PROVINCIAL STANDARDS & GUIDELINES

BCRenal
Provincial Health Services Authority

Hemodialysis Guideline

Dalteparin Extracorporeal Circuit Anticoagulation Protocol for Hemodialysis

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Anticoagulation is required to prevent clotting of the extracorporeal circuit (ECC) during hemodialysis (HD). The purpose of this document is to provide renal nurses with direction on the administration of dalteparin for ECC anticoagulation during HD.

Requirements:

A nephrologist's order is required to initiate the dalteparin protocol for HD patients.

Contact the nephrologist for assessment:

- If the patient has had a recent injury or fall that has not been medically assessed
- If the patient is receiving systemic anticoagulation [e.g., intravenous (IV) unfractionated heparin (UFH) infusion]
- If the patient is from a critical care unit, requires HD greater than 4 hours, or is under 18 years old [consider UFH instead of low molecular weight heparin (LMWH) if ECC anticoagulation is needed]
- If the patient has any of the following contraindications:
  - Hypersensitivity to dalteparin (including constituents), and other LMWHs or UFH
  - Platelet count below 50 x 10^9/L
  - History of heparin-induced thrombocytopenia (HIT)
  - Uncontrolled active bleeding (e.g. gastrointestinal bleed, retinal bleed, hemoptysis)
  - Major blood clotting disorder (e.g., hemophilia)
  - Cerebral hemorrhage
  - Recent surgeries

Administration:

1. Assemble the following:
   - Alcohol swab
   - Pre-filled syringe(s) of dalteparin (dose as prescribed by nephrologist)
2. Begin hemodialysis treatment
3. Swab arterial injection port on bloodline with the alcohol swab
4. Administer dalteparin via the arterial port within the first 15 minutes of HD treatment
   - Dalteparin should not be administered intramuscularly or subcutaneously for this indication
   - Do not remove small air bubbles from the pre-filled syringe before injection
5. Assess and document stage of clotting in the venous chamber and dialyzer at the end of hemodialysis treatment, post return of the extracorporeal blood
6. Consult with the nephrologist if there is objective evidence of consistent clotting (Stage 3 or 4) during two (2) HD treatments within a seven (7) day period
7. Assess the patient for any episodes of bleeding prior to discharge from the unit

Note: Do NOT administer an additional dose if a circuit change is required

Hold dalteparin:

- If the patient is scheduled for a surgical or interventional radiology procedure in the next 12 hours, including any central venous catheter (CVC) procedure (insertion, exchange or removal)
- If the patient has had a surgical or interventional radiology procedure in the last 24 hours, including:
  - Peritoneal dialysis catheter insertion or removal
  - Thrombosis of arteriovenous fistula (AVF)/ ateriovenous graft (AVG)
  - Post fistulogram/angioplasty of AVF/AVG
  - CVC insertion or exchange
  - Dental extraction
- If there are signs and symptoms of bleeding

Increase dose:

When there is objective evidence of consistent clotting (Stage 3 or 4) during two (2) HD treatments within a seven (7) day period, and after the following conditions have been ruled out as a possible cause of clotting:

- Hgb greater or equal to 120 g/L
- Machine/mechanical breakdown during the dialysis treatment (e.g., frequent alarms)
- Vascular access complications
- Clotting due to interrupted HD treatment
- Missed dose of anticoagulation

Note: if a dalteparin dose increase is required, give the new dose at the next HD treatment

Decrease dose:

- If bleeding at the AVF/AVG needle site is abnormal (i.e., greater than 15 minutes)
- If the patient reports new or unusual bleeding

Reversal of anticoagulant effect:

- Protamine sulfate can be prescribed for the treatment of dalteparin overdose
- The anticoagulant effect of dalteparin may be largely neutralized by slow intravenous injection of protamine sulfate, but it is important to note that it is not fully reversed
- The dose of protamine to be given should be 1 mg protamine per 100 IU of dalteparin administered. A second infusion of 0.5 mg protamine per 100 IU of dalteparin may be administered if the aPTT measured 2 to 4 hours after the first infusion remains prolonged. However, even with higher doses of protamine, the aPTT may remain prolonged to a greater extent than usually seen with unfractionated heparin. Anti-Xa activity is never completely neutralized (maximum about 60%)

Monitoring:

