

When to use and how to monitor intravenous unfractionated heparin in adults

Key Points

- Unfractionated heparin (UFH) should only be used in an environment where staff are experienced with its use.
- UFH dosing is unpredictable. Close attention must be paid to regularly monitoring the APTT ratio at appropriate intervals in order to minimise risks of bleeding or under-anticoagulation.

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Abbreviations

APPT _r	APPT ratio
DOAC	Direct oral anticoagulant
HIT	Heparin-induced thrombocytopenia
LMWH	Low molecular weight heparin
NEWS	National Early Warning System
PE	Pulmonary embolism
UFH	Unfractionated heparin

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1.0 WHEN TO CONSIDER USING IV UFH

Heparin remains the most widely used parenteral antithrombotic. Low molecular weight heparins (LMWHs) have replaced unfractionated heparin (UFH) as the preferred option in most instances due to their predictable dosing, ease of administration and lower rate of side effects.

There remains a role for UFH in certain selected cases where patients have a definite need for therapeutic anticoagulation. Its advantages are that it can be stopped quickly if necessary and its effect wears off rapidly. It can also be easily reversed with protamine. Examples of when UFH may be considered include:

1. Patients who may require their anticoagulation to be stopped very quickly, i.e., those with a very high bleeding risk or those who may require urgent invasive procedures/operations in the next 12-24 hours
2. Patients with severe renal failure (CrCl <10ml/min)
3. Patients with unstable pulmonary embolism (PE) following treatment with alteplase
4. Acute arterial disease

2.0 MONITORING PATIENTS ON IV UFH

- 2.1 Safe use of UFH relies on close monitoring of appropriately timed APPT_r measurements, according to the protocol outlined on p.4. If the patient is not in an environment where the staff regularly manage patients on UFH infusions, they should be moved to a high dependency / critical care setting, or a ward where the staff are familiar with its use.
- 2.2 The target APTT ratio is 1.5-2.5. If the ratio rises above this target, there is an associated bleeding risk and the infusion rate should be slowed (see protocol, Appendix A). If the ratio falls below 1.5, the patient is under-anticoagulated and the rate should be increased.
- 2.3 Staff should monitor patients closely for signs of bleeding or bruising. In the event of significant bleeding (e.g., bleeding from an orifice or bleeding with a change in physiology, i.e., increased NEWS score), the heparin should be stopped and a doctor urgently informed.
- 2.4 The risk of Heparin-induced thrombocytopenia (HIT) is higher with UFH than LMWH. HIT does not usually develop until 5-10 days after starting heparin therapy, unless the patient has been exposed to heparin before. If the patient has received heparin before within the last 100 days, obtain a platelet count 24 hours after starting heparin. For all other patients at least alternate day platelet counts should be performed from day 4 to 14 of therapy. Signs of HIT include a 50% reduction of platelet count, thrombosis, or skin allergy. If HIT is strongly suspected, contact the on-call haematologist for advice.
- 2.5 Inhibition of aldosterone secretion by heparin can result in hyperkalaemia; the risk appears to increase with duration of therapy. The potassium concentration in patients at risk of hyperkalaemia should be monitored regularly, particularly if heparin is to continue for longer than 7 days.

3.0 ADMINISTRATION OF IV UFH

- 3.1 Heparin infusions are given at a standard concentration of 1000 units/mL. The standard volume of 20mL should always be prepared (i.e., 20000 units in 20mL). Once prepared the infusion should only be used for 24 hours and any remaining infusion solution discarded.
- 3.2 The heparin infusion rate must be accurately controlled using a syringe pump and monitored using the specific infusion chart (p.4).
- 3.3 Two registered professionals must set up and check the initial and subsequent syringes and rate changes.

