Procedure

Heparin: Therapeutic Unfractionated Heparin (UFH) Infusion Procedure

1. Purpose

This document outlines the procedure details for the commencement and maintenance of unfractionated heparin (UFH) infusions at the Women's. It may be necessary to modify this procedure according to individual patient requirements.

2. Definitions

Not applicable.

3. Responsibilities

All staff involved with the prescribing, supply and administration must be aware of this guideline to ensure the safe and appropriate use of heparin infusion.

This includes:

- medical staff
- nursing and midwifery staff
- pharmacy staff.

4. Procedure

4.1 The indications for therapeutic unfractionated heparin (UFH) include the following:

- treatment of acute venous thromboembolism in the medically unstable patient or for patients where labour or surgery is imminent
- prevention of arterial thromboembolism in medically unstable patients with cardiac arrhythmias and/or presumed embolic stroke
- peripartum or perioperative anticoagulation in women with prosthetic heart valves.

4.2 Prescription

UFH can be administered by intravenous or subcutaneous routes. This guideline applies to the intravenous route only. UFH is compatible with 5% Dextrose and 0.9% sodium chloride (NaCl). Premixed heparin infusion bags containing 25,000 units in 250mL sodium chloride 0.9% (100 units/mL) are available .

* Heparin infusion orders should include the dose written as units/kg/hour and the corresponding mL/hour rate.

- Obtain patient weight.
- Obtain baseline FBE, APTT and PT.

  Any patient with a low platelet count or an abnormal APTT or INR should be discussed with a haematologist prior to starting heparin.
- A loading dose of heparin = 80 units/kg to a maximum of 5000 units over 10 minutes is usually prescribed. This may be omitted in patients at increased risk of bleeding.
- A typical maintenance infusion = 18 units/kg/hr.

Patients with renal failure will require modified doses. Consult with Haematology.

4.3 Administration

Equipment:

- Heparin 5000 units in 5mL ampoules (for initial bolus and repeat bolus doses)
- Heparin infusion bag 25,000 units in 250mL sodium chloride 0.9% (100 units/mL) (commercially available premixed bag).

* Patients should have a dedicated line for heparin infusions. The infusion must not be stopped or interrupted for other medicines. APTT blood samples should be drawn from the contra-lateral arm.

Loading dose (80units/kg to maximum of 5000units)

Intravenous injection: administer the required heparin loading dose according to the table below based on patient weight by slow IV injection.

Using:

- Heparin 5000 units in 5mL ampoule (1000 unit/mL).

Patient weight	***Loading dose = 80 units x kg to maximum of 5000 units***	***Volume of loading dose (IV injection)***
kg	***units***	***mL***
40	***3200***	***3.2***
45	***3600***	3.6
50	***4000***	***4***
55	***4400***	***4.4***
60	***4800***	***4.8***
> 62.5	***5000***	***5***
>100	**Contact Haematologist**	

Maintenance Dose (18units/kg/hr)

Intravenous infusion: Premixed heparin infusion bags of 25,000 units in 250mL sodium chloride 0.9% (100 units/mL) should be used and infused at the required rate using an infusion pump with guardrails. Once the loading dose has been completed, configure the infusion pump to accept the 25,000 units in 250mL premixed heparin infusion bag (concentration = 100 units/mL).

Set the weight of the patient and the pump rate to infuse maintenance dose (mL/hr) according to the table below:

Patient weight	**Maintenance dose** **= 18 units x kg / hr**	**Rate of infusion** **= [(maintenance dose ÷ 25000) x 250mL] / hr**
kg	**units**/hr	**mL/hr**
40	**720**	**7.2**
45	**810**	**8.1**
50	**900**	**9**
55	**990**	**9.9**
60	**1080**	**10.8**
65	**1170**	**11.7**
70	**1260**	**12.6**
75	**1350**	**13.5**
80	**1440**	**14.4**
85	**1530**	**15.3**
90	**1620**	**16.2**
95	**1710**	**17.1**
100	**1800**	**18**

4.4 Nomogram for adjusting heparin dose (dose adjustment to be decided by medical officer)

APTT (seconds)	BOLUS (units/kg)	HOLD (minutes)	RATE CHANGE (units/hr)	REPEAT APTT
< 50	50	0	Increase 20%	4 hours
50-59	0	0	Increase 10%	4 hours
60-85	0	0	No change	24 hours
86-95	0	0	Reduce 10%	4 hours
96-120	0	30	Reduce 10%	4 hours
>120	0	60	Reduce 15%	4 hours

