



Updated 2025

Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package

Participant Name:

Assessor Name:

Date package Completed:

Date entered on to HETI: / /

HETI Code: 94741346 (or CSK 13976)

Note: this knowledge assessment package has been updated to reflect SESLHDPR/402 Anticoagulation with Intravenous Heparin Sodium Infusion version 9 published January 2025.

INTRODUCTION

Continuous intravenous infusion of **heparin sodium (IV heparin)** is used to prevent and manage venous and arterial thromboembolism. The clinical indications for IV heparin in SESLHD include:

- treatment of venous thromboembolism (VTE), including pulmonary embolism (PE) and deep vein thrombosis (DVT)
- treatment of acute coronary syndromes (ACS):
 - ST elevation myocardial infarction (STEMI)
 - Immediate to high-risk non-ST elevation acute coronary syndromes (NSTEMI/ACS)
- treatment of arterial thromboembolism, including peripheral arterial occlusion
- prevention of thrombosis in atrial fibrillation (AF)
- prevention of thrombosis with mechanical heart valves.

Systemic anticoagulation with **IV heparin** is also used as bridging therapy for individuals ceasing oral anticoagulation temporarily for invasive procedures.

Heparin belongs to a group of medicines called **anticoagulants**. **Heparin** acts through inactivation of blood clotting factors. Anticoagulants have a narrow therapeutic index, meaning over or under anticoagulation can have devastating consequences. **Heparin** and other **anticoagulants** have a high risk of causing patient injury or death (related to extensive bleeding) if they are inadvertently misused or administered incorrectly. In addition to bleeding, patients can experience an uncommon but serious adverse reaction known as heparin induced thrombocytopenia (HIT) which carries a mortality rate of thirty percent.

IV **heparin** is a high risk medication and has been linked to serious adverse patient outcomes. Review of incidents revealed the importance of documenting the clinical indication for IV Heparin, using the appropriate IV heparin protocol and documenting the actions related to the infusion (i.e. titration).

To improve the safety of IV heparin management SESLHD facilities have implemented [Anticoagulation with Intravenous Heparin Sodium Infusion - SESLHDPR/402](#). The procedure standardises the process to prepare, prescribe and administer IV heparin. It includes the approved IV heparin infusion protocols which 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.

To centralise and improve the documentation of IV heparin, documentation **MUST** occur on the SESLHD Intravenous Heparin Sodium chart (SES130.030).

This knowledge assessment package is designed to ensure clinicians are aware of their professional responsibilities related to the preparation, administration, monitoring and documentation of IV **heparin**.

This knowledge assessment package may be completed by registered nurses (RNs)/ registered midwives (RM) and enrolled nurses (ENs) who have completed all relevant board approved units of study for medication **AND** intravenous medication administration.


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.

RESOURCES

This package can be completed by referring to the SESLHD Procedure 'Anticoagulation with Intravenous Heparin Sodium Infusion' (under 'H' for Heparin): [SESLHDPR/402 - Anticoagulation with Intravenous Heparin Sodium Infusion](#) and:

- [SESLHDPR/303 - Clinical Handover: Implementation of the ISBAR Framework and Key Standard Principles](#)
- [NSW Ministry of Health Policy Directive PD2022_032 - Medication Handling](#)
- [NSW Ministry of Health Policy Directive PD2024_006 – High-Risk Medicines Management](#)
- [Clinical Excellence Commission – Anticoagulants High Risk Medicines Standard](#)
- Australian Commission on Safety and Quality in Health Care, [National Standard for User-applied Labelling of Injectable Medicines, Fluids and Lines](#), 2015

Other resources to assist with completion of knowledge assessment package:

- CIAP portal accessed through the  icon on computer desktops located in your ward. Through this portal the following can be accessed: Australian Injectable Drug Handbook; Australian Medicines Handbook; Australian Neonatal Medicines Formulary; AMH Children's Dosing Companion; Therapeutic Guidelines and MIMS.
- [NSW Health Policy Directives](#)
- [South Eastern Sydney Local Health District Policies](#)
- [Antithrombotic Management](#), Hematology Services, POWH

