral anticoagulant medications requires considerable caution. Guidance from a Haematology Consultant should be sought whenever changing to IV heparin
- Bolus injection may cause bleeding in patients already therapeutically anticoagulated – seek Haematology advice when switching anticoagulant drugs.

6.6 Prescribe and Administer IV Heparin Bolus

- Refer to the indication specific protocol for instruction regarding bolus dose prescription
- Bolus injection 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)
    - No bolus for stroke patients unless requested by admitting Neurologist
    - No bolus for neurosurgical patients 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.

6.7 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
- Premixed **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.

6.8 Monitoring APTT Levels and Infusion Rate Adjustments

- Order and take blood sample for an APTT:
  - Six hours after the start of the IV heparin infusion
  - 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
- Mark requests "urgent IV heparin" to ensure 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.

6.9 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.

6.10 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 IV heparin dose, APTT results and risk factors for bleeding (concomitant anti-platelet 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 PACE system [2]
- 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 the 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. [2] Return to prior section

6.11 Advice for Ceasing and Recommencing IV Heparin

6.11.1 Surgery

- Patients on intravenous heparin undertaking surgery require a pre and post-operative plan for their anticoagulant therapy to be 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 infusion (without bolus) six to eight hours postoperatively
- Generally patients not at very high risk of thromboembolism should recommence infusion after 24 to 48 hours postoperatively depending on surgical assessment.

6.11.2 Procedures (e.g. insertion CVC, biopsy)

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

6.11.3 Lumbar Puncture

- Cease infusion ≥ 6 hours prior to procedure
- Recommence infusion (without bolus) > 2 hours after procedure provided no blood on needle
- If traumatic lumbar puncture anticoagulation may need to be delayed for up to 24 hours depending on the clinical context.

6.11.4 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.

6.12 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, 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 SESLHD Falls policy for information on the management of patients following a fall (p 11) https://www.seslhd.health.nsw.gov.au/policies-and-publications/functional-group/107

7. 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 Information Management System (IIMS).

8. AUDIT

- Pre and post implementation chart audit
- Review IIMS pertaining to IV heparin
- Stock and storage of ward/unit heparin ampoules.

9. 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.	TGA eBS Product and Consumer Medicine Information Heparin Sodium Product Information-Australia version 6 pp1-7. Last Updated: 23 June 2015
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

National Safety and Quality Health Service Standard No. 4 “Medication Safety” National Safety and Quality Health Service Standards - Australian.
NSW Ministry of Health PD2015_029 High-Risk Medicines Management Policy
NSW Ministry of Health 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

APPENDICES

1 – 4 SESLHD IV Heparin Protocols

- **NSTEMI -** Non ST Elevation Myocardial Infarction
- **STEMI -** ST Elevation Myocardial Infarction (with thrombolysis)
- **VTE / ATE / AF -** Venous Thromboembolism / Arterial Thromboembolism / Atrial Fibrillation and other indications for therapeutic anticoagulation where a specific protocol does not exist such as prosthetic heart valves
- **Acute Stroke** – NB: only to be used in consultation with the Attending Medical Neurologist (No bolus unless requested by admitting 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.

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.

Return to document content

APPENDIX 1 – NSTEMI [5]

IV Heparin Initiation Protocol: NSTEMI - Non-ST Elevation Myocardial Infarction

Initial Bolus Dosage: 60units/kg

- Only use Heparin Sodium 5,000 units in 5 mL ampoules

Infusion: 25,000 units Heparin Sodium in 250 mL Sodium Chloride 0.9% (Use Premix Solution)
(100 units per mL based on 15 units/kg/hr MAX: 1,000 units/hr, rounded to nearest 1 mL per hour)

WEIGHT (kg)	BOLUS (units)	Infusion rate (units per hour)	Infusion Pump Rate (mL per hour)
40	2400	600	**6**
45	2700	675	**7**
50	3000	750	**8**
55	3300	825	**8**
60	3600	900	**9**
65	3900	975	**10**
70	4200	1000	**10**
75	4500	1000	**10**
80	4800	1000	**10**
Greater than 80	5000	1000	**10**

