Nottingham University Hospitals NHS
NHS Trust

Nottingham Renal and Transplant Unit

Full Title of Guideline:	**Guideline for Performing Sustained Low Efficiency Daily Diafiltration (SLEDDf)**
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Division & Speciality:	**Cancer and Associated Specialities (Renal/Transplant)**
Scope ***(Target audience, state if Trust wide):***	Speciality specific guideline
Review date ***(when this version goes out of date):***	December 2023
Explicit definition of patient group to which it applies ***(e.g. inclusion and exclusion criteria, diagnosis):***	Applies to: All Acutely Ill Patients under the care of the Nottingham Renal and Transplant Unit (including patients receiving extracorporeal therapies within Carrel and Bramley wards, excluding the City Campus Dialysis units and those dialysing at Kings Mill Hospital and Ilkeston Community Hospital and South Nottingham Dialysis Unit (Diaverum) Lings Bar Hospital
Changes from previous version ***(not applicable if this is a new guideline, enter below if extensive):***	No major changes from previous version
Summary of evidence base this guideline has been created from:	See evidence base section below

This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date or outside of the Trust.

Evidence base of policy

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Audit Plans

1. The incidence of symptomatic hypotensive episodes during SLEDDf treatments
2. The incidence of blood borne virus result checks and countersignatures not undertaken
3. The incidence of patients requiring inotropic support to maintain a suitable blood pressure for the extra-corporeal therapy.

Training and implementation

SLEDDf treatment principally occurs on Carrel ward.

All new nursing staffs (Band 2 – Band 7) receive their theoretical training from attending the renal foundation programme and their practical extra-corporeal training within the ward and on the City Hospital Dialysis Units.

SLEDDf is taught on Carrel by the clinical educator and Band 6 nurses with support from the Renal Educator Lead.

It is recommended to use a Fresenius 5008 or Fresenius 5008S for this treatment.

Changes from previous guidelines

Monitoring of antibiotics post SLEDDf

This procedure may only be performed by Registered Nurses who have been assessed as competent in haemodialysis, with assistance from haemodialysis competent renal support nurses.

To be used in conjunction with the following guidelines:

- **Guidelines for the Commencement and Termination of Extra-Corporeal Therapies via a Central Venous Catheter (Tunnelled and Non-Tunnelled) using Citrate Locking Solution**
- **Guidelines for the Prevention and Control of Blood Borne Virus Infections in Adult Patients with Chronic Renal Failure.**
- **Guidelines for Anticoagulation of Extra Corporeal Circuits**

INTRODUCTION

Reports of clinical experience with this form of renal replacement therapy have existed since 2004. There has been an increasing interest in the use of Sustained Low Efficiency Daily Diafiltration (SLEDDf). SLEDDf has evolved as a conceptual and technical hybrid of Continuous Renal Replacement Therapy (CRRT) and Intermittent Haemodiafiltration (IHDf), with therapeutic aims that combine the desirable properties of each of these component modalities:

- a reduced rate of ultrafiltration for optimal haemodynamic stability
- low efficiency solute removal to minimise solute disequilibrium
- sustained treatment duration to maximise dialysis dose and attainment of ultrafiltration goal
- continue to offer an intermittent treatment to minimise anticoagulation requirements and maximise patient mobility
- reduced nursing time and costs in comparison to CRRT

Although more definitive data is required from multicentre prospective randomised trials, studies to date appear to be associated with satisfactory outcomes, demonstrating that SLEDDf is a safe, effective and convenient renal replacement therapy for patients who were considered inappropriate for intermittent haemodiafiltration (IHDf) or intermittent haemodialysis (IHD). In general, contemporary practice in the critical care setting has demonstrated that SLEDDf meets most of the above therapeutic objectives that led to its original inception. It is able to achieve ultrafiltration goals in patients who are hypotensive or inotrope dependent. Critically ill patients with Acute Kidney Injury (AKI) have an increased risk of urea disequilibrium as low blood pressure, oedema, tachycardia and decreased cardiac output have been shown to be associated with slow urea transfer. However, low rates of solute clearance enabled by SLEDDf ensure minimal intradialytic solute disequilibrium. Delivered dialysis dose has been shown to be comparatively higher in comparison to typical IHD regimes and also much closer to the dose prescribed. Ironically, despite the high intradialytic solute clearances achieved by IHD, the dose of dialysis delivered in AKI tends to be low compared to targets established for End Stage Renal Disease (ESRD). Evidence exists to support a relationship between delivered dose of dialysis and overall mortality in patients with ESRD. There are now an increasing number of reports that support the existence of a similar relationship in critically ill patients with AKI.