OBJECTIVES

The purpose of this knowledge assessment package is to:

- Provide staff with education to increase their knowledge regarding the basic pharmacology of IV heparin as a therapeutic anticoagulant including class of medication, mechanism of action, principles of administration, monitoring, common adverse effects, and management of bleeding.
- Provide staff with education to increase their knowledge regarding the clinical indications and SESLHD approved protocols used for anticoagulation with IV heparin
- Facilitate safe practice and adherence to SESLHD procedure regarding the **preparation, administration, monitoring and documentation** of IV heparin.

LEARNING OUTCOMES

The learner who successfully completes this package will comprehend the clinician responsibilities involved with preparation, administration, monitoring and documentation of anticoagulation with IV heparin.

ACKNOWLEDGEMENTS:

This package was originally developed by members of the SESLHD Heparin Working Party in April 2015.

The package was adapted from the POWH Intravenous Heparin Infusion Learning Package developed by Sarah Lyons CNC Venous Thromboembolism (VTE) prevention in January 2014 as part of initiatives undertaken by the POWH Heparin and other Anticoagulants High Risk Medicine Working Party.

The format of this package has been adapted from the 'S4D & S8 MEDICATION' learning package which was based on the original work by Parkes 4 Oncology Unit & Dickinson 2 North Surgical Unit POWH.

SESLHDPR/402 Anticoagulation with Intravenous Heparin Sodium Infusion Procedure was extensively revised in late 2024. The Anticoagulation with Intravenous Heparin Sodium Infusion Knowledge Assessment Package was subsequently updated with the support of Robin Girle, Nurse Manager, Practice and Workforce Capabilities Service and several Clinical Nurse Educators from across the district.

INSTRUCTIONS

Read the Anticoagulation with Intravenous Heparin Sodium Infusion Procedure – [SESLHDPR/402 - Anticoagulation with Intravenous Heparin Sodium Infusion](#). Circle or underline the correct response.

Sample Question:

Q. Indications for IV Heparin infusions in SESLHD are:

- a. Treatment of venous thromboembolism (VTE)
- b. Prevention of thrombosis in atrial fibrillation (AF)
- c. Treatment of acute coronary syndromes (ACS)
- d. All of the above

QUESTIONS

Q1. Heparin belongs to the class of medications known as?

- a. Antiplatelet medications
- b. Anticoagulants
- c. Anti-inflammatory medications
- d. Fibrinolytic medications

Q2. Heparin is a high risk medication. The main risk of anticoagulation with IV heparin is:

- a. Bleeding
- b. Infection
- c. Allergic reaction
- d. Anemia

Q3. Safe administration of anticoagulation with Intravenous IV heparin in SESLHD requires:

- a. Appropriate dosing according to clinical indication and body weight
- b. Individualisation of heparin infusion rate by measurement of aPTT and protocol directed rate (dose) adjustments
- c. Regular review of the patient's clinical progress and documentation of IV heparin therapy on the Intravenous IV Heparin Sodium Chart
- d. All of the above

Q4. In regards to bolus doses of IV heparin which statement is the most correct?

- a. Baseline laboratory tests are NOT required prior to the commencement of the initial bolus dose
- b. The bolus prescriptions is protocol dependent and calculated using the patient's actual body weight
- c. The initial bolus dose MUST be given by the responsible medical officer
- d. Bolus dosing can be administered via a volumetric pump using the premixed heparin infusion bag rather than using a heparin 5000 units in 5 mL solution

Not all patients will require a bolus dose of IV heparin sodium. The responsible Medical Officer must refer to the relevant protocol for instructions regarding bolus dose prescription. An IV bolus of heparin is given in conjunction with the initiation of the IV Heparin infusion if an immediate anticoagulant effect is required.

