

Covid-19 Critical Care Renal Replacement Therapy

This is a policy outlining Renal Replacement Therapy (RRT) in critical care areas at Sunderland Royal Hospital during the Covid-19 pandemic. Critical care areas are defined as all locations outlined in the Covid-19 critical care expansion planning.

This applies to critically ill patients admitted to a designated critical care area for organ support.

The critical care team will not deliver RRT via an A/V fistula or an A/V Graft. This is the responsibility of the Nephrology team.

Modality

Haemodiafiltration

Standard modality of critical care RRT will be Haemodiafiltration (HDf).

HDf is a 3-4 hour extracorporeal treatment combining the benefits of dialysis and haemofiltration. The advantage of HDf over slow low efficiency daily dialysis (SLEDD) include:

- Shorter therapy duration allowing increased capacity to deliver RRT during the pandemic
- Potential reduction in premature termination of therapy and failure of therapy due to reduced duration and increased blood flow
- Flexibility in its use as an alternate day or daily therapy
- Comparable cardiovascular stability
- Equivalent solute and fluid clearance

Due to the combination of dialysis and filtration the modality requires both dialysate fluid and sterile substitution fluid for replacement. The site of replacement fluid in the dialysis circuit is orientated to the dialysis filter and determines the dilutional method.

Pre-dilution

In pre-dilution HDf the replacement fluid is infused before the dialysis filter. This site of replacement fluid administration:

- Reduces haemoconcentration across the dialysis membrane i.e. avoids the formation of clots in the dialysis filter leading to therapy failure and loss of circuit.
- Maintains haemodynamic stability.
- Efficient correction of acid base abnormalities.
- Efficient fluid removal. This is relevant in critically ill patients with who require meticulous fluid balance management.
- Less efficient solute clearance by diffusion.

Post-dilution

In post dilution HDf the replacement fluid is infused after the dialysis filter. This site of replacement fluid administration:

- Is a more efficient method of solute removal due to the preservation of a higher concentration gradient between the blood and dialysate fluid. This may be a preferable therapy in patients who are hypermetabolic and where creatinine clearance with SLEDD or pre-dilution HDf has been inadequate.
- Increases haemoconcentration across the dialysis membrane may lead to a high transmembrane pressure gradient and clotting of the dialysis filter.
- Maintains haemodynamic stability.
- As an alternate day step down therapy.

Slow Low Efficiency Daily Dialysis

SLEDD should be considered on an individual patient basis in those with significant cardiovascular instability after discussion between the Nephrology & ICCU consultant.

Prescription

The daily prescription is the responsibility of the Nephrology team and should be available at 0730 to allow patients to start therapy at the beginning of the day shift.

Haemodiafiltration

Dilution

- Pre dilution HDf is to be used as the first line therapy.
- Post dilution may be considered in those who have inadequate creatinine clearance or are transitioning to an alternate day therapy.

Duration

- 3-4 hours - less for those who have lower metabolic rates and are of smaller size (45Kg)

Net weight loss

- To be dictated by the ICCU team.
- Any changes to the prescribed fluid loss are to be edited within the V6 prescription.

Machine Settings

- Dialysate flow 500ml/min
- Temperature 35°C
- Effective Blood flow 250ml/min
- Dialysis Filter FX600

HD Replacement fluid – (this does not need to be completed for acute patients)

Dialysate

- Standard Concentrate & Bibag- (click on icon for guidance)
- Citrustate dialysate fluid
 - Serum K+ = 5 mmol/l and above 411 - 2mmol KCl:1.5 mmol Ca
 - Serum K+ = 4-5 mmol/l 413 - 3mmol KCl:1.5 mmol Ca
 - Serum K+ = 4 mmol/l or less 415 - 4mmol KCl:1.5 mmol Ca

Monitoring

- Mid-point bloods are not to be routinely taken during HDf therapy but if clearance is a persistent problem then consider taking mid-point U&E and discussing changes to therapy to improve clearance.

Anticoagulation

- Patients who are systemically anticoagulated do not need additional anticoagulation unless they are receiving post dilution HDf. If receiving post-dilution HDf they will need a stat of 500 - 1000units of unfractionated heparin (UFH) into the circuit on starting HDf.
- Unless there is an absolute contraindication to anticoagulation all patients should have a stat of 500 -1000units of unfractionated heparin (UFH) into the circuit on starting HDf. Absolute contraindications to unfractionated Heparin include;

- Heparin induced thrombocytopenia
 - Allergy
 - Platelet count of $20 \times 10^9/L$ or less
 - Severe coagulopathy such as disseminated intravascular coagulation i.e. Fibrinogen $<1g/L$, Prothrombin time >30 secs, APTT >40 secs
- To ensure the patency of the circuit all RRT extracorporeal circuits should be anticoagulated with 500 units to 1000 units of UFH per hour. Note this is NOT the protocol for systemic anticoagulation with UFH.
 - All patients should have an APTT ratio checked at the end of each RRT session OR after 4 hours of therapy as a quality control measure to detect unintended systemic anticoagulation.
 - Unfractionated heparin is to be prescribed on V6 as HEPARIN 5000U (RENAL) via dialysis circuit and must be prescribed by the medical team and countersigned by the nursing staff.

Prime

- Standard 1000ml 0.9%.
- Colloids such as albumin and blood products should be given to the patient NOT via the circuit as this may increase risk of filter clotting.

Pre bloods

- Repeat U+E if greater than 18 hours since last checked.
- Check arterial blood gas for potassium levels in those with a valid U+E within 16 hours

Post bloods

- U+E & APTTr (note this should be requested within the prescription as other bloods)

Slow Low Efficiency Daily Dialysis

SLEDD remains an alternative therapy for those who have cardiovascular instability and are unable to tolerate HDf. This is anticipated to be a minority of patients. Refer to the SLEDD SOP.

Amendments to the ICCU SLEDD SOP include:

Routine anticoagulation of the circuit with UFH:

- Unless there is an absolute contraindication to anticoagulation all patients should have a stat of 500 -1000units of unfractionated heparin (UFH) into the circuit on starting HDf.
- To ensure the patency of the circuit all RRT extracorporeal circuits should be anticoagulated with 500 units to 1000 units of UFH per hour. Note this is NOT the protocol for systemic anticoagulation with UFH.
- All patients should have an APTT ratio checked at the end of each RRT session OR after 4 hours of therapy as a quality control measure to detect systemic anticoagulation.