4.0 PERI-OPERATIVE MANAGEMENT OF UFH

- 4.1 IV UFH infusions should be stopped 6 hours before surgery to allow coagulation to return to normal unless instructed otherwise by a doctor.
- 4.2 Post-operatively, UFH is usually restarted 6-12 hours post-operatively (provided there is no abnormal blood loss). It should restart at the previous “steady state” rate, without any bolus dose. It may be started sooner on the advice of a doctor, e.g., following vascular surgery.

5.0 SWITCHING UFH TO ALTERNATIVE ANTICOAGULANT

- 5.1 **LMWH.** UFH infusion should be stopped approximately 2 hours before the first dose of LMWH is due. LMWH can then be started at usual dose.
- 5.2 **DOACs.** DOACs should generally be started at the time of stopping the UFH infusion, apart from Edoxaban, where the SPC states to start 4 hours after stopping the UFH infusion.
- 5.3 **Warfarin.** Patients should continue UFH whilst being loaded with warfarin. Continue to adjust heparin infusion according to APTT ratio. Check INR daily. Discontinue UFH when INR >2.0.

APPENDIX A: HEPARIN INFUSION RECORD CHART

Heparin Infusion Record Chart



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Surname.....			
First name..... Male / Female			
Date of birth			Hospital No:
D	M	Y	NHS No:

Date:
Consultant:

Patient's baseline APTT ratio (pre-heparin): **FBC, U&E and LFTs must also be measured before starting heparin**

If baseline APTT ratio is <1.5:	If the baseline APTT ratio is ≥1.5:
1. Prescribe stat initial loading dose: - 5000 units heparin IV injection (5ml of 1000 units/ml) if patient <120 kg OR - 10000 units heparin IV injection (10ml of 1000 units/ml) if patient >120 kg 2. Prescribe heparin continuous IV infusion (see below), using 20,000 units in 20ml ampoules undiluted (i.e. 20ml of heparin 1000 units/ml). - The initial prescription should be for 1000 units /hour (i.e. 1ml/hour)	Consider the cause of this and consider omitting the bolus dose. Seek advice from the haematologist on-call if needed.

Date	Time	Infusion solution	Drugs to be added	Total volume	Route	Complete either or		Signature and GMC	Start time / Stop time
						Rate	duration of infusion		
d/m/y	hh:mm	Heparin 1000 units/ml		20ml	IV infusion	1ml/hr then adjust according to APPT ratio on heparin infusion record chart		A Doctor	

Above: Example of prescription to be written on the drug chart

After commencement of the infusion, the APTT ratio should be rechecked after **4 hours**, and the heparin dose adjusted according to the table below. ***Advice on altering rate of heparin infusion**

- Use the APTT ratio reported on WinPath/ICE. Do not calculate the APPT ratio.
- Aim for APTT ratio of 2.0 (range 1.5 – 2.5)
- Adjust infusion rate using the table below

Latest APTT ratio	Rate	Recheck APTT in:
>4.0	Stop for one hour, decrease by 0.5ml/hr	4 hours
3.01-4.0	Decrease by 0.2ml/hr	4-6 hours
2.51-3.0	Decrease by 0.1ml/hr	4-6 hours
1.5-2.5	NO CHANGE	Within 24 hours
1.2-1.49	Increase by 0.2ml/hr	4-6 hours
<1.2	Increase by 0.4ml/hr	4-6 hours

Date	Time	Laboratory calculated APTT ratio	Current rate ml/hr	New rate ml/hr	Signature / Checker	Next APTT to be taken	
						Date	Time

If patient requires surgery - Stop heparin 6 hours prior to surgery unless instructed otherwise by a doctor.

If the patient bleeds - As heparin has a short half life, it is usually sufficient to stop the heparin infusion. Protamine sulphate can be used in an emergency to inhibit the anticoagulant effect of heparin; 1mg protamine sulphate inhibits the effect of 100 units of heparin – do not exceed the maximum dose of 50mg. Protamine is given by slow IV injection (rate not exceeding 5mg per minute). Contact haematologist for advice.

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Version Control Sheet

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Related Documents

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