Q5. A bolus dose of heparin may be omitted if:

- a. The patient is already therapeutically anticoagulated (e.g. switching from warfarin to IV heparin infusion where the INR is therapeutic).
- b. The patient has been diagnosed with an acute ischaemic stroke and is at risk of a bleeding or haemorrhagic transformation.
- c. The responsible Medical Officer has deemed the bolus is not indicated or safe for an individual patient in a specific clinical situation (i.e. the patient does not require or should not receive immediate anticoagulation). In this instance this rationale MUST been documented in the patient's Health Care Record. An example may include restarting IV Heparin infusion following a high bleeding risk surgery such as a craniotomy.
- d. All of the above.

Q6. Which statement, about the safe monitoring of a patient receiving a heparin infusion, is most accurate?

- a. The aPTT sample should be collected from the same arm as the intravenous access point for the IV heparin infusion
- b. A blood sample for aPTT MUST be taken between 4 and 6 hours after the commencement of the IV heparin infusion
- c. aPTT monitoring should be checked at the same time every day
- d. Blood tests and results monitoring are the sole responsibility of the medical team

Scenario based questions:

The following scenario-based questions relate to **Katherine**:

Katherine, a 73-year-old women, presents to the emergency department with pain and swelling in her lower right leg. She was recently discharge from hospital after a 7-day admission for pneumonia. She has recently quit smoking. Her D-dimer is elevated and a venous compression ultrasound (CUS) confirms a deep vein thrombosis (DVT).

Q7. Which of the following baseline blood tests should be ordered and reviewed prior to starting anticoagulant therapy? Select ALL correct answers.

- a. full blood count (FBC), including platelet count and haemoglobin
- b. prostate specific antigen (PSA)
- c. activated partial thromboplastin time (aPTT)
- d. prothrombin time (PT)
- e. glycated haemoglobin (HbA1c)
- f. International Normalised Ratio (INR) if the patient was previously using warfarin or is being transitioned to warfarin or liver impairment is suspected.
- g. urea, electrolytes and creatinine (UEC)
- h. liver function tests (LFT)
- i. thyroid stimulating hormone (TSH)

Q8. The IV heparin infusion protocol routinely used to achieve therapeutic anticoagulant for the treatment of VTE, including PE and DVT is the:

- a. Standard Risk Protocol
- b. Higher Bleeding Risk Protocol
- c. None of the above

Q9. The dosing of heparin bolus and infusion is weight based. Which of the following is correct?

- a. Calculating the patient's ideal body weight using age, height and gender is preferred
- b. An estimate of total body weight is preferred to weighing the patient for convenience
- c. Weighing the patient and recording the actual body weight kilograms on both the SESLHD Intravenous Heparin Sodium chart and in the electronic medical record
- d. Using the weight recorded in the patient care record from previous admissions is adequate

Katherine has a list of her medications in her wallet. She currently takes:

- ***Aspirin 100 mg in the morning***

These are confirmed with Katherine's GP, and she has no allergies, no history of bleeding problems, or prior history of HIT.

The emergency registrar recognizes that Katherine is on aspirin and has determined that it is appropriate to withhold while on anticoagulant therapy.

Katherine is 160 cm tall and weighs 65 kg.

Q10. What bolus dose of IV heparin would be prescribed for Katherine (unless protocol variation specified by a clinician experienced in anticoagulation management)?

- a. 1260 units
- b. 13 mL
- c. 2.5 mL
- d. 5000 units

Q11. What commencement rate for the heparin infusion would be prescribed for Katherine (unless protocol variation specified by a clinician experienced in anticoagulation management)?

- a. 1350 units
- b. 12 mL
- c. 2.5 mL
- d. 5500 units

Katherine's aPPT result is now available.

The blood test was taken 5 hours after the commencement of the IV heparin infusion and the value is 48 seconds.