Dosing of antibiotics in SLEDDf

Recent research has reported inadequate dosing of antibiotics for extended extra-corporeal therapies. One research article identified fifty-eight percent of piperacillin was cleared by a single 6 hour SLEDDf session compared with previous reports of 30%–45% clearance by a 3.5 h intermittent haemodialysis session (Sinnollareddy et al, 2018). Patients on SLEDDf may require extra dosing of antibiotics post SLEDDf.

BACKGROUND

There are an increasing number of patients presenting with AKI requiring Renal Replacement Therapy (RRT) who are considered unsuitable for standard intermittent haemodialysis (IHD) and intermittent haemodialfiltration (IHDF). In order to avoid unnecessary admission of these patients to critical care for continuous renal replacement therapy (haemofiltration (HF)), modification of existing therapy options has been required to enable these patients to be managed within the renal unit.
A summary of the current treatment options available and their specific prescription parameters are provided in the following tables to enable appropriate individualised treatment selection.

Table 1: Renal Replacement Therapy Options

Therapy	Therapy Time	Principles	Advantages	Disadvantages
IHD	2-5hrs	Diffusion Ultra-filtration	Excellent clearance of small molecules	Potential cardiovascular instability Increased risk of solute disequilibrium Reduced clearance in the acutely ill
HF	2-5hrs	Convection Ultra-filtration	Enhanced clearance of middle molecules Improved cardiovascular stability Increased tolerance of fluid removal	Reduced urea clearance
IHDf	2-5hrs	Diffusion Convection Ultra-filtration	Enhanced clearance of both small and middle molecules Improved cardiovascular stability Increased tolerance of fluid removal	Increased risk of solute disequilibrium
SLED	6-12hrs	Diffusion Ultra-filtration	Low efficiency solute removal minimises solute disequilibrium Improved cardiovascular stability Increased tolerance of fluid removal Sustained treatment maximises dialysis dose	Risk of intradialytic hypotension Risk of clotted circuit due to low pump speeds
SLEDDf	6 – 8hrs	Convection Diffusion Ultra-filtration	Low efficiency solute removal minimises solute disequilibrium Improved cardiovascular stability Increased tolerance of fluid removal Sustained treatment maximises dialysis dose	

Table 2: **Prescription Parameters**

Therapy	Machine	Blood Pump Speed (mls/min)	Dialysate Flow Rate (mls/min) (min-max)	Dialysate Temp.	Na	K	Ca	Bic
					mmols/l			
IHD	Braun	≥200	300-800	36^{0}C	13.7	2.0	1.5	37
	Fresenius 5008/5008S	≥200	100-1000	36^{0}C	13.7	2.0	1.5	37
	Nipro Surdial X	≥200	100-800	36^{o}C	13.7	2.0	1.5	37
IHDF	Fresenius 5008/5008S	≥250	700	36^{0}C	137	2.0	1.5	37
	Nipro Surdial X	≥200	100-800	36^{o}C	13.7	2.0	1.5	37
SLED	Fresenius 5008/5008S	200	200	36^{0}C	14.0	2.0	1.5	35
SLEDDf	Fresenius 5008/5008S	250-350	200	36^{0}C	14.0	2.0	1.5	35

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NB: SOME OF THESE PARAMETERS ARE DEFAULT OPTIONS SPECIFIC TO THE MACHINE BEING USED AND THE THERAPY OPTION SELECTED (E.G SODIUM AND BICARBONATE LEVEL AND DIALYSATE FLOW RATE/TEMPERATURE) AND SHOULD BE ADJUSTED WITHIN A THERAPEUTIC RANGE IN ORDER TO ACCOMMODATE THERAPY AND PATIENT SPECIFIC REQUIREMENTS. OTHER PARAMETERS (E.G. POTASSIUM AND CALCIUM LEVEL) ARE BASED ON STANDARD A7 DIALYSATE AND CAN BE VARIED BY USING ALTERNATIVE DIALYSATE SOLUTIONS (SEE TABLE 3).

