Guidelines for the Management of Patients with Advanced Chronic Kidney Disease admitted to receive a Bone Marrow Transplant on the Bone Marrow Unit	University Hospitals of Leicester NHS NHS Trust RRCV CMG Trust Ref: C1/2009

1. Introduction

Guidelines for the Management of Patients with Advanced Chronic Kidney Disease admitted to receive a Bone Marrow Transplant on the Bone Marrow Unit.

2. Scope

Guideline for use by the renal and haematology teams

3. Recommendations, Standards and Procedural Statements

3.1 Pre-dialysis patients.

- Patients with eGFR of <20 mls/min should have a short 1.5 hour dialysis session the day before the melphalan therapy. They would then have 2 further sessions of 2 hours each on the day following melphalan and the following day. This is particularly important for patients with arteriovenous fistula as occasionally on the first needling of the fistula there can be complications resulting in the patient requiring a temporary catheter. It may be beneficial to pick up such a problem before melphalan treatment so a line could be secured semi-electively. Patients should receive their first dialysis on the renal unit. This will be arranged by one of the nominated renal consultants. If the fistula is not usable a tunnelled dialysis catheter ('permcath') should be secured on the same day to allow the transplant to proceed as planned.

- Vascular Access: The gold standard would be to establish a native arterio-venous fistula (AVF) or peritoneal dialysis catheter prior to the transplant. If there is urgency to proceed with the treatment as agreed by senior clinicians and with the patient, a tunnelled catheter rather than a temporary untunnelled catheter ('vascath') should be inserted as this is associated with a lower risk of infection. In patients on haemodialysis via an AVF a 'permcath' will be inserted temporarily to avoid needling the fistula during the first 1-3 weeks post transplant when profound thrombocytopenia may occur. The patient will come to the Renal Unit 2 or 3 days prior to the melphalan therapy to have the 'permcath' inserted as a day case procedure. This will be arranged by the nominated renal consultant. The patient will then be admitted the day before melphalan to the Bone Marrow Transplant Unit (BMTU) and receive a short dialysis session and follow the same protocol as the above receiving 2 hour dialysis at day +1 and day +2 following melphalan. In the presence of a functioning AVF the permcath will be removed as soon as patient's platelet count is stable above 50,000 without the need for platelet transfusion and the AVF should be used for haemodialysis.

- Haemodialysis: Haemodialysis will be prescribed by one of the nephrology consultants and delivered by a member of the renal nursing staff who is trained to do this in keeping with the agreement between both Directorates. Further dialysis sessions may be required if electrolyte disturbance occurs as a result of tumour lysis. Venous blood from patients will be sent by the staff on the BMTU for analysis at 6 am each day and the results forwarded to the nominated renal consultant. Decision to deliver dialysis will be made by the renal consultant before 10am to allow delivery of treatment within working hours.

- Use of Hickman lines. Patients who require a 'permcath' will not have a Hickman line inserted. The 'permcath' can be used for delivery of drugs short term during the patient's

initial stay on the BMTU and should be removed at the earliest possible time. The port used for drug delivery can be locked with Hepsal instead of Taurolock as per Trust policy. If the line is likely not to be used for 12 hours or more then it should be locked with Taurolock. If the patient is discharged with the permcath then it should be locked with Taurolock.

- Permcath care: Patients who have a 'permcath' in situ will have a sterile transparent dressing over the exit site. This can be left in situ for up to 7 days unless any excess exudate or perspiration is noted or the dressing does not remain intact in which case the dressing should be changed. If the patient is allergic to the transparent dressing or excess exudate is noted then a sterile gauze dressing would be appropriate.
  When the dressing is changed the exit site will be cleaned with a 2% chlorhexidine swab and left to dry before applying the next dressing.

- When accessing the lines for administering drugs (when no other access available) a sterile non-touch technique should be used. The line and hub will be cleaned with 2% chlorhexidine prior to use. The 'permcath' locks will be removed and flushed with 0.9% normal saline prior to administering drugs. After drugs are administered the 'permcath' lumens will be locked using 10mls of 0.9% sodium chloride and the anticoagulant lock prescribed by the renal team. The port used for drug delivery can be locked with the appropriate volume of Heparin sodium 50 units in 5 ml instead of Taurolock as per Trust policy (for reference see Parenteral Nutrition via a Central Venous Catheter UHL Policy and Vascular Access UHL Policy) . If the line is likely not to be used for 12 hours or more then it should be locked with Taurolock-Hep500. If the patient is discharged with the permcath then it should be locked with Taurolock-Hep500 Bionector caps can be used to close permcath during the inpatient period on the BMU. Following the last dialysis session prior to discharge sealed caps should be used. Patient should be discharged with sealed caps at the end of the permacath and not Bionector caps.

- Dialysis prescription and anticoagulation: member of the nephrology team will prescribe dialysis. Minimal dose of unfractionated heparin (250 units/hour) should be used where possible in light of the risk of thrombocytopenia

- Platelet cover when AVF needled: for patients with a platelet count less than 50 x 10^9/L, platelet infusion should be considered within the last hour of dialysis. Dose of platelets will be decided and prescribed by the haematology team. Appropriate pressure should be applied to needle sites to avoid excess bleeding

3.2 Patients receiving chronic peritoneal dialysis.

- Patients performing peritoneal dialysis should continue this on the bone marrow unit. There is no conclusive evidence from the literature to suggest that these patients should receive haemodialysis rather than their routine peritoneal dialysis following high dose melphalan.

