University Hospitals Birmingham NHS
NHS Foundation Trust

CONTROLLED DOCUMENT

Standard Operating Procedure (SOP) for Home Haemodialysis

CATEGORY:	**Procedural Document**
CLASSIFICATION:	**Clinical**
PURPOSE	**To provide information and practical guidance on the procedure of the selection, training and support of patients dialysing at home**
Controlled Document Number:	**745**
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Controlled Document Sponsor:	**Associate Director of Nursing, Division B** **Divisional Medical Director, Division B**
Controlled Document Lead:	**Professional Development Nurse-Renal**
Approved By:	**Divisional Medical Director, Division B** **Associate Director of Nursing, Division B** **Matron Established Renal Failure** **Clinical Service Lead**
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Distribution: • **Essential Reading for:** • **Information for:**	 **All clinical staff involved in the treatment of haemodialysis patients in their home.** **All clinical staff**

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This Standard Operating Procedure is to be used in conjunction with the following Trust guidelines:

- Guidelines for the cannulation, monitoring of arteriovenous fistula (AVF) and arteriovenous graft (AVG) and access surveillance for the purpose of haemodialysis treatment
- Guidelines for Patients on the Chronic Haemodialysis Programme at QEHB
- Clinical Procedure for Screening, Prevention and Management of Blood Borne Virus in Patients under the Care of UHB Renal Service (2nd edition)
- Protocols for Screening, Prevention and Management of Blood Borne Virus in Patients under the Care of UHBFT, Renal Service (2nd edition)
- Guidelines for the Care of Central Venous Access Devices (CVADs)

Refer to Appendix 1

1.0 Introduction

End stage renal failure (ESRF) is an irreversible, lethal condition. It has many causes and can be treated with regular dialysis or transplantation. It is associated with a high level of co-morbidity, both pre-existing and acquired after developing ESRF. Most cases develop from long-standing, slowly progressive chronic kidney disease (CKD), although some arise from a sudden loss of kidney function called acute kidney injury (AKI). ESRF is associated with a marked reduction in life expectancy and quality of life. The financial costs of treatment are also high, at present accounting for more than 2% of the United Kingdom healthcare budget.

Haemodialysis is the most prevalent mode of renal replacement therapy providing intermittent haemodialysis to over 1100 patients at University Hospital Birmingham NHS Trust (UHB) and regional satellite dialysis units.

There is a current drive to increase the numbers of patients having home dialysis therapies (National Service Framework, 2005; NICE, 2002)

The home haemodialysis service strives to promote dialysis to the renal population as a choice of modality. Home haemodialysis can offer improved clinical outcomes and quality of life when effective clinical support and patient education is in place. This also includes the option of nocturnal haemodialysis (appendix 4).

Haemodialysis is an aggressive but effective process of solute and fluid removal by diffusion, convection and ultra filtration across an artificial, semi-permeable membrane. Placement of an arteriovenous fistula or central venous access device (CVAD) enables a continuous flow of blood around an extra corporeal circuit and returned to the patient via the artificial kidney (haemodialyser).

2.0 Statement of Need

This SOP has been developed by senior medical and nursing staff in the Renal Unit in order to ensure that there is a standard document that is evidence based and available for registered staff working within the home haemodialysis team. In addition, the Registered Nurse must have been assessed as competent to cannulate arteriovenous fistulae in accordance with the competencies for chronic haemodialysis.

The purpose of this SOP is to:

1. Clarify and define the procedure for assessing patient suitability for performing haemodialysis in the home, their training and the continuing care management of the patient.

2. Provide registered healthcare professionals with support, knowledge and evidence-based practice necessary to enable them to manage the patient on chronic haemodialysis.

3.0 Staff competence

This SOP will supplement the chronic haemodialysis, CVAD and arteriovenous fistula cannulation guidelines already in use in the Renal Unit. The clinical competencies are available to nursing staff and can be downloaded from the 'Renal Unit' department page of the University Hospitals Birmingham NHS Foundation Trust Intranet site. Assessment of competence is by direct observation of practice and discussion in relation to the chronic haemodialysis procedure.