Table 3: **Dialysate Options**

Dialysate No.	CONTENT (mmols/l)						
	Na	K	Mg	Ca	Cl	Glucose	Acetate
A7	100	2.0	0.5	1.5	109	1.0	3.0
A3	100	1.0	0.5	1.5	108	1.0	3.0
A10	100	3.0	0.5	1.25	109.5	1.0	3.0
A27	100	2.0	0.5	1.0	108	1.0	3.0

In addition to the dialysate solutions above each machine also uses a dry sodium bicarbonate component which is mixed by the machine to a specific default setting to formulate the final dialysate

PATIENT APPLICABILITY

SLEDDf should be used for those patients with AKI who are likely to be unsuitable for standard therapy options (HD & HDF). This would include:

- patients at risk of disequilibrium, e.g. very uraemic patients (urea > 50mmol/l), older patients and those with pre-existing CNS disease
- those with borderline cardiovascular stability

- patients with cardio-renal failure
- very fluid overloaded/nephrotic patients
- patients requiring inotropic support (option currently unavailable on Carrel Ward)

(For patients with End Stage Renal Disease refer to the Guidelines for Performing Haemodialysis in patients with Established Renal Failure.

STANDARD SLEDDf PRESCRIPTION

SLEDDf consists of 6 dialysis sessions per week for 8 hours. Patients with AKI should generally be dialysed daily until they are stable and intermittent haemodialysis can be initiated. SLEDDf treatments are carried out using a Fresenius 5008/5008S with an average blood pump speed (250-350mls/min), slow dialysate flow (200mls/min), substitution rate (100mls/min) using a Fresenius Medical Care CorDiax FX60 dialyser. In many patients SLEDDf may be performed without anticoagulation; however heparin anticoagulation can be used in accordance with the guidelines for anticoagulation of extra-corporeal circuits. SLEDDf treatments should be prescribed for 8 hours (if using a heparin free regime treatment, duration may need to be reduced to 6 hours).

Electrolyte Composition

Potassium; - 1, 2, and 3 mmol solutions are available (see table 3). Aim for 1 hr post dialysis potassium of 3.0-3.5 mmol/l (guesstimate for K^+ content of dialysate: 7-pre-dialysis K^+ concentration ~ = dialysate K^+). Low dialysate potassium may cause post-dialysis serum potassium rebound.
Bicarbonate: - The standard prescription is 35mmol/l. This may need reducing further to 30 if the patient becomes progressively more alkalotic.
Sodium: - 140mmols/l (if the patient is hypo/hypernatraemic the Na setting should be individually prescribed by the renal Speciality Registrar/ Consultant and should generally be within +/-10mmol/s of the patient's baseline sodium)
Phosphate: - supplementation may be necessary after a few days treatment with SLEDDf if pre-dialysis phosphate < 1.0mmol/l (see Appendix 2)

HAZARDS

Ensure a safe environment is maintained throughout the procedure (see Nottingham University Hospitals NHS Trust Health and Safety policies and Infection Control policies).

EQUIPMENT LIST

Patient Specific Direction (signed by medical staff)
Patient Haemodialysis Prescription (it may be necessary to use an Emergency Dialysis Prescription if this is the patient's first dialysis)
Fresenius 5008 Haemodialysis Machine
Fresenius 5008 HDF Lines. Blood Volume Lines (BVM) if requested by SpR.
Fresenius Medical Care FX60 CorDiax Dialyser
500ml 0.9% Sodium Chloride (Fresenius 5008, for emergencies, unopened)
Infusion Giving set (Fresenius 5008, for emergencies, unopened)
Bicarbonate Bi-Bag (900g)
Dialysate **(discuss with registrar, as this will vary depending on the patients' biochemical status)**

Anticoagulant (usually heparin, but discuss potential contraindications with registrar)
IV Heparin Label
BD Plastipak 20ml Syringe
21g needle (green)
Female recirculator
Bedside clotting analyser (Actester) and sampling tubes
1ml syringes and 21g needles
Equipment related to Haemodialysis Access procedure

