1. Introduction

A first acute or chronic haemodialysis session may induce disequilibrium syndrome which occurs due to the over correction of metabolic abnormalities (uraemia). This can be due to serum urea concentration being reduced too quickly, especially if the initial blood urea is very high. Patients with pre existing alterations in their mental state may be at greater risk.

Symptoms of disequilibrium include:

- Headaches
- Nausea
- Disorientation
- Restlessness
- Blurred vision
- Tremor
- Fits
- Coma
- Rarely death

These symptoms can occur during or after dialysis. They are probably caused by cerebral oedema due to osmotic influx of water into the brain after removal of urea by dialysis, before equilibration across cell membranes occurs. Slow removal of urea minimises the risk. Symptoms are normally self-limiting and usually resolve over a few hours.

The following factors should be considered when prescribing the first few dialysis sessions for these patients:-

- Length of session
- Blood flow rate
- Choice of dialyser
- Anticoagulation
- Dialysate composition
- Fluid removal (UF)

Therefore, care must be taken in prescribing these initial dialysis sessions. However, repeated audits have shown that patients new to the renal replacement therapy programme may remain underdialysed with low urea reduction ratios for many months. Although this may not be critical initially when residual function remains, the danger is that as residual function declines they may be at increased risk. It is important to ensure the dialysis dose is increased appropriately.

2. Scope

These guidelines are applicable to patients directly under the care of University Hospitals of Leicester NHS Trust. Local guidance (for example for the inpatient care of kidney patients not in a Leicester hospital) may also exist and take precedence.
The guidance is for use by Nephrology Consultants, SpRs and Nurse Independent Prescribers.

3. Recommendations, Standards and Procedural Statements

3.1 Initial haemodialysis prescription

Assessment of the patient is required prior to prescribing the first dialysis session. This should include blood chemistry, weight, fluid status, blood pressure and access.
A first haemodialysis treatment should at a maximum only reduce the urea by 30-40%. Some patients may require daily dialysis when starting but those as outpatients will start three times a week dialysis. This requires a prescription of between 1 ½ to 2 hours with a blood pump speed of 150-200mls/min with a small dialyser surface area (e.g. 14H) and no more than a 1000ml of fluid removal. Isolated ultrafiltration may be required for those acute patients who require more fluid removal due to pulmonary oedema in order not to over dialyse them initially.

3.1.a Initial dialysis treatment virology and quantiferon

Ideally, all patients starting renal replacement therapy should have their HepBsAg, HepC Ab and HIV Ab checked before starting dialysis. If up to date virology results within 3 months are not available, these should be checked on the FIRST treatment session and the results requested urgently. The patient should be dialysed with isolation machine and the machine not used for another patient without careful decontamination (see below 3.3) until HepBsAg has been shown to be negative.
Although national guidance does not recommend HIV screening of incident dialysis patients, local advice is that the incidence of HIV in the region and the availability of effective treatment strongly support initial screening (this is now done for all pregnant women and all emergency admissions.
For further information please see BBV guideline on insite http://insitetogether.xuhl-tr.nhs.uk/pag/pagdocuments/Blood%20Borne%20Viruses%20BBV%20in%20Patients%20Receiving%20Renal%20Replacement%20Therapy%20RRT%20UHL%20Renal%20Guideline.pdf

If patient does not have a quantiferon result please send appropriate form and sample at the first dialysis treatment. http://insitetogether.xuhl-tr.nhs.uk/pag/pagdocuments/Mycobacterium%20Tuberculosis%20Infection%20Prevention%20in%20Patients%20with%20Established%20Kidney%20Failure%20UHL%20Renal%20Guideline.pdf

3.2 Second and third sessions

Typically the second session would be 2-3hours with a blood flow rate of 200-250ml/min remaining on a small surface area dialyser. The third session would be between 2 ½ and 3 ½ will a pump speed between 250 – 300ml/min blood flow rate. The subsequent prescriptions should be reliant on the clearance on the third session.

3.3 After the third dialysis session

For long term haemodialysis therapy, most patients should have the length of each dialysis increased to a minimum of 4hrs if dialysing three times a week in line with UK Renal Association guidelines(1). Patients should be increased to this time over the first month of dialysis. Very large patients with a high volume of distribution of urea (Vd) may require even longer sessions.
Urea reduction ratios should be measured over the first few dialysis sessions of 4hrs with a target URR of 70% but this should not be the only factor in determining dialysis duration. Access blood

flow should be increased to a minimum of 300ml/min and up to 400ml/min if possible. In patients achieving higher blood flow, increasing dialyser surface area will be more effective.
The dialysis prescription should be recorded in the dialysis nursing notes and on PROTON (HD prescription screen.