In accordance with codes of professional practice, the registered nurse has a responsibility to recognise, and to work within, the limits of their competence. In addition, the registered nurse has a responsibility to practice within the boundaries of the current evidence based practice and in line with up to date Trust and national policies and procedural documents. Evidence of continuing professional development and maintenance of skill level will be required and confirmed on an annual basis at the personal development review by the registered nurse's line manager.

A list of the registered nurses and medical staff competent to perform this skill must be kept by their line manager

4.0 Patient and carer competence

Selection of suitable patients for home haemodialysis is made using the home haemodialysis selection criteria, which include assessment of the patient's and carer's motivation and ability to learn, communication needs, psychological suitability and accommodation (Appendix 3). The criteria are listed and the selection process recorded on MARS. Patients are given information about the home haemodialysis pathway and assessment (Appendix 2).

Both the patient and carer must undertake a competency based training, recorded on the Trust Home Haemodialysis Training Document, before they commence dialysing at home. There is no minimum training period; it is dependent on the patient/carer achieving competencies.

Patients are normally trained at UHB, in groups of 2 or 3 at a time. In exceptional circumstances patients can be trained at home for a short period, usually when re training is required due to machine upgrade or carer change.

5.0 Provision of Home Haemodialysis

5.1 Roles

Each patient has a dialysis prescription which is reviewed by the Renal Consultant leading the Home Haemodialysis programme on a monthly basis.

All patients are given the opportunity to speak to an expert patient. All patients are allocated a named nurse (see current version of Role of the Home Haemodialysis Named Nurse). All patients are seen by a dietician and offered the opportunity to see a psychologist and social worker.
The Renal Technicians at UHB are responsible for the care and maintenance of the dialysis machine and other equipment supplied, and also for monitoring the water quality. Consumables are supplied to the patient's home by the relevant company.

If in-centre dialysis is required due to technical problems or the need for respite, this is arranged and delivered either at UHB or, if the patient is suitable, at a satellite unit linked to the Trust.

If the patient for whatever reason is no longer suitable for home haemodialysis, this decision is made by the Renal Consultant following discussion with the nursing team and the patient is then transferred back to in centre dialysis.

5.1 Blood Monitoring

A full renal profile, FBC, B12, Folate, Ferritin, PTH must be checked. During the first week a full renal profile must be taken pre dialysis and U & Es, serum calcium and phosphate taken post dialysis. Blood sampling post dialysis should ensure that no recirculation from the single needle affects the result.

The lead consultant for home haemodialysis will review the bloods results promptly and make necessary changes. These will include advising the patient when dietary and fluid restrictions can be relaxed or stopped, changing the dialysate potassium, and when phosphate binders need reducing or stopping and supplements commenced.

5.2 Nocturnal Haemodialysis

Once the patient has been established on home haemodialysis therapy and has dialysed at home successfully for approximately three months they can be considered for nocturnal haemodialysis. Refer to Appendix 4 for guidance on the care of patients undertaking nocturnal haemodialysis at home.

6.0 Monitoring and Audit of the SOP

6.1 Monitoring

This SOP will be rolled out fully across the chronic dialysis unit and the following goals have been set:

- Registered nursing staff must be deemed competent by successfully completing the haemodialysis procedure competencies before they can perform chronic haemodialysis independently. This will be reviewed annually.

- 100% of staff will receive annual infection control training.

Complications associated with home haemodialysis and nocturnal haemodialysis will be continually monitored and reviewed at monthly quality assurance meetings. Patients' dialysis indexes must be monitored monthly.

6.2 Audit of the SOP

A home haemodialysis nurse specialist will lead the audit of the SOP. The audit will be undertaken in accordance with the review date and will include:

- The number of patients on home haemodialysis and nocturnal haemodialysis
- Adherence to the SOP
- Any untoward incidents or complaints
- The number of registered nurses competent to perform the chronic haemodialysis procedure.
- Patient experience questionnaire.

All audits will be logged with the Risk and Compliance Unit.

6.3 Clinical Incident Reporting and Management

Any untoward incidents and near misses must be reported via the Trust incident reporting system, and where required escalated to the appropriate management team. In addition, the Risk and Compliance Unit must be notified by telephone of any Serious Incidents Requiring Investigation (SIRI).