ALL INTRAVENOUS FLUIDS AND DRUGS MUST BE CHECKED BY TWO REGISTERED NURSES

Fresenius 5008 or Fresenius 5008S SLEDDf Treatment

PREPARATION		
	PRINCIPLE	**RATIONALE**
1	Ensure patient is positioned in a fully equipped and functioning bed, to allow patient position to be adjusted according to necessity throughout treatment.	By being able to alter the patient's position one is able to act as clinically indicated in cases of: • Commencement and termination of dialysis therapy • Patient comfort • Prevention of pressure sores • Administration of clinical procedures • Hypotension • Cramp • Nausea and vomiting • Air embolism • Respiratory and Cardiac Arrest
2	Ensure working oxygen, suction, automated blood pressure, cardiac and pulse oximetry monitoring equipment are available at the patient's bedside. All alarm limits should be activated and set accordingly.	To enable effective monitoring of the patient's condition and rapid response to unacceptable parameters and clinical emergencies.
3	Obtain Hepatitis B surface antigen, Hepatitis B antibody, Hepatitis B core antibody (Anti HBc), Hepatitis C antibody, Hepatitis C RNA and HIV status of patient prior to commencement of initial therapy. Ensure appropriate samples have been taken and requested accordingly. (See Guidelines for the Prevention of Blood Borne Viruses). If patient status positive, or unknown, isolate patient and dialysis machine as per unit policy.	To reduce the risk of the spread of blood borne virus infection within the unit.

4	Ensure the following blood samples are taken and results reviewed by a renal registrar prior to commencement of each treatment: • Urea & Electrolytes • Bicarbonate • Calcium • Phosphate • Albumin The following will be required before the 1st treatment and then as clinically indicated: • Full Blood Count • Clotting Screen ***In emergency situations it may be necessary to start treatment before blood results are obtained*** *Additional blood samples may be requested according to clinical condition (e.g. blood glucose, blood gas analysis)*	To enable effective monitoring of the patient's condition and therapeutic effects of previous treatments. To maximise the safe and effective delivery of an appropriately individualised dialysis prescription. To treat life threatening biochemical imbalances (hyperkalaemia, acidosis). To effectively monitor glucose removal during dialysis. To ascertain and monitor patients oxygenation and acid/base balance.
5	Obtain and record patient's baseline observations: • Respiratory rate • Pulse • Blood Pressure • Temperature • Oxygen saturations • Blood Glucose (if required) *Patients may require a triple lumen line inserting to enable invasive monitoring of CVP*	To assess and enable effective monitoring of patient's condition. To help monitor vascular filling and cardiac pre-load.
6	If patient's condition allows obtain pre dialysis weight and document accordingly. Following a fluid assessment, discuss and determine the prescribed weight reduction on dialysis for **EACH** treatment with the renal registrar/ consultant.	To enable an accurate assessment of patient's fluid status and general well being -Weight gain or loss may represent either changes in nutritional status or fluid overload or depletion -Pre haemodialysis hypertension is usually volume related and should be used in conjunction with an assessment of patient weight and assessment of oedema to ascertain target fluid removal for dialysis -Pre haemodialysis hypotension may be related to cardiovascular causes or sepsis.

7	Read patient's pre-dialysis plan, computerised prescription, any previous pre and post dialysis assessments and nursing notes Identify specific needs for individual patient, such as blood tests, anticoagulation requirements and tolerance of previous treatments.	To ensure patient receives prescribed dialysis treatment, as appropriate to individual needs. To ensure continuity of care and ongoing patient assessment.
8	WASH HANDS. Machine preparation should be undertaken as a clean non-touch procedure. Ensure machine is attached correctly to electricity, water supply and drain.	To minimise the risk of infection. To enable correct functioning of machine and effective use of water supply and drainage.
9.	Switch on the Fresenius 5008/5008S. The machine will complete a self-test. Press the Status key at the top of the screen (third from the left). From the drop down menu, press the Cleaning Status key. If the machine has not been heat disinfected for 24hrs complete heat disinfection. Select Treatment or Disinfection.	To ensure machine safety prior to preparation. To minimise the risk of contamination of the blood circuit and the spread of blood borne virus infection within the unit.
10	When Treatment is selected, Connect concentrate and BiBag; ensure correct concentrate is selected in the dialysate menu. T1 test starts automatically Discuss with Renal Registrar/ Consultant which concentrate is required.	Discuss with Renal Registrar/ Consultant which concentrate is required. To ensure the patient electrolytes are removed efficiently but not too aggressively.
11.	Open the Extra-Corporeal Blood Module (EBM) doors and follow on screen instructions for lining the machine. Ensure the sound is generated when inserting the red 'alpha clip' and the clear plastic 'alpha clip'.	Manufacturers of haemodialysis machines and dialysers have their own specific operating instructions. For reasons of safety, these should always be followed.
12.	Attach Heparin syringe if required. Insert the heparin syringe during set-up and before prime. ***The heparin syringe cannot be inserted after the prime has commenced.***	A connection test will be performed by the machine to ensure correct positioning of the syringe and clamp.