- If the patient is unable to perform the peritoneal dialysis themselves then support from staff at the renal unit will be made available to either facilitate the treatment where practical or train the staff to support the patient to deliver this treatment. This arrangement will be actioned by Johanna Bayes, renal nursing manager.

- Nephrologists will review and alter dialysis prescription in conjunction with the renal nursing team.

3.3 Patients receiving chronic haemodialysis.

a. Vascular access: These patients should have a functioning arteriovenous fistula at the time of the bone marrow transplant. This is to avoid the prolonged use of temporary vascular catheters with the very high risk of infection associated with them. These patients will be prioritised for fistula formation when the decision is made to proceed to

bone marrow transplantation is confirmed. Bone Marrow transplant should not be delayed significantly if there are difficulties establishing a fistula. Any delays occurring with access formation should be discussed between the lead renal and bone marrow transplant consultant to allow planning of bone marrow transplant. In patients on chronic haemodialysis via an AVF a 'permcath' will be inserted temporarily to avoid needling the fistula during the first 1-3 weeks post transplant when profound thrombocytopenia may occur. The patient will come to the Renal Unit 2 or 3 days prior to the melphalan therapy to have the 'permcath' inserted as a day case procedure. This will be arranged by the nominated renal consultant. The patient will then be admitted the day before melphalan to the Bone Marrow Transplant Unit (BMTU) and receive a short dialysis session and follow the same protocol as the above receiving 2 hour dialysis at day +1 and day +2 following melphalan. In the presence of a functioning AVF the permcath will be removed as soon as patient's platelet count is stable above 50,000 without the need for platelet transfusion and the AVF should be used for haemodialysis.

- Routine haemodialysis. Patients will receive their routine haemodialysis between 18-24 hours following delivery of high dose melphalan. They will then receive regular haemodialysis for 4 hours alternate days until medically and biochemically stable.. Prescription of the dialysis will be made by one of the nephrology consultants. Dialysis sessions will be delivered by nursing staff from the renal unit.

- Additional haemodialysis: Additional sessions of dialysis may be required in the early post transplant period if electrolyte imbalance or sepsis occurs. Venous blood from patients will be sent for analysis at 6 am each day. Decision to deliver dialysis will be made before 10am to allow delivery of treatment within working hours.

- Anticoagulation on dialysis: Minimal dose of unfractionated heparin (250 units/hour) should be used where possible in light of the risk of thrombocytopenia.

- Platelet cover when AVF needled: This will be decided by the bone marrow transplant (BMT) team depending on the patient's progress. Generally a transfusion is required if the platelet count is less than 30,000 but this should be discussed with the BMT team.

- AVF care: DO NOT measure blood pressure by using the fistula arm, insert cannulae into the fistula arm, place anything tight or restrictive on the fistula arm unless required in life threatening emergencies. If possible, avoid venepuncture on the fistula arm.
  DO THE FOLLOWING: check daily with stethoscope, listening for "bruit" or "buzz" of the fistula, observe the skin around the needle puncture sites for any inflammation, and observe for any swelling and any new skin discolouration. If any of the above occurs then please inform the renal medical staff.

- Discharge planning: The early post-discharge period is a potential time of risk to the patient during which close surveillance is important. Sepsis may not manifest in the expected way and CRP and temperature may not be significantly raised.

    - All patients post-discharge should have an isolation haemodialysis slot. Isolation is required for a period of 6 weeks to 3 months depending on the patient's progress. This will be decided by the bone marrow transplant team in the post transplant period. Consultant Nephrologist and renal head of nursing to ensure isolation slot available at the estimated time of discharge.

    - Lead nephrologist caring for the patient during the time of their Bone marrow transplant should handover to the consultant on the haemodialysis unit the patient is transferred to and to the Matron of that unit.

    - Patients will have a medical review when they attend for haemodialysis until their blood counts have stabilised.

- Patients will be reviewed on the bone marrow unit regularly. They may be issued with blood forms to take to their next haemodialysis session.

- Information/education about BMT, potential complications, and necessary monitoring after discharge will be provided for the haemodialysis unit clinical staff. The bone marrow unit team will communicate with the Matron of the haemodialysis unit.

- Haemodialysis unit clinical staff will be asked to contact the BMT team about any medical problem arising in the early post-discharge period.

3.4 General Matters

Drug Clearance by Dialysis

Drug clearance may be influenced by dialysis therapy. Doctor prescribing any drug should check if it is cleared using relevant medicines information resources, such as the Renal Drug Database and the product of summary characteristic for each drug available on www.medicines.org.uk. The Renal pharmacy team are also available for advice on 01162588177 as well as the Medicines information department.