7.0 References

University Hospitals Birmingham NHS Foundation Trust (current version) **Guidelines for the care of central venous access devices (CVADs).** University Hospitals Birmingham NHS Foundation Trust. Controlled document number 229.

University Hospitals Birmingham NHS Foundation Trust (current version) **Infection Prevention and Control Policy and Procedural documents**. University Hospitals Birmingham NHS Foundation Trust.

University Hospitals Birmingham NHS Foundation Trust (current version) **Cannulation of an arteriovenous fistula.** University Hospitals Birmingham NHS Foundation Trust.

The National Service Framework For Renal Services (2005). **Part 1 Dialysis and Transplantation** Department of Health. London.

National Institute For Clinical Excellence (2002) **Guidance On Home Compared With Hospital Haemodialysis For Patients With End Stage Renal Failure**. London.

University Hospitals Birmingham NHS Foundation Trust (current version) **Role of the Home Haemodialysis Nurse .** University Hospitals Birmingham NHS Foundation Trust.

Standard Operating Procedure Submission Details

Standard Operating Procedure prepared by:

Trina Poleon	Home Haemodialysis Nurse Specialist
Colette Doyle	Home Haemodialysis Nurse Specialist
Christopher Duncan	Professional Development/Project Nurse
Dr Paul Cockwell	Consultant Nephrologist Clinical Service Lead
Liz Simpson	Matron for Established Renal Failure

Standard Operating Procedure submitted to and approved by:

Divisional Medical Director, Division B .....

Date: 27-1-2015

Associate Director of Nursing, Division B M S Cahill

Date: 20/1/15

Matron for Established Renal Failure C Simpson.

Date: 9/1/15

Clinical Service Lead .....

Date: 12/1/15

Appendix 1

UNIVERSITY HOSPITALS BIRMINGHAM NHS FOUNDATION TRUST

LINKS TO PROCEDURES RELATED TO THE HAEMODIALYSIS TREATMENT

1. Set up and preparation of the Fresenius 5008H haemodialysis machine.

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2. Renal CVAD Connection and disconnection procedure

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3. Duralock guidelines

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4. Synerkinase guidelines

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5. Guidelines for the cannulation, monitoring of arteriovenous fistula (AVF) and arteriovenous graft (AVG) and access surveillance for the purpose of haemodialysis treatment

   http://uhbpolicies/cannulation-of-avf-and-avg.htm

6. Guidelines for the Care of Central Venous Access Devices (CVADs)

   http://uhbpolicies/central-venous-access-devices.htm

7. Standard Operating Procedures (SOPs) for the Management of a Patient's Haemodialysis Care

   http://uhbpolicies/haemodialysis-care.htm

8. Guidelines for Patients on the Chronic Haemodialysis Programme at QEHB

   http://uhbpolicies/chronic-haemodialysis-programme.htm

9. Clinical Procedure for Screening, Prevention and Management of Blood Borne Virus in Patients under the Care of UHB Renal Service (2nd edition)

   http://uhbpolicies/assets/BloodBorneVirusesProcedure.pdf

10. Protocols for Screening, Prevention and Management of Blood Borne Virus in Patients under the Care of UHBFT, Renal Service (2nd edition)

    http://uhbpolicies/assets/BloodBorneVirusScreeningRenalPatients.pdf

HOME HAEMODIALYSIS PATHWAY AND INFORMATION FOR PATIENTS AND CARERS

YOUR REFERRAL IS RECEIVED

You have expressed an interest in home haemodialysis and have been referred to our team.

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YOU WILL BE CONTACTED BY PHONE TO ARRANGE AN ASSESSMENT VISIT AT HOME

You will be asked about who will be assisting you in having your treatment at home. It is a requirement at present to have someone with you whilst you are having your dialysis at home. We would prefer the carer to be there for the home visit.

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ASSESSMENT VISIT

This is an opportunity to speak to one of the team about what is involved in having your dialysis at home. The nurse will want to ensure that you have a willing and committed carer and that you and your carer will be able to come to the QE for as long as it takes to complete training. We will also ensure that your home circumstances are suitable to have your dialysis at home.

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TECHNICIAN HOME VISIT

They will assess your current plumbing and see what modifications need to be made in order to put the dialysis machine in your chosen space.
If you do not own your own home, we will need written permission from the landlord in order to plumb the machine in. Training cannot commence before we get this permission.