13.	On completion of T1 test, insert the substitution connector into the online substitution port, and the rinse connector onto the online rinse port. Close the doors and attach the dialyser couplings as instructed. Prime as per the manufacturer's instructions.	
14.	On completion of the prime, the machine screen will read pre-circulation, the pump speed will reduce to 50mls/min	This puts the machine into Ecoflow – minimal dialysate flow during stand-by.
15.	Enter individual patient prescription requirements into dialysis machine. Suggested parameters are listed below: • Dialysate flow- **200**mls/min • Substitution flow – **100**mls/min • Dialysate temperature- **35.5 -36**°C • Na level - **140**mmols/l (**if the patient is hypo/hypernatraemic the Na setting should be individually prescribed by the renal registrar/consultant and should generally be within +/- 10mmol/s of the patient's baseline sodium**) • Bicarbonate level- **35**mmols/l • Treatment time- **6 - 8hrs** ***If at risk of disequilibrium start on 6hr treatment*** ***If using heparin free dialysis restrict treatment time to 6hrs*** • UF goal (to be assessed prior to each treatment) • Heparin dose (refer to guidelines for anticoagulation of extracorporeal circuits) • Correct dialyser (FMC CorDiax FX60 dialyser) ***These parameters may vary according to clinical indications and should therefore be confirmed with the Renal Registrar/ Consultant prior to EVERY treatment***	To ensure the patient receives prescribed dialysis treatment, as appropriate to individual clinical needs. Access the Online screen – Turn Autosub off and input 100mls sub rate manually. Autosub will increase the substitution rate to two thirds of the blood pump. This will reduce diffusion and increase convection which could cause a reduction in urea clearance. To minimise the risk of dialysis disequilibrium and maximise achievement of dialysis dose and ultrafiltration goal.

16	In the Dialysate menu, select the correct concentrate that has been prescribed by the doctor, and that has been selected for use. Ensure the correct Prescribed sodium and prescribed bicarbonate values are selected.	To ensure the patient is receiving the correct prescribed treatment.
17	Heparin Press the heparin Key on the right side of the screen. Select the rate required (at 0.5mls/hr intervals) Ignore CLOCK button for patients receiving SLEDDf for AKI , this is used for setting a heparin stop time which is only necessary for peripheral access (For first treatments and when a heparin dose has not been established or an alternative anticoagulant is required refer to Guidelines for Anticoagulation of Extra-corporeal Circuits)	To ensure that heparin is delivered at the correct rate at the commencement of treatment. To avoid clotting of the extra corporeal circuit and to prevent risk of patient bleeding.
18	Online Clearance Monitor (OCM) On the bottom of the screen, press the options key (second from the right) Press the OCM key. Input the Goal Kt/V as 1.4 Press V Urea, then press the calculate key. From this menu, enter the patients dry weight (if known), height (or estimated height), age and gender. The OCM will initially be used to monitor clearance and enable data collection to help determine appropriate urea clearance in patients with AKI.	To enable accurate monitoring of on-line urea clearance during treatment. Every patient receiving haemodialysis three times a week should have an equilibrated Kt/V of > 1.2 (or single pool Kt/V > 1.3) aim for 1.4 (Renal Association Standards, 2009).
19	Press the Online key on the right hand side of the screen. In this screen, press the treatment mode key & select **HDF Predilution** In this screen select the Dialyser class and select the dialyser used for this SLEDDf treatment. Also select the Bolus dose required for use if the patient has intradialytic hypotension.	To ensure the Right Prescribed Treatment is administered to the right patient, at the right time.

