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Issue [3.1]  
[Nov 2017]  
Anticoagulation Guidelines – unfractionated heparin  
Current Version is held on the Intranet  
Check with Intranet that this printed copy is the latest issue  
Page 1 of 12
Who should read this document?

All staff involved in the prescribing, administration or monitoring of unfractionated heparin.

Key Messages

Indications for use of unfractionated heparin infusions must be documented
All patients must have baseline platelet count checked
All patients require monitoring and infusion rates should be adjusted according to these guidelines.

Background & Scope

This guideline is for use by all staff who prescribe, supply, administer and monitor patients receiving anticoagulation therapy in the form of intravenous unfractionated heparin infusions. The aim is, where possible, to standardise the doses used and recommend dose adjustments.

This guideline has been based upon the British Committee for Standards in Haematology (BCSH) Guideline 2012 on the use and monitoring of heparin.

Clinical judgement and individual patient preferences should be exercised at all times. However reasons for deviation from the guidelines should be documented fully in patients notes.

What is new in this version?

Revision of Heparin - induced thrombocytopenia section

Policy/ Guideline/ Protocol

Introduction
The Low molecular weight heparins (LMWH) have become widely used parenteral antithrombotic agents in the UK. However in some clinical situations intravenous unfractionated heparin (UFH) maybe required. This guideline offers advice on prescribing and monitoring of UFH. Please refer to the separate guideline for low molecular weight heparin and fondaparinux.

Please note, UFH will not dissolve a formed clot however it may prevent development and growth of clots.
When to use unfractionated heparin

LMWHs have replaced UFH as the preferred option in most clinical situations. Use of UFH is only considered in the following situations:

1. Patients who might require their anticoagulation to be stopped rapidly e.g. patients at very high risk of bleeding and those who may require urgent invasive procedures (the half-life of UFH is dose dependant, around 45-60 min unless renal function is severely impaired).

2. Patients in severe renal failure: titration against the Activated Partial Thromboplastin Time (APTT) is simpler than using LMWH and relying on anti-Xa levels.

3. Patients undergoing procedures that only require anticoagulation for a short time (e.g. coronary angioplasty).

If patient’s condition (see above) warrants the use of UFH rather than LMWH this must be clearly documented in the patient’s notes together with the indication for use.

Cautions/Contraindications when using unfractionated heparin – note this list is not exhaustive. Check BNF/SpC for full details.

Cautions
- concomitant medicines that may enhance anticoagulant effect e.g. aspirin, clopidogrel, dipyridamole iloprost, NSAIDs, etc.
- liver failure with associated with coagulopathy
- renal impairment
- Intramuscular injections should be avoided in patients receiving anticoagulants, except for adrenaline in severe anaphylaxis.

Contraindications
- severe liver disease
- active bleeding from a peptic ulcer
- severe / uncontrolled hypertension
- known haemorrhagic diathesis
- thrombocytopenia
- recent cerebral haemorrhage
- injuries to or recent operations to the eyes/ears or central nervous system
- infective endocarditis
- active tuberculosis
- spinal or epidural anaesthesia
Adverse effects

Haemorrhage

There are a number of Trust guidelines for management of haemorrhage.

The management of major haemorrhage can be found here:
http://intranet.srht.nhs.uk/policies-resources/trust-policy-documents/trust-wide-
clinical/gen/tc508/?locale=en

Alternatively type haemorrhage into the intranet search tool.

Heparin Induced Thrombocytopenia (HIT)

Incidence
In medical patients given therapeutic unfractionated heparin the risk of HIT reported in the BCSH guideline is approximately 0.7%. The incidence is higher in surgical patients (up to 2.6%). Females are twice as likely to experience HIT with unfractionated heparin as males.

Monitoring

All patients who are to receive heparin must have a baseline platelet count checked.

Patients who have been exposed to heparin in the last 100 days must have a full blood count checked 24 hours after starting a heparin infusion.