A sample haemodialysis prescription for new patients starting at Hamilton outpatient dialysis unit is appended to this document as an illustrative example. Each dialysis unit will have a different standard prescription/filters/dialysates. Please check with the relevant unit before completing a prescription. This prescription does not apply to patients who received dialysis as an inpatient and then discharged to outpatient units.

3.4 Patient involvement

Education of the patient in paramount in ensuring their adherence by emphasising the importance of both dialysis adequacy and of dialysis duration and regular attendance at sessions. They should also be encouraged to inform the nursing staff of any symptoms.

3.5 Anti coagulation

Heparin free dialysis for 1st HD session is recommended to reduce the risk of pericardial bleeding, bleeding from access sites or intracerebral bleeding in the setting of hypertension. However, a good blood flow rate (ideally >300ml/min) is required to prevent clotting.

3.6 Dialysate

Serum potassium (K) levels will be reduced on dialysis and by the correction of acidosis. Use 3.00mmol/L dialysate if K <4.5mmol/L and 2mmol/L dialysate if K >4.5mmol/L. If K >6.0mmol/L then consider using 1.0mmol/L dialysate (A325) but with caution as this may reduce the K too far.

3.7 Anaphylaxis

Rare on dialysis but can occur within the first few dialysis sessions. Normally within the first 30mins symptoms may be moderate to severe and include:-

- Itching
- Urticaria
- Cough
- Abdominal cramps
- Dyspnoea
- Burning
- Collapse
- Death

Causes include reactions to ethylene oxide (very rare, due to use of heat sterilization), bacterial contamination of dialysis in high flux dialysis, heparin allergy (rare).
Treatment for severe symptoms is to remove from dialysis immediately (without washing the patient's blood back), cardiopulmonary resuscitation if necessary, intravenous antihistamines, steroids and adrenaline if severe.
If symptoms are mild then dialysis can be continued with caution, if any doubt then the patient will be taken off dialysis.

3.8 Vascular access

A careful assessment of vascular access is required prior to dialysis

3.8.1 AV fistula or grafts.

These should be assessed and needled by an experienced haemodialysis nurse (band 5 or above) and the process of needling explained to the patient carefully. It is wise to warn patients that it may take some weeks to establish consistent use of the fistula/graft.

3.8.2 Haemodialysis catheters.

These should be carefully inspected for signs of bleeding or infection and all jugular or subclavian catheters must have a CXR, position checked and signed off as satisfactory before use.

4. Education and Training

All new haemodialysis staff should be familiarised with this guideline during induction and training

5. Monitoring and Audit Criteria

Key Performance Indicator	Method of Assessment	Frequency	Lead
URR	Renal registry Data collection	quarterly	Dr Medcalf

6. Legal Liability Guideline Statement

See section 6.4 of the UHL Policy for Policies for details of the Trust Legal Liability statement for Guidance documents

7. Supporting Documents and Key References

UK RA Clinical Practice Guideline for haemodialysis
http://www.renal.org/Clinical/GuidelinesSection/Haemodialysis.aspx(accessed 30May 2011)

8. Key Words

Haemodialysis, Prescription, New patients

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DEVELOPMENT AND APPROVAL RECORD FOR THIS DOCUMENT		
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Approved by:	As above	**Date Approved:** 21Feb2016

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Appendix 1: Sample New Patient Dialysis Prescription For **Hamilton** Dialysis Unit
Each unit may have its own initial prescription.

Special Instructions (i.e. regular instructions, e.g. diabetic, allergies, isolation)
Please document any allergies in red.

On 1st HD please take all new patient pre & post bloods,

swabs and complete nursing documentation.

On 3rd and 5th HD please take **and** check pre & post U & E

Allergies:

Named nurse

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Slot times (day and time)

	Dialyser	Dialysate	Time	Blood Flow	Pre HD K^+	Post HD K^+	URR
1st Dialysis	FX60	AC-F219/1	90 mins	180 ml/min			
2nd Dialysis	FX60	AC-F219/1	150 mins	200 ml/min			
3rd Dialysis	FX60	AC-F219/1	210 mins	200 ml/min			
4th Dialysis	FX60	AC-F219/1	210 mins	250 ml/min			
5th Dialysis	FX60	AC-F219/1	240 mins	250 ml/min			
6th Dialysis	FX60	AC-F219/1	240 mins	300 ml/min			

*3mMol/L Potassium = AC-F313/2, 1mMol/L Potassium = AC-F119/5

Access	Needle Size	Dialysate Flow	Bi Bag
AVF	16 g	500ml/min	900g

Bicarbonate	Sodium		Profiling		Machine Temp Set
	Base	Concentration	Na	UF	
+/- 0 mmol/l	138 mmol/l	135 mmol/l	x	x	36 ^{0}C

Target weight (kg)	Date of change	Comments	Signature

Signature Date