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TRAINING DATE GIVEN AND TRAINING COMMENCES

Training will take place on ward 301 at the QE for approximately 6 weeks. During this time plumbing is put in at home, dialysis machine and stock is ordered and delivered to your home. There may be a wait before your training commences, in which case you can begin to self care at your current unit; please seek further advice from your named nurse at your dialysis unit. This may well reduce the time you need to spend training at the QE.

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COMPETENCIES ACHIEVED

Once you and your nurse are happy that you and your carer are fully trained and confident, you will be given a date to start your treatment at home. You will be given a named nurse.

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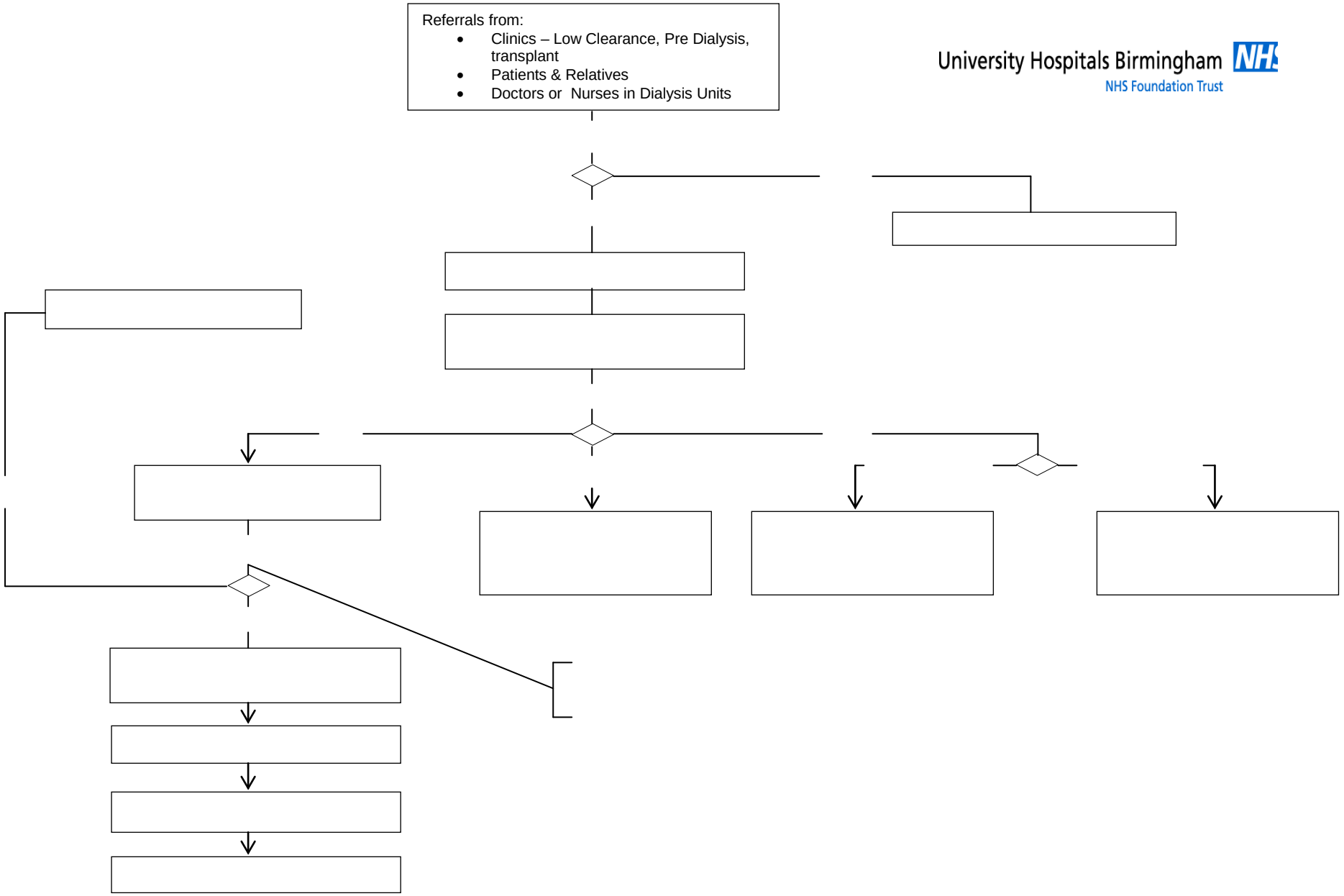
HOME

Once home, your nurse will go in for the first 3 sessions to provide extra support. Ongoing support will be given, monthly home visits, clinic appointments and the home team available via telephone Monday to Friday 9 till 5. Technical support for help with your machine is available all day every day.