SLEDDf TREATMENT	
PRINCIPLE	**RATIONALE**
20. Assess, prepare and establish haemodialysis access according to the Guidelines for the Commencement and Termination of Extra-Corporeal Therapies via a Central Venous Catheter (Tunnelled and Non-Tunnelled) using Citrate Locking Solution.	Adequate access is required to achieve optimal blood flow rate. To observe for access complications, such as infection and dysfunctional flow.
21. Using a **STRAIGHT CONNECTION:** Stop the blood pump. Close the arterial and venous line clamps. At this stage press the dialysate screen & press the flow button & input 200mls/min Connect the SafeLine™ to the arterial line, before the dialyser (predilution) Connect arterial blood line to patient arterial access. **Press the Online key and enter the substitution rate (sub rate) as 100mls/min. DO NOT USE AUTOSUB.** Remove the rinse connector. Disconnect the venous blood line from the rinse connector and connect it to the patient, according to the Guidelines for the Commencement and Termination of Extra-Corporeal Therapies via a Central Venous Catheter (Tunnelled and Non-Tunnelled) using Citrate Locking Solution. Close the rinse port. Message: *Start the blood pump* – **Confirm** Touch the **Confirm** button. Optical detector sensed blood. Message: *Blood detected - Treatment* **Start** The blood pump stops. The arterial / venous occlusion clamp closes. **Mute** LED is flashing. Use rocker keys set the blood pump at 100mls/min and start. Touch the **Start** button. The system automatically changes to the TREATMENT SCREEN. Heparin pump and ultrafiltration are started automatically, if preset in the Operator Setup. Set the desired blood flow rate. The alarm limits will be set automatically. The substitute pump will start automatically after approx. 3 minutes. The substitute pump may also be started in advance by touching the **Sub pump I/O** button. Once the blood lines are completely filled with blood, check arterial and venous chamber levels are correct and begin to increase pump speed.	 To prevent blood loss Machine will default to 500mls/min if this info is not inputted. To reduce the risk of hypotension Access the Online screen – Turn Autosub off and input 100mls sub rate manually. Input Haematocrit and total protein if known. **Autosub will increase the substitution rate to two thirds of the blood pump. This will reduce diffusion and increase convection which could cause a reduction in urea clearance.** To minimise the risk of infection. To reduce the risk of hypotension. To reduce the risk of air entering the blood lines. To reduce the risk of recirculation. To avoid clotting of extra corporeal circuit and to prevent risk of patient bleeding.

22.	Build up blood pump speed to 250 - 350mls/min, unless otherwise indicated. Ensure pressure readings remain within acceptable limits: • Arterial pressure – 180mmHg • Venous pressure + 180 mmHg All alarm limits are set automatically, however, the size and position of the arterial and venous limits **MUST** be adjusted to ensure the setting of tight alarm limits. Second nurse to check the data (UF Goal, Prescribed SLEDDf Time, UF Rate, sub rate and all prescribed Dialysis Parameters).	To enable optimum blood volume to be processed and to achieve target urea reduction ratio whilst minimising the risks of damage to access vessels and risk of excessive recirculation. To enable prompt recognition of an alteration in patient's blood flow or access disconnection. To ensure the safety of the patient during the SLEDDf treatment.

23.	Ensure patient is comfortable and position with a nurse call buzzer, advising them to summon assistance if feeling unwell during treatment. Ensure patient access is secure and blood lines are taped to patient.	To maintain patient comfort. Patient complaints of dizziness, sweating, nausea and vomiting and cramp are often signs of hypotension/hypovolaemia and should be treated immediately. To prevent blood loss and trauma to access.
24.	Document essential pressures and information as requested on the SLEDDf chart (see Appendix 1). Immediately following commencement of dialysis, Obtain and record patient's observations: • Respiratory rate • Pulse • Blood Pressure • Oxygen saturations Re-check observations as indicated by patient's clinical status during treatment. **THIS SHOULD BE UNDERTAKEN AT LEAST EVERY 30 MINUTES AND MORE FREQUENTLY IF CLINICALLY INDICATED.** ***If patient is diabetic observations should include blood glucose monitoring***	To ensure patient receives prescribed dialysis treatment, as appropriate to individual needs. To assess and monitor patient's response to dialysis treatment. Signs of hypotension/hypovolaemia should be treated immediately by lying patient flat and reassessing target weight loss. Fluid resuscitation may be necessary depending on severity of symptoms.

25.	• Check patient prescription for any drugs/ IV therapy required on haemodialysis. Administer any prescribed drugs appropriately and according to the Trust NUH Intravenous drug administration policy and the NMC Standards for medicines management.	To ensure that any prescribed drugs/IV fluids are administered according to the patient prescription taking into account compatibility with haemodialysis treatment.