- Routinely monitor and inform nephrologist if any of the following adverse reactions are present:
  - Active bleeding (e.g., petechiae, bruising, bleeding gums, epistaxis, hematuria, and/or melena)
  - Allergic reactions
- Routine Anti-Xa monitoring is not required for use of dalteparin for ECC anticoagulation.
- Consult nephrologist and renal pharmacist to assess and consider trough Anti-Xa levels to assess for accumulation:
  - If dalteparin dose is greater or equal to 10,000 units IV per HD treatment
  - If the patient's weight is less than 46 kg

Note: The half-life of dalteparin is approximately 2 hours after IV injection in the general population and is extended to approximately 5.7 hours in HD patients when dalteparin 5,000 IU is given

Storage:

- Store pre-filled syringes of dalteparin at room temperature (15 to 30°C) and out of direct sunlight. No special handling is required

Acknowledgement

This protocol acknowledges the use of portions of the Alberta Health Services, Nova Scotia Health Authority and Sunnybrook Health Sciences Centre policies related to dalteparin for ECC anticoagulation during HD

Table 1. BC Renal Intradialytic DALTEPARIN Adjustment Protocol

Dialyzer Clotting Scores (see Figure 1 for definitions)	**DALTEPARIN** Adjustment Guidelines (based on clotting scores during 2 hemodialysis treatments within a 7 day period)
0 to 2	No **DALTEPARIN** adjustment required
3 or 4	Increase **DALTEPARIN** by one 2,500 IU increment Recommended max dose is 10,000 IU for a standard hemodialysis treatment of 4 hours. If doses greater than or equal to 10,000 IU is required, nephrologist to reassess and consider consulting pharmacist for anti-Xa level monitoring.

Figure 1. Dialyzer Clotting Scores

Dialyzer should be assessed all around for clotting

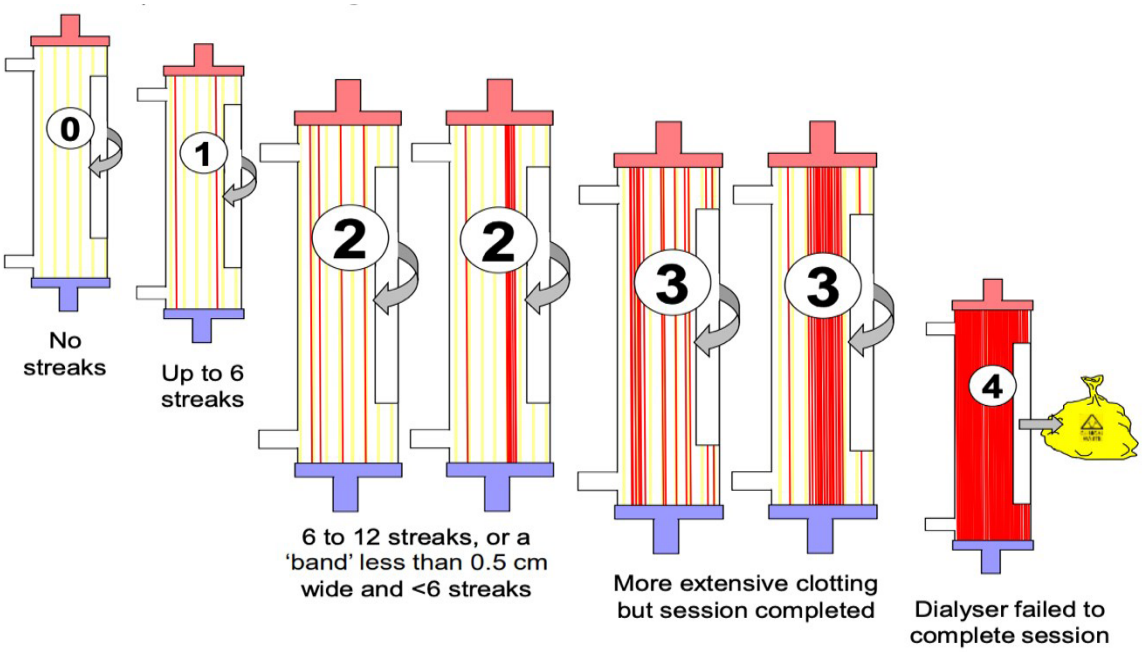

Figure 2. DALTEPARIN Extracorporeal Circuit Anticoagulation Protocol for Hemodialysis