BCSH recommendation:
For other patients where the calculated risk of HIT is <1%, routine platelet monitoring is not required.

Salford Royal NHS Foundation Trust/ Haematology Recommendation:

All patients receiving unfractionated heparin infusion should have at least two full blood counts recorded from day 4 to day 14 post treatment. If platelet count drops by 30% or more from the baseline and/or the patient develops new thrombosis, skin allergy or any rare manifestations of heparin-induced thrombocytopenia between days 4 and 14 of heparin administration, HIT should be considered and patients require a full clinical assessment and discussion with Haematologist.

If HIT is suspected, the probability should be judged on clinical grounds. A pre-test probability score should be undertaken - if this is low further laboratory investigation is not required.

If the pre-test probability of HIT is not low, heparin should be stopped, an alternative anticoagulant given. Laboratory tests should be discussed with haematology.
Heparin Induced Thrombocytopenia with Thrombosis (HITT)

The probability of HITT can be estimated by applying the “four T’s” scoring tool to certain patient parameters:

<table>
<thead>
<tr>
<th>Category</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0, 1 or 2 points for each category; maximum possible score is 8)</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>&gt;50% fall or platelet nadir 20-100x10^9/L</td>
</tr>
<tr>
<td>Timing of platelet count fall or other sequelae*</td>
<td>Clear onset between days 5-10; or less than 1 day (if previous heparin exposure within the last 100 days).</td>
</tr>
<tr>
<td>Thrombosis or other sequelae (e.g. skin lesions)</td>
<td>New thrombosis; skin necrosis; Post heparin bolus acute systemic reaction.</td>
</tr>
<tr>
<td>Other causes for thrombocytopenia not evident</td>
<td>No other cause for platelet count fall is evident</td>
</tr>
</tbody>
</table>

*First day of immunising heparin is considered day 0; the day the platelet count begins to fall is considered the day of onset.

Probability of HITT score:
6 – 8 points: High probability
4 – 5 points: Intermediate probability
0 – 3 points low probability

A low pre-test probability rules out HIT/ HITT in most clinical situations.

All cases of suspected HIT/HITT should be discussed with the haematology Consultant or SpR

Following confirmed diagnosis of HIT, patient’s allergy status must be updated to include details.

Note – low molecular weight heparin must not be given to patients with HIT.

Alternative anticoagulation should be discussed with haematology and pharmacy.
Hyperkalaemia

Inhibition of aldosterone secretion by heparin can result in hyperkalaemia; patients with diabetes mellitus, chronic renal failure, acidosis, raised plasma potassium or those taking potassium-sparing drugs seem to be more susceptible. The risk appears to increase with duration of therapy and the CSM has recommended that the serum potassium concentration should be measured in patients at risk of hyperkalaemia before starting heparin and monitored regularly thereafter, particularly if heparin is to be continued for longer than 7 days.

- Osteoporosis
- Alopecia on prolonged use
- Hypersensitivity reactions (including urticaria, angioedema, and anaphylaxis)
- Note this list is not exhaustive and for further detail on adverse effects please consult the Summary of product characteristics.

Baseline Tests

Before starting treatment with UFH measure:
- Activated Partial Thromboplastin Time (APTT)
- Prothrombin Time (PT)
- Platelet count
- Serum potassium.
- Patient body weight in Kg (this should be recorded on EPR)
- Serum creatinine
Dosing and Monitoring * see appendix 1 for summary tables

Unfractionated heparin dosing is unpredictable and a high proportion of patients will still have APTT results outside the desired range even with careful monitoring. The risks of this must be taken into account when deciding to use UFH rather than LMWH.

A lower loading dose and initial maintenance infusion should be used for patients who have recently received a thrombolytic agent, e.g. in treatment of stroke or STEMI. See cardiology/ stroke guidelines for specific indications and dose recommendations.