Referrals from:
Clinics – Low Clearance, Pre Dialysis, transplant
Patients & Relatives
Doctors or Nurses in Dialysis Units

Guidelines for Nocturnal Haemodialysis

(adapted from Heart of England Foundation Trust Guidelines).

Purpose of guidelines

To enable patients to undertake nocturnal home haemodialysis

Evidence base of guidelines

These guidelines have been derived following a review of the literature and discussions with other renal units that have successfully implemented a nocturnal home haemodialysis programme both within the UK and internationally.

Nocturnal Haemodialysis Training

Once the patient has been established on home haemodialysis therapy and has dialysed at home successfully for approximately three months they can be considered for nocturnal haemodialysis training. This period allows the patient and the dialysis partner to develop their skills and confidence during the day when they will be more alert and advice is easy to access. Additional training needed, in order to undertake nocturnal dialysis, will be:

- single needle haemodialysis training if an AV fistula is used for haemodialysis (except in exceptional circumstances agreed by the consultant)
- the use of safety mechanisms to reduce the risk of disconnection. This will include securing of blood lines and needles and the use of a HEMOdialert
- Revision of what to do in the unlikely event of significant blood loss related to needle dislodgement.

Needling

Single needle dialysis is used for nocturnal dialysis as an added safety measure. Single needles reduce the likelihood of excessive blood loss if the needle becomes dislodged as this will affect the arterial flow into the needle and will trigger machine alarms. Venous needle dislodgement in double needle dialysis will not reliably trigger machine alarms. The patient will be informed of the different types of needling techniques and consideration given to the suitability of the buttonhole needling technique. Instruction in this technique will be given if required. If this technique is used arrangements will be made for reviewing the fistula in 3-6weeks in order to switch to blunt needles if required.

Securing technique when using single needle inserted in a fistula arm

The patient will be instructed on how to secure the needle and dialysis lines to reduce the risk of needle dislodgement and how to use the HEMOdialert.

The HEMOdialert is placed as per manufacturer's instructions and will need to be tested before each dialysis session. The patient must be provided with two devices to ensure that there is back up if a device fails.

Methods of securing will be adapted individually for each patient depending on their fistula and needling points. A suggested method is that the lines are looped loosely up to the shoulder, padding placed under the clamps and a tubular bandage applied over the whole arm to the shoulder to retain lines and needle. This dressing must be sufficiently large that the fistula is not compressed and the lines are not held tightly against the arm

Dialysis prescription

- The standard prescription should be 8 hours dialysis up to 6 times weekly but this needs to be individualised to blood results and patient preferences. Regular review of results in the first few weeks will allow this to occur (see below).
- The patient should initially continue to use the same dialyser as prior to nocturnal dialysis although this should be reviewed regularly following commencement of long slow dialysis.
- The machine should be adapted to 300ml/min dialysate flows to ensure the 5 litre dialysate container will be sufficient for the whole dialysis (A 5 litre container should be sufficient for 9.5 hours at this flow rate and a large (900g) Biobag should be used.) Blood flow rates should be correspondingly reduced to as little as an effective blood flow of150mls/min but the flow rate may need to be higher to prevent venous pressure alarms.
- Patients should initially use standard dialysate concentrate but this may need adjusting with increase in potassium or phosphate depending on blood monitoring.
- The patient should ideally be anticoagulated with unfractionated heparin. If the patient chooses to stay on low molecular heparin they are likely to need a second dose after 4 hours.
- The patient's dialysis prescription must be prepared by a Consultant Nephrologist from the home haemodialysis team and reviewed during their training.