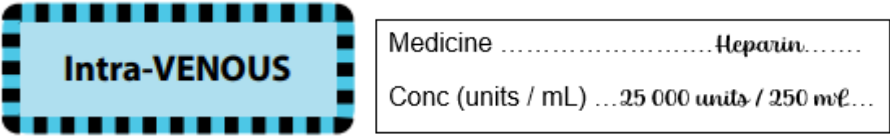
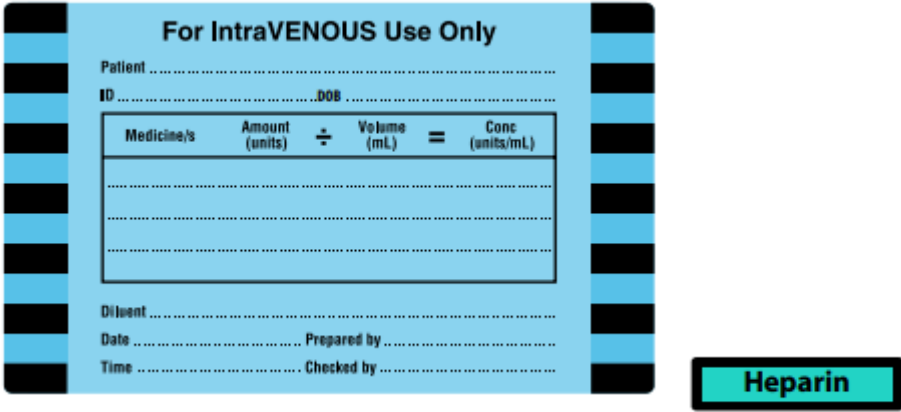

Q12. Which of the following actions would be appropriate for Katherine's heparin infusion in accordance with the protocol?

- a. Give a bolus dose of heparin 5000 units and repeat the aPTT between 4– 6 hours post bolus
- b. Stop the infusion for 90 minutes, alert the Medical Officer to review the patient for bleeding and restart the infusion (after 90 minutes) at 2 mL/hr less than the previous rate. Repeat the aPTT between 4– 6 hours post dose adjustment
- c. Nil action. Continue at current rate. Repeat the aPTT in 6 hours
- d. Increase the rate by 1 mL/hr from the current rate. Repeat the APTT between 4– 6 hours post dose adjustment. Do not give a bolus. Do not stop the infusion

Q13. You are preparing Katherine's infusion.

i. Does the heparin infusion fluid bag require an additional user-applied label?

ii. Which of the following correctly identifies the line labels that are required for a heparin infusion in SESLHD?

- a. 
- b. 
- c. 
- d. 

Katherine wants to go for a shower and needs to change her gown. She has asked to be disconnected from their intravenous heparin infusion so they can shower more freely.

Q14. Why should intravenous heparin infusions NOT be disconnected? Select ALL correct answers.

- a. Continuous intravenous infusion of IV heparin is used for the prevention and management of venous and arterial thromboembolism in hospitalised patients
- b. Anticoagulation with intravenous heparin must be continuous in order to be therapeutic
- c. Interruption of parental therapeutic anticoagulation places the patient at risk of venous and/ or arterial thromboembolism

While you were on your break Katherine was escorted to and from another department by another clinician. When you check her heparin infusion you observe that the infusion rate is running at 15 mL/hr.

Q15. Place the following actions in the order which best describe the subsequent nursing actions to be undertaken (place a 1 next to the first action and so on):

- Continue to monitor the patient and document appropriately on the IV Heparin Sodium Chart and in the patient's health care record
- Assess the patient for signs of bleeding (look for obvious and concealed bleeding, attend to vital signs)
- Review the IV Heparin Sodium Chart and in the patient's health care record to determine if the rate change was intentional
- Ask the other clinician about the rate change
- Escalate appropriately if signs of bleeding are observed
- Arrange for blood test monitoring as per the responsible Medical Officer
- Inform the responsible medical officer immediately and seek advice on rate prescription

Katherine has signs of gum bleeding. The heparin infusion is STOPPED. Urgent FBC, aPTT and Blood Group and Antibody Screen (“Group and Hold”) are ordered, but there is a delay collecting the blood sample due to difficult access. The blood sample is collected 2 hours after the heparin infusion was STOPPED and the aPTT result returns as 42 seconds. Katherine’s gum bleeding has resolved 4 hours after heparin infusion STOPPED.