Unfractionated heparin is available in ready to use amps containing 20000units in 20mls equivalent to 1000units per ml and does not require further dilution.

The continuous maintenance infusion should be prepared by drawing up two x 20ml amps giving 40000units in 40ml. This should be administered using a syringe pump.

Loading Dose

Omission of loading dose delays effective anticoagulation.

Give a slow intravenous bolus heparin 75 units/kg over 3-5 minutes see table below. (maximum dose of 8000 units, elderly patients max 5000 units, renal impairment (eGFR <30mls/min) max 2500 units).

<table>
<thead>
<tr>
<th>Weight (Kg) (actual body weight)</th>
<th>LOADING DOSE</th>
<th>Volume of Heparin 1000units/ml to be given as a slow IV bolus over 3-5 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max 5000units if &gt;70 years Max 2500units if eGFR &lt;30mls/min</td>
<td></td>
</tr>
<tr>
<td>35 – 46</td>
<td>3000units</td>
<td>3mL</td>
</tr>
<tr>
<td>47 – 60.9</td>
<td>4000units</td>
<td>4mL</td>
</tr>
<tr>
<td>61 – 74.9</td>
<td>5000units</td>
<td>5mL</td>
</tr>
<tr>
<td>75 – 87.9</td>
<td>6000units</td>
<td>6mL</td>
</tr>
<tr>
<td>88 - 100</td>
<td>7000units</td>
<td>7mL</td>
</tr>
<tr>
<td>&gt;100</td>
<td>8000units</td>
<td>8mL</td>
</tr>
</tbody>
</table>

Initial Maintenance Dose

The maintenance infusion should be started immediately after the loading dose. This should be given as continuous intravenous infusion using a syringe pump. Starting dose at 18 units/kg/hr for first 4 hours – see table 2 below. The infusion rate must be accurately controlled using a syringe pump.
Table 2

<table>
<thead>
<tr>
<th>Weight (Kg) (actual body weight)</th>
<th>Heparin Initial Maintenance Infusion Rate 18units/Kg/hour for first 4 hours</th>
<th>Infusion Pump Rate Heparin 1000units/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 – 46.9</td>
<td>700 units per hour</td>
<td>0.7mL per hour</td>
</tr>
<tr>
<td>47 – 60.9</td>
<td>1000 units per hour</td>
<td>1.0mL per hour</td>
</tr>
<tr>
<td>61 – 74.9</td>
<td>1200 units per hour</td>
<td>1.2mL per hour</td>
</tr>
<tr>
<td>75 – 87.9</td>
<td>1400 units per hour</td>
<td>1.4mL per hour</td>
</tr>
<tr>
<td>88 - 100</td>
<td>1600 units per hour</td>
<td>1.6mL per hour</td>
</tr>
<tr>
<td>&gt;100</td>
<td>1800 units per hour</td>
<td>1.8mL per hour</td>
</tr>
</tbody>
</table>

Check APTT 4 hours after starting the initial maintenance infusion then adjust the infusion rate accordingly, see table 3 below.

*The usual target APTT ratio is 2.0 (range 1.5 – 2.5) unless specified and documented by the clinician initiating UFH infusion. Where APTT ratio is in range re-check within 12hours. Where infusions have been stopped, Recheck APTT ratio 4 hrs after the infusion rate has been restarted.*

Dose Adjustment  (adapted from D&TB, 1992 30 (20): 77-80)

The APTT ratio* will be reported if “APTTh” is requested on the sample.