NSTEMI

IV Heparin Adjustment Nomogram: NSTEMI- Non-ST Elevation Myocardial Infarction

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	6 hours
45-70	**Therapeutic Range No change from current rate**			**Repeat** at 6 Hours **After** 2 consecutive therapeutic APTTs, check APTT at 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	6 hours
90.1 to 105	Nil	No	**Decrease** rate by 2 mL/hr from current rate	6 hours
Greater than 105	Nil	**Stop** for 90 minutes. MO to assess patient for bleeding	**Restart** infusion after 90 minutes and **reduce previous rate** by 2 mL/hr	6 hours after recommencing infusion

NSTEMI

Return to document content

APPENDIX 2 – STEMI (in conjunction with Thrombolysis) [4]

IV Heparin Initiation Protocol: STEMI - ST Elevation Myocardial Infarction with Thrombolysis

Initial Bolus Dosage: 60 units/kg. Maximum 4000 units.

- Only use Heparin Sodium 5000 units in 5 mL ampoules

Infusion: 25,000 units Heparin Sodium in 250 mL Sodium Chloride 0.9% (Use Premix Solution)
(100 units per mL based on 12 units/kg/hr MAX:1,000 units/hr, rounded to nearest 1 mL per hour)

WEIGHT (kg)	BOLUS (units)	Infusion rate (units per hour)	Infusion Pump Rate (mL per hour)
40	2400	480	**5**
45	2700	540	**5**
50	3000	600	**6**
55	3300	660	**7**
60	3600	720	**7**
65	3900	780	**8**
70	4000	840	**8**
75	4000	900	**9**
80	4000	960	**10**
Greater than 80	4000	1000	**10**

STEMI

IV Heparin Adjustment Nomogram: STEMI (in conjunction with Thrombolysis) - ST Elevation Myocardial Infarction

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	6 hours
45 to 70	**Therapeutic Range No change from current rate**			**Repeat** at 6 hours. **After** 2 consecutive therapeutic APTTs check at 24 hours. **Daily** APTT whilst results within therapeutic range.
70.1 to 90	Nil	No	**Decrease** rate by 1 mL/hr from current rate	6 hours
90.1 to 105	Nil	No	**Decrease** rate by 2 mL/hr from current rate	6 hours
Greater than 105	Nil	**Stop** for 90 minutes; MO to assess pt for bleeding	**Restart** infusion after 90 minutes and **reduce previous rate** by 2 mL/hr	6 hours after recommencing infusion

STEMI

Return to Document Content

APPENDIX 3 - VTE/ATE/ AF and other indications [1]

IV Heparin Initiation Protocol: VTE / ATE / AF and other indications

Initial Bolus Dosage: based on 80 units/kg rounded to nearest 500 units

- Only use Heparin Sodium 5000 units in 5 mL ampoules
- No bolus for stroke patients unless requested by Attending Neurologist
- No bolus for neurosurgical patients unless requested by attending Neurosurgeon with guidance from a Haematology consultant

Infusion: 25,000 units Heparin Sodium in 250 mL Sodium Chloride 0.9% (use Premix Solution)
(100 units per mL based on 18 units/kg/hr rounded to nearest 1 mL per hour)

WEIGHT (kg)	**BOLUS (units)**	Infusion rate (units per hour)	**Infusion Pump Rate (mL per hour)**
40	3000	720	**7**
45	3500	810	**8**
50	4000	900	**9**
55	4500	990	**10**
60	5000	1080	**11**
65	5000	1170	**12**
70	5500	1260	**13**
75	6000	1350	**14**
80	6500	1440	**14**
85	7000	1530	**15**
90	7000	1620	**16**
95	7500	1710	**17**
100	8000	1800	**18**
105	8500	1890	**19**
110	9000	1980	**20**
115	9000	2070	**21**
120	9500	2160	**22**
125	10000	2250	**23**
130	10500	2340	**23**
135	11000	2430	**24**
140	11000	2520	**25**
145	11500	2610	**26**
150	12000	2700	**27**
155	12500	2790	**28**
160	13000	2880	**29**
165	13000	2970	**30**
170	13500	3060	**31**