Clinical Nephrology Care

Patients will be reviewed regularly by a member of the nephrology consultant team. Prof Burton and Dr Topham will be the leads for this service. It is envisaged that one consultant will care for one patient throughout their stay with cross cover by the on-call consultant over the weekend and out of hours. Zoe Dilks, matron, is the nursing lead.

Timings

Six weeks' notice is required for the nursing arrangements to deliver the haemodialysis or support with peritoneal dialysis.

Dialysis delivery is available 9am to 7pm.

Storage of consumables used for haemodialysis on the BMTU

An area for consumable storage outside the patient's room will need to be identified. This is to avoid contamination of any unused consumables should the patient have MRSA or CDT. Arrangements will be made for rapid removal of any unused consumables post-discharge.

Drugs used during haemodialysis will be stored in a cupboard in the patient's room.

General Maintenance

The water circuits should be tested when the Bone Marrow Unit is closed for annual maintenance. When a patient is planned to be admitted for a BMT the BMU team will liaise with renal technicians about a suitable time to test the haemodialysis circuit prior to the first haemodialysis session.

Contacts

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Day 1: Potential Patient identified by Bone Marrow Transplant Consultant.
Renal consultant informed of planned BMTU

Within 2 weeks of day 1
1. Patient reviewed by renal consultant to establish modality of RRT/Access plans etc
2. Renal consultant discusses plan with Renal Lead Nurse or Matron or anyone acting in their absence
3. Renal consultants alerts renal technician

Within 3 weeks of day 1
Renal Consultant and Head of nursing liaise with BMTU consultant and Cath Morrow to agree BMTU date, pre admission and post discharge plan and isolation slot. **At least further 3 weeks required at this point before the transplant date.**

Renal Consultant's responsibilities are
1. Plan the exact date, location and prescription of the first dialysis session. If patient is predialysis make contingency plan for access failure. Confirm this in writing to Patient, BMTU consultant, Renal lead nurse or matronand BMTU Manager
2. Make plans for regular visits to the BMTU
3. liaise with MDT regarding isolation slot

Head of Nursing responsibility
1. Identify staff delivering the dialysis
2. Confirm method of communication between BMTU staff and renal nurses and between renal nurses and renal consultants
3. Confirm availability of isolation slot at the estimated discharge time

Renal Technicians responsibility
1. Ensure machines and disposables, dialysates are available for treatments
2. provide emergency contact details to the renal nurses involved, renal consultants and BMTU staff
3. test drainage and liaise with SERCO

Appendix 1:

Renal Services

Bone Marrow Transplant (BMT) plan: Internal responsibilities within the Nephrology team

Author: Johanna Bayes. Former Head of Nursing, Renal and Urology

- The lead nurse or matron will be notified by the Consultant Nephrologist of the impending bone marrow transplant date. Modality of renal replacement therapy (RRT) and access plan will be discussed allowing 6/52 notice from notification to BMT date.

- The BMT date will be agreed between Bone marrow transplant Consultant, BMTU Manager, Consultant Nephrologist HON and the patient.

- The lead nurse will liaise with ward 15A/Community Team/other areas as appropriate to identify and confirm staff to deliver the RRT in line with the plan. A programme for RRT delivery will be drawn up by the lead nurse.

- A communication plan will be drawn up between the responsible dialysis nurses and the responsible Consultants.

- **The Nephrology nurses' responsibility**:

- To liaise with the Renal Technician and ensure the presence of machine and a baseline stock of fluids and consumables are available for use at the BMTU. Consider the use of a 'grab bag' to be maintained by the renal nurse as appropriate.

- To obtain the dialysis prescription and maintain communication with the patient in respect of the dialysis requirements.

- To deliver the treatment as per prescription and manage any inter-dialytic complications (HD).

- Following the last dialysis session prior to patient discharge to close the permcath with non Bionector caps.

- To maintain communication with the Consultant Nephrologist and BMTU staff as per plan.

- To maintain nursing documentation in respect of the delivery of RRT and record information on PROTON as appropriate.

- To maintain communication with the lead nurse and confirm that the RRT is being delivered to plan

- To notify the lead nurse of any deviation from the plan and address any staffing issues that arise from this

- The renal nurse will report to the nurse in charge of the BMTU prior to entering the patients room

- The checking of the dialysis machine settings and related IV fluids will be undertaken by the renal nurse and an IV competent nurse from the BMTU.

- Nurse delivering dialysis should request a “bank form” to be signed before leaving the BMTU

4. Education and Training

All staff involved in providing renal support for renal patients undergoing bone marrow transplantation should be familiar with this document

5. Monitoring and Audit Criteria

Key Performance Indicator	Method of Assessment	Frequency	Lead
Adherence to guidance in this document	‘debriefing’ meetings of the renal and haematology teams	Biannually	Dr Hunter/ Dr Al-Jayyousi

6. Legal Liability Guideline Statement

Guidelines issued and approved by the Trust are considered to represent best practice. Staff may only exceptionally depart from any relevant Trust guidelines and always only providing that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible healthcare professional’ it is fully appropriate and justifiable - such decision to be fully recorded in the patient’s notes

7. Supporting Documents and Key References

None listed

8. Key Words

Bone marrow transplant, haemodialysis, CKD, end stage renal failure

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