TERMINATING SLEDDf		
	PRINCIPLE	**RATIONALE**
26.	• When SLEDDf is completed, the yellow status indicator will flash; an audible alarm will be heard. The displayed message will state *Treatment goal achieved – Treatment* ***Continue*** *Reinfusion* ***Start*** Take the Patient's temperature.	Safe to commence termination of SLEDDf treatment. To ensure central blood cultures are taken if the patient becomes pyrexial, to ensure further manipulation of the central venous access line is kept to a minimum.
27.	Touch the on screen start button. The system switches automatically to the Reinfusion Screen. A Message will automatically appear. *ONLINE REINFUSION: Connect the SafeLine to the arterial blood line –****OK*** *Reinfusion* ***NaCl – Treatment.*** The blood pump stops. The arterial / venous occlusion clamp closes The Yellow LED is illuminated and an audible alarm is heard. Press the mute button. Disconnect the SafeLine from the Blood line and attach a recirculating adapter to the SafeLine. Disconnect the line from the patient's arterial access (take out) as per Guidelines for the Commencement and Termination of Extra-Corporeal Therapies via a Central Venous Catheter (Tunnelled and Non-Tunnelled) using Citrate Locking Solution. Touch the **OK** button or **NaCl** button Reinfuse at no greater than 200mls/min.	To reinfuse the patient's blood back to the patient at a safe rate. Use 0.9% Sodium Chloride only if the dialysate or bicarbonate levels are too low to perform reinfusion without having to use a new bicarbonate bag/dialysate canister.

28.	Once the optical sensor does not detect blood, a message will appear:- *Blood reinfused – Reinfusion* ***Continue –*** *Blood lines* ***Remove*** If at this point if further reinfusion is required the blood pump must be restarted by pressing the ***Continue*** button, blood pump will not switch off automatically at this point and must be switched off manually by the nurse controlling the reinfusion, once enough blood has been reinfused. Stop the blood pump; disconnect the venous line from the patient as per Guidelines for the Commencement and Termination of Extra-Corporeal Therapies via a Central Venous Catheter (Tunnelled and Non-Tunnelled) using Citrate Locking Solution. Once this is complete Second nurse to touch the **Remove** button. Once the blood lines are removed from their housing open the doors, drain the dialyser as prompted, remove the empty BiBag (emptied automatically)	To ensure enough red blood cells have been reinfused back to the patient.
29.	Put machine into a cleaning program as described in 9. (Refer to Guidelines for Disinfection of Haemodialysis Machines). Dispose of equipment according to unit protocol. Wash exterior aspect of machine and patient area according to unit guidelines and machine manual.	To maintain a safe environment and reduce risk of cross-infection.
30.	Obtain and record patient blood pressure after termination of treatment. (at a minimum this should be 5 minutes post treatment) Record post dialysis weight and all treatment data including the substitution volume and any other information required to complete SLEDDf documentation according to dialysis prescription. Ensure paper and computerised records are updated as appropriate (see NMC Standards for Records and Record Keeping).	To allow an accurate reflection of blood pressure following wash-back. To ensure adequate patient documentation, good communication and continuity of individualised care.

31.	Ensure the following blood samples are taken **60 minutes** after the termination of treatment and results reviewed by a renal registrar: • Urea & Electrolytes • Bicarbonate • Calcium • Phosphate *Additional blood samples may be requested according to clinical condition (e.g. blood glucose, blood gas analysis)* **Hypokalaemia may develop after 2-3 days of daily SLEDDf. In those patients it may be necessary to use a 3mmol/l dialysate solution (this will be kept in the equipment store room on the corridor leading to Carrel/Bramley).** **Hypophosphataemia may also develop after 2-3 days of daily therapy. Please refer to guidelines for phosphate supplementation (see Appendix 2).**	To enable effective monitoring of the patient's condition and therapeutic effects of the dialysis. To maximise the safe and effective delivery of appropriately individualised prospective dialysis sessions. To maintain potassium level within therapeutic range and avoid clinical complications of hypokalaemia. To maintain phosphate level within an acceptable therapeutic range and avoid clinical complications of hypophosphataemia.

PLEASE SEE ADDITIONAL INFORMATION FOR THE FOLLOWING:

- **Terminating Dialysis early**
- **Exchanging an empty BiBag during treatment**

TERMINATING SLEDDf EARLY

There may be occasions when dialysis may need to be abandoned early either due to technical difficulties or because of a change in the patient's clinical condition. When terminating dialysis before the UF goal is reached the **Treatment goal achieved** and **reinfusion** prompts will not appear. The following steps should be followed:

- Touch the **REINFUSION** button
- Message will automatically appear
- *ONLINE REINFUSION: Connect the SafeLine to the arterial blood line –**OK***
  *Reinfusion **NaCl – Treatment***
- Blood pump stops automatically
- Prepare to wash-back as previously described

EXCHANGING AN EMPTY BIBAG DURING TREATMENT

The larger BiBag should last for the duration of a SLEDDf treatment. However, if there has been a delay after preparing the machine, before commencing dialysis, this may mean that the BiBag will not last for the duration of treatment. If an exchange is required the following steps should be followed:

- Touch the **DIALYSATE MENU** button.
- Touch the **Empty bags** field.
- Touch the BiBag field and accept with the **OK** button.
- The drain program is in progress.
- Message: *The BiBag is empty and it can now be removed – or – Empty BiBag* **Repeat**
- Remove the BiBag.
- Connect the new BiBag.
- Close the bicarbonate flap until it clicks into place.