V T E / A T E / AF

IV Heparin Adjustment Nomogram: VTE / ATE / AF and other indications					
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	6 hours	
40 to 44.9	Nil	No	**Increase** rate by 1 mL/hr from current rate	6 Hours	
45 to 90	**Therapeutic Range No change from current rate**			**Repeat** at 6 Hours. **After** 2 consecutive therapeutic APTTs check at 24 hours. **Daily** APTT while results within therapeutic range.	VTE / ATE / AF
90.1 to 95	Nil	No	**Decrease** rate by 1 mL/hr from current rate	6 hours	
95.1 to 105	Nil	No	**Decrease** rate by 2 mL/hr from current rate	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	6 hours after recommencing infusion	

Return to Document Content

APPENDIX 4: Acute Stroke - Only to be used in consultation with the Attending Neurologist

IV Heparin Initiation Protocol: Acute Stroke

Initial Dosage: Bolus dose NEVER used, unless requested by Attending Neurologist

Infusion: 25,000 units Heparin Sodium in 250mL Sodium Chloride 0.9%
(100 units per mL - based on 15 units/kg/hr, MAX:1000 units/hr, rounded to nearest 0.1 mL/hour)

WEIGHT (kg)	Infusion rate (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	1,000	**10**
Greater than 70	1,000	**10**

ACUTE STROKE

IV Heparin Adjustment Nomogram: Acute Stroke

APTT (seconds)	Stop Infusion	IV Rate Change (mL/hr)	Repeat APTT
Less than 40	No	**Increase** rate by 1 mL/hr from current rate	6 hours
40 to 44.9	No	**Increase** rate by 0.5 mL/hr from current rate	6 hours
45 to 60	**Therapeutic Range No change from current rate**		**Repeat** at 6 hours. After 2 consecutive therapeutic APTTs, check at 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	6 hours
65.1 to 70	No	**Decrease** rate by 1 mL/hr from current rate	6 hours
70.1 to 80	No	**Decrease** rate by 2 mL/hr from current rate	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

APPENDIX 5: Overview of Procedure – Anticoagulation with Intravenous Heparin Sodium Infusion

Overview of Procedure – Anticoagulation with Intravenous Heparin Sodium Infusion	
Appendices	Approved Intravenous Heparin Administration Protocols in SESLHD are: • **NSTEMI -** Non ST Elevation Myocardial Infarction • **STEMI -** ST Elevation Myocardial Infarction (in conjunction with Thrombolysis) • **VTE / ATE / AF -** Venous Thromboembolism / Arterial Thromboembolism / Atrial Fibrillation and other indications for therapeutic anticoagulation where a specific protocol does not exist such as for prosthetic heart valve • **Acute Stroke** – use only in consultation with the Attending Medical Neurologist (No bolus unless requested by Attending Neurologist)
Procedure Section	
6.1	**Verify Actual Body Weight** (measured)
6.2	**Order & take baseline tests**
6.3	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)
6.6	**Prescribe & Administer** IV Heparin Bolus (only if required) No bolus for stroke patients unless requested by admitting 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 - according to the prescribed protocol and patient's weight - administer via a designated port, lumen or cannula - flush with 5 to 10 mL Sodium Chloride 0.9% pre and post injections
6.7	**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 weight - use a volumetric infusion pump
6.8	**Order APTT** tests (to be collected 6 hours after the start of the IV heparin infusion)
6.8	**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 2 consecutive results are within the therapeutic range. Then daily while results are within therapeutic range.
6.8	**Check for APTT** results **within 2 hours** of taking sample
6.8	**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
6.8	Continue to order blood for APTT, check APTT and titrate infusion as per the nomogram until patient reaches therapeutic range
6.9	**Monitor** for possible Heparin Induced Thrombocytopenia **(HIT)** - ongoing
6.9	**Monitor patient for Bleeding** - inspect cannulas, drains, surgical or wound sites - check for bruising, epistaxis, microscopic haematuria (urinalysis), gum bleeding - escalate concerns