Table 3

<table>
<thead>
<tr>
<th>APTT Ratio</th>
<th>Infusion Rate Change</th>
<th>Repeat APTT ratio*</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 5.0</td>
<td>Stop for 2 hours, reduce by 500units/hour (0.5mL/hour)</td>
<td>recheck APTT 4 hours after heparin infusion has been restarted</td>
</tr>
<tr>
<td>4.1 to 5.0</td>
<td>Stop for 1 hour, reduce by 300units/hour (0.3mL/hour)</td>
<td>recheck APTT 4 hours after heparin infusion has been restarted</td>
</tr>
<tr>
<td>3.1 to 4.0</td>
<td>Reduce by 200units/hour (0.2mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>2.6 to 3.0</td>
<td>Reduce by 100units/hour (0.1mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>1.5 to 2.5</td>
<td>NO CHANGE</td>
<td>12 hours</td>
</tr>
<tr>
<td>1.2 to 1.4</td>
<td>Increase by 200units/hour (0.2mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>&lt; 1.2</td>
<td>Give 2,500 units IV bolus. Increase by 400 units/hour (0.4mL/hour)</td>
<td>4 hours</td>
</tr>
</tbody>
</table>
Explanation of terms & Definitions

Terms explained in document

References and Supporting Documents


Roles and responsibilities

All clinical staff involved in the prescribing and administration of anticoagulant drugs should adhere to this guideline including full documentation in electronic patient records as detailed. Where individualised patient therapy requires deviation from the guidelines reasons should be documented in patients notes.

Any patient who experiences harm from treatment with heparin should have a DATIX adverse incident report submitted.

Any adverse incidents involving heparin will be reviewed at the Medicines Safety Group meetings.
## Appendices

### Appendix 1  
**Corrected Appendix 1 of the Anticoagulation Guidelines-Unfractionated Heparin**

<table>
<thead>
<tr>
<th>Weight (Kg) (actual body weight)</th>
<th>LOADING DOSE</th>
<th>INITIAL MAINTENANCE INFUSION (FOR FIRST 4 HOURS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heparin Loading Dose (75units/Kg)</td>
<td>Heparin Initial Maintenance Infusion Rate 18units/Kg/hour</td>
</tr>
<tr>
<td></td>
<td><strong>Max 5000units if &gt;70 years</strong> Max 2500units if eGFR &lt;30ml/min</td>
<td>For the first 4 hours</td>
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<tr>
<td>35 – 46.9</td>
<td>3000units</td>
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<td>1800 units per hour</td>
</tr>
</tbody>
</table>

**LOADING DOSE**

Volume of Heparin 1000units/ml to be given as a slow IV bolus over 3-5 minutes

**INITIAL MAINTENANCE INFUSION (FOR FIRST 4 HOURS)**

Infusion Pump Rate using Heparin 1000units/ml For the first 4 hours
After loading dose followed by the initial 4 hour maintenance infusion recheck APTT ratio and adjust according to table below.

<table>
<thead>
<tr>
<th>APTT Ratio</th>
<th>Infusion Rate Change (using 1000unit/ml infusion)</th>
<th>Repeat APTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 5.0</td>
<td>Stop for 2 hours, reduce by 500units/hour (decrease previous rate by 0.5mL/hour)</td>
<td>recheck aPTT ratio 4 hours after heparin infusion has been restarted</td>
</tr>
<tr>
<td>4.1 to 5.0</td>
<td>Stop for 1 hour, reduce by 300units/hour (decrease previous rate by 0.3mL/hour)</td>
<td>recheck aPTT ratio 4 hours after heparin infusion has been restarted</td>
</tr>
<tr>
<td>3.1 to 4.0</td>
<td>Reduce by 200 units/hour (decrease previous rate by 0.2mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>2.6 to 3.0</td>
<td>Reduce by 100 units/hour (decrease previous rate by 0.1mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>1.5 to 2.5</td>
<td>NO CHANGE</td>
<td>12 hours</td>
</tr>
<tr>
<td>1.2 to 1.4</td>
<td>Increase by 200 units/hour (increase previous rate by 0.2mL/hour)</td>
<td>4 hours</td>
</tr>
<tr>
<td>&lt; 1.2</td>
<td>Give 2,500 units IV bolus and increase infusion by 400units/hour (increase previous rate by 0.4mL/hour)</td>
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</table>