4.5 Monitoring of therapy

- **Heparin is usually monitored by APTT.**
  - The therapeutic range corresponds to 1.5-2.5 times the normal APTT (usually 60-90 second).
  - A modified target range may be determined by the haematologist in patients at increased risk of bleeding
  - The MAXIMUM interval between APTT assays should not exceed 24 hours. The APTT may be inaccurate in certain clinical circumstances. An alternative is an anti Xa assay. The therapeutic range for the UFH anti Xa assay is 0.3 – 0.7 units/mL.

NOTE: the UFH anti Xa is a different therapeutic range compared to the LMWH assay. Results cannot be interchanged. Request forms must indicate the **type of heparin** being used.

- **APTT blood samples**
  - Blood samples can NOT be drawn from the same line as the heparin infusion. Coagulation tubes must be filled exactly to the specified mark.
- **Twice weekly FBEs, (platelet count) are required.**
  - If there is an abrupt decrease in platelet count, (e.g. 50%) consider Heparin Induced Thrombocytopaenia (HIT), cease all heparin administration and immediately contact haematologist on call.
- **Duration of therapy**
  - The duration of heparin therapy is dependent upon the primary problem. Please consult the Haematology department for guidelines.
- **Precautions during heparin therapy**
  - Avoid aspirin and other anti-platelet medicines during heparin therapy.
  - Avoid IM injections and arterial stabs during anticoagulant therapy. When such procedures are clinically necessary, ensure adequate external pressure is applied post-procedure.

4.6 Neuroaxial anaesthesia

Intravenous UFH infusion should be ceased 4-6 hours before epidural catheter insertion or spinal injection. A normal APTT and platelet count should be documented before the procedure occurs.

4.7 Adverse events

The major adverse event potentially related to standard heparin infusion is bleeding. If a patient on heparin develops bleeding, cease heparin infusion and seek urgent Haematology consult.

4.8 Heparin antidote

If anticoagulation with heparin needs to be discontinued for clinical reasons, termination of the heparin infusion will usually suffice.

If an immediate effect is required, consider administering protamine sulfate.

Protamine is a medicine that requires a high level of caution when being prescribed and administered. Protamine sulfate neutralises heparin by virtue of its positive charge. Following IV administration, neutralisation occurs within 5 minutes.

- The dose of protamine sulfate is based on the amount of heparin received in the previous 2 hours as follows:

Time since last heparin dose	Protamine dose (mg) per 100 Units heparin received	Maximum Dose of protamine
< 30 min	**1 mg**	The maximum dose of protamine, regardless of the amount of heparin received is 50mg except for reversal of heparin following cardiopulmonary bypass
30-60 min	**0.5-0.75mg**	
60-120 min	**0.375-0.5mg**	
>120 min	**0.25-0.375mg**	

Protamine administration

Protamine sulfate is usually administered by slow IV injection in a concentration of 10mg/mL at a rate not to exceed 5mg/minute. If administered too quickly, protamine sulfate may cause cardiovascular collapse.

Patients with known hypersensitivity reactions to fish, and those who have received protamine-containing insulin or previous protamine therapy may be at risk of hypersensitivity reactions to protamine sulfate.

Obtain blood for PT and APTT 15 min after the administration of protamine sulfate.

5. Evaluation, monitoring and reporting of compliance to this procedure

Compliance to this procedure will be monitored, evaluated and reported through:

- the VHIMS online incident reporting system,
- clinical audit.

6. Reference

1. Lackie CL, Luzier AB, Donovan JA, Feras HI, Forrest A. Weight-based heparin dosing: clinical response and resource utilization. Clin Ther. 1998 Jul-Aug;20(4):699-710.

2. 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. Ann Intern Med. 1993 Nov 1;119(9):874-81.
3. Myzienski AE, Lutz MF, Smythe MA. Unfractionated heparin dosing for venous thromboembolism in morbidly obese patients: case report and review of the literature. Pharmacotherapy. 2010 Mar;30(3):324.
4. Smith ML, Wheeler KE. Weight-based heparin protocol using antifactor Xa monitoring. Am J Health Syst Pharm. 2010 Mar 1;67(5):371-4.

7. Legislation related to this guideline

Not applicable.

8. Appendices

Not applicable.