Q16. Which of the following is the most accurate response?

- a. Due to the short half-life of heparin, withholding a heparin infusion for more than 2 hours requires the re-initiation of the protocol. Administer a bolus dose and restart the infusion using the initial rate calculation
- b. As the bleeding has resolved, restart heparin infusion at previous protocol rate
- c. The protocol does NOT support withholding a heparin infusion for more than 2 hours. The AMO to provide specific instruction for treatment off-protocol.
- d. Increase the infusion rate by 1 mL/hr from current rate (i.e., 16 mL/hr).

Q17. Complete the grey sections of the Intravenous Heparin Sodium chart

Date	Time*	aPTT Result (seconds)	Action (eg rate commenced/increased/ decreased/ hold for 90 minutes/ ceased or rate maintained)	Rate mL/ hour	Sign	Second Person Check
16/12/24	09:00		Infusion STOPPED due to bleeding		Nurse A	
16/12/24			aPTT collected		Nurse A	
16/12/24	12:00		aPTT reviewed		Doctor B	
16/12/24	12:00				Nurse A	Enrolled Nurse Z

Q18. Indicate (with a cross) which clinicians are responsible for the following activities:

	Medical Officers (MO)	Nurse Practitioners (NP) / Registered Nurses (RN) / Registered Midwives (RM)	Enrolled Nurses (ENs)	Pharmacists
a. Determining the appropriate heparin protocol				
b. Reviewing aPTT results				
c. Monitoring patients for signs of bleeding				
d. Adjusting heparin infusions in accordance with the protocol				
e. Witnessing dose adjustments				
f. Reporting adverse events associated with heparin				

On DAY 5 of admission, Katherine is diagnosed with hospital acquired pneumonia and requires intermittent intravenous antibiotics. She currently has only ONE peripheral intravenous cannula in situ.

Q19. What is the appropriate action for managing Katherine's infusion of intravenous antibiotics in addition to a IV heparin infusion?

- a. Use her single peripheral cannula to connect the heparin infusion to and stop it for antibiotics when required
- b. Arrange a maintenance fluid line to connect to the cannula for intermittent antibiotics and 'piggy back' the heparin infusion at the 'y site'
- c. Arrange for the insertion of dedicated intravenous access (peripheral intravenous cannula) for use for the continuous intravenous heparin infusion
- d. Stop the heparin infusion while considering switching anticoagulant and route of administration (e.g. oral, intramuscular, subcutaneous)

On DAY 7 of admission, Katherine has a witnessed fall.

Q20. Regarding Katherine's fall while on a heparin infusion, which statement is the most accurate?

- a. A fall (witnessed or unwitnessed) while on IV heparin requires an immediate medical review
- b. Falling in hospital, with confirmed or unconfirmed blunt head injury, whilst on therapeutic anticoagulation is potentially fatal
- c. If there is evidence of head injury, immediate discussion with the patient's doctor, measurement of APTT, cessation of IV heparin therapy, and urgent CT scanning is recommended
- d. All of the above

On DAY 9 of admission, Katherine is preparing for discharge and needs to be switched to an oral anticoagulant to complete her DVT treatment course.

Q21. If the medical officer decides to start apixaban, what dose is appropriate for DVT treatment and when should it start after stopping the heparin infusion?

- a. 5 mg TWICE a day starting within one hour of stopping the heparin infusion
- b. 15 mg TWICE a day starting 12 hours after stopping the heparin infusion
- c. 10 mg TWICE daily for 7 days, then 5 mg TWICE a day starting within one hour of stopping the heparin infusion
- d. 20 mg in the morning starting 12 hours after stopping the heparin infusion

You have completed the knowledge assessment package. Well done.

Please forward your answers to the Educator on your unit/ward. Your Package will be assessed and completion details entered on the HETI system.