NB: Treatment time lost will not be captured by the UF clock, therefore additional time may need to be added. Effective treatment time is displayed in the treatment data key.

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APPENDIX 1

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Date:	**Patient Details** **Name:** **DOB:** **Hospital No:**	**Station No:**	**Machine No:**
DOES MACHINE NEED TO BE ISOLATED? (please circle) **YES** **NO**			**Machine checked by:**
Nurse Commencing Dialysis:		**Nurse Terminating Dialysis:**	
Start Time:	**Estimated Finish Time:**	**Actual Finish Time:**	
Prescribed Treatment Time:	**Target Fluid Loss:**	**Actual Treatment Time:**	**Actual Fluid Loss:**
Dialysate Flow:	**Dialyser:**	**Litres Processed:**	**OCM Kt/V:**

Dialysate	**Dialysate Temp:**	**Dialysate Flow:**	**Sub Rate:**	**Dialysate Sodium Level:**	**Dialysate Bicarbonate Level:**
Vascular Access:					**Height (cm):**
Baseline Clotting Time:	**Initial Heparin Bolus:**	**Total Heparin Dose Administered:**			
Additional blood tests required:		**Alternative Anticoagulant:**			
GeloplasmaPrime required? YES/NO		**Additional IV Fluids Given:**			

Pre-Dialysis Observations		**Post-Dialysis Observations**	
Temperature		Temperature	
Pulse		Pulse	
Blood Pressure		Blood Pressure	
Resp rate		Resp rate	
O_2 Saturations		O_2 Saturations	
Blood Glucose (if required)		Blood Glucose (if required)	

Pre-Dialysis Blood Results				**Post Dialysis (60 mins post HD) Blood Results**			
Sodium		Albumin		Sodium		Bicarbonate	
Potassium		Hb		Potassium		Phosphate	
Urea		WBC		Urea		Calcium	
Creatinine		Platelets		Creatinine			
Bicarbonate		APTT					
Phosphate		PT		**Intradialytic Hypotension (YES/NO)**			
Calcium		TT		Fluid bolus	Yes/No	Min UF	Yes/No
***HBsAg**		***HBCG**		Volume		No of times	
***HCV**		***HCVL**		Type		Total Time	
***HBsAb**		***HIV**					

***First Treatment only or if not taken previously as per the Guideline for the Prevention and Control of Blood Borne Virus Infections and Other Communicable Diseases In Adult Patients with Chronic Kidney Disease.**

APPENDIX 1 (cont'd)

TIME	T	P	B/P & MAP	RESP RATE	O_2 SATS	BLOOD PUMP SPEED	ART PRESS	VEN PRESS	TMP	RBV %	HCT	ACT	HEPARIN		COMMENTS
													Bolus	Rate	

- APPENDIX 2

- **Phosphate Supplementation Guidelines**

Therapeutic phosphate range = 0.8mmols/l-1.4mmols/l.

- **Symptoms of Hypophosphataemia**

CNS: irritability, weakness, paraesthesia, confusion, seizures
Cardiac: decreased contractility
Respiratory: respiratory failure
GIT: anorexia, nausea, vomiting
Musculoskeletal: weakness, myalgia
Haematological: haemolysis, platelet dysfunction

- **Intravenous Treatment**

Phosphate supplementation is recommended when the phosphate level falls below 0.6mmols/l.

Rate of infusion and choice of initial dose should be made on severity of symptoms, however, the following dosage is recommended for those patients requiring phosphate supplementation whilst receiving Slow Low Efficiency Daily Diafiltration:

Administer 9mmol of potassium acid phosphate diluted in 100mls of Sodium Chloride 0.9% over 6hrs. This can be administered during treatment via the port attached to the venous chamber using an IV infusion pump.

If necessary the dose may be repeated every 12hrs until the phosphate level is above 0.6mmol/l.

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