Renal Directorate Guidelines

Royal Infirmary of Edinburgh

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**Restarting Warfarin: Anticoagulation Bridging for Patients with Severe Renal Impairment or End Stage Renal Disease**

Unfractionated heparin (UFH) is the preferred anticoagulation option for patients with creatinine clearance <30ml/min as it does not depend on renal clearance. It also has a shorter half-life and can be fully reversed in the event of bleeding. Guidance for initiating UFH infusion can be found in the NHS Lothian Antithrombotic Guide on the Intranet.

However, dependence on a continuous intravenous infusion of UFH prolongs hospital admission. Low molecular weight heparin (LMWH) is a more convenient option. With appropriate monitoring, LMWH can be a suitable alternative when a patient is medically fit for discharge. For the purpose of anticoagulation bridging when warfarin treatment is initiated or restarted, treatment dose LMWH may be considered. This should be assessed on a case-by-case basis, taking into account the patient’s thrombosis and bleeding risk, and discussed with senior medical staff in Renal and Haematology is more advanced advice is required. The use of LMWH for bridging is short term until INR is therapeutic which usually takes about 5 to 7 days. It is important to note that use of treatment dose LMWH for prolonged periods in renal impairment may lead to accumulation therefore increasing the risk of bleeding.

**Low to Moderate Thrombosis Risk**

A reduced dose of dalteparin to 2/3 of the full treatment dose can be considered for the following indications:

1. Atrial fibrillation
2. Maintenance anticoagulation for deep vein thrombosis (DVT) or pulmonary embolism (PE)

To achieve the most accurate dose for the patient, anti-factor Xa levels should be measured and dose adjusted accordingly.

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| **Dose calculation** | **Anti-factor Xa monitoring**  ***(Ordered as LMW heparin assay on TRAK – collect sample in green tube)*** | **Warfarin** |
| Dalteparin  130units/kg  *Please round to nearest available syringe:*   * *5,000units* * *7,500units* * *10,000units* * *12,500units* * *15,000units* * *18,000units* | After 3rd dose  This must be done 3-4 hours after dose administration to achieve an accurate peak level  (Target 0.5-1.0 units/ml)  Repeat on day 10 if treatment still ongoing | Outpatients:  Restart at usual dose  Inpatients:  May be restarted at higher dose – please discuss with senior medical staff |

**High Thrombosis Risk**

Anticoagulation bridging with LMWH for conditions with high thrombosis risk must be carefully considered. A reduced dose of LMWH may not provide full anticoagulation therefore may not be suitable in these cases. Bridging with intravenous infusion of UFH is the preferred choice in these situations. Examples of high-risk conditions are:

1. Anti-phospholipid syndrome
2. Anti-thrombin deficiency
3. Protein C/S deficiency
4. Metallic heart valve (mitral and aortic) – twice daily dosing may be recommended in some cases. Please discuss with Haematology if this option is to be considered

Dalteparin is the LMWH of choice in NHS Lothian. However, for cases with high thrombosis risk, tinzaparin may be considered at its full treatment dose as it is the LMWH least dependent on renal clearance.

Please note that treatment dose tinzaparin syringes are graduated and may not be suitable for use for all patients, depending on their ability to measure and discard the excess volume to achieve the desired dose. Clear instructions are available in the product leaflet. Assessment on patient dexterity and ability to self-administer can be completed by any member of the multidisciplinary team who is involved with discharge planning for the patient. Assistance by the district nursing team for administration of injections post-discharge can be arranged via the GP surgery if required.

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| **Dose calculation** | **Anti-factor Xa monitoring**  ***(Ordered as LMW heparin assay on TRAK – collect sample in green tube)*** | **Warfarin** |
| Tinzaparin  175units/kg  *Please round to nearest 1000units. Graduated syringes are available in the following strengths:*   * *10,000units (red)* * *14,000units (yellow)* * *18,000units (blue)* | After 3rd dose  This must be done 3-4 hours after dose administration to achieve an accurate peak level  (Target 0.5-1.0 units/ml)  Repeat on day 10 if treatment still ongoing | Outpatients:  Restart at usual dose  Inpatients:  May be restarted at higher dose – please discuss with senior medical staff |

**Bleeding Risk**

For patients where bleeding risk is significant, bridging may be initiated with intravenous infusion of UFH and then switched to LMWH when safe to do so. Examples of such situations are:

1. Post-biopsy
2. Post-surgery or invasive procedure – please involve surgical team when considering switch as the need for further surgical intervention may be imminent or uncertain
3. Recent hemorrhagic event

**Switching from UFH Infusion to LMWH**

In most cases, the desired dose of LMWH should be given at the same time the UFH infusion is stopped to allow for cross-over of both agents. There may be selected cases where this may differ depending on patient requirements. Please discuss with senior medical staff or consult Haematology or Specialist Pharmacists for advice if required.