Excessive Ultrafiltration rates

Patients should ensure that the ultrafiltration rate prescribed is double checked to ensure that excessive fluid loss is not entered. The machine default will be set to maximum ultrafiltration of 1000ml/hour but this will not prevent excessive ultrafiltration over an 8 hour treatment. Patient education is therefore imperative and a clear understanding of a maximum total ultrafiltration volume established.

Blood Monitoring

- A full renal profile, FBC, B12, Folate, Ferritin, PTH must be checked. During the first week a full renal profile must be taken pre dialysis and U & Es, serum calcium and phosphate taken post dialysis. Blood sampling post dialysis should ensure no recirculation from the single needle affects the result.
- After the first week these bloods can be taken weekly for the first month and then reduced to monthly when clinically indicated.
- The lead consultant for home haemodialysis will review the bloods results promptly and make necessary changes. These will include advising the patient when dietary and fluid restrictions can be relaxed or stopped, changing the dialysate potassium,

and when phosphate binders need reducing or stopping and supplements commenced.

PHOSPHATE The post dialysis phosphate should not be below 0.4mmols/L and ideally not below 0.8mmols. If below this the dialysis prescription and patient's diet will be reviewed and supplemental dialysate phosphate added if needed
POTASSIUM The post dialysis potassium should be greater than 3mmol/l. Low potassium can be addressed either by relaxing dietary restrictions or using 3mmol/l potassium dialysis concentrate.

Medication

Antihypertensives can often be reduced or discontinued.
Folic acid and multivitamin supplementation may be required. The IV iron requirement should be closely monitored as this may increase following conversion to daily nocturnal dialysis.

COMPLETION OF TRAINING

The patient and registered nurse must complete the training nocturnal haemodialysis competencies (Appendix 5) and a copy placed in the patient's notes.

Problem solving

Patients should be confident in overcoming common problems during dialysis and know how to obtain advice or support if required once they return home. They should be reassured that they will be sufficiently well dialysed that if problems occur they can discontinue dialysis and discuss problems the next day if there are machine related problems or non urgent medical problems. They must be provided with contact details for the renal technicians, the main Dialysis Unit, and the home haemodialysis team. During the night patients can contact the on call Specialist Registrar (SpR) or on call consultant Nephrologist for emergency advice.

References / Bibliography

Chan. C; Floras J. S; Miller, J. A. & Pierratos, A. (2002) Improvement in ejection fraction by nocturnal haemodialysis in end-stage renal failure patients with coexisting heart failure. **Nephrology Dialysis and Transplant**. 17 pp1518−1521.

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Chan, C. T; Notarius, C. F; Merlocco, A. C. and Floras, J. S. (2007) Improvement in exercise duration and capacity after conversion to nocturnal home haemodialysis. **Nephrology DialysisTransplantation**. 22(11) pp3285-3291.

Cullerton, B. F; Walsh, M; Klarenbach, S. W; et al (2007) Effect of Frequent Nocturnal Hemodialysis versus Conventional Hemodialysis on Left Ventricular Mass and Quality of Life: A Randomized Controlled Trial. **Journal of the American Medical Association**. 298(11) pp1291-1299.

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Pierratos, A. (1999) Nocturnal hemodialysis: dialysis for the new millennium **Canadian Medical Association Journal**. 161(9) pp1137.

Pierratos, A. (2008) Daily nocturnal hemodialysis-a paradigm shift worthy of disrupting current dialysis practice. **Nature Clinical Practice: Nephrology**. 4(11) pp 602-603.

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Twardowski, Z. J (2004) Blood access in daily hemodialysis. **Hemodialysis International**. 8(1) pp70 – 76.

Nocturnal Dialysis Competencies

Nocturnal dialysis competencies	Date	Signature of patient/carer	Signature of nurse
Patient/carer competent in securing lines and needles safely using elasticated bandage and tape			
Patient/carer competent to use HEMOdialert			
Patient/carer identifies emergency action to take if venous needle dislodges i.e. apply pressure to site, and if using double needle, wash back via arterial needle. Carer identifies action to take if patient is in state of collapse and does not respond to wash back i.e. dial 999			
If using double needle, patient/carer aware of how to wash back through arterial needle, if venous needle dislodges			