Haemodialysis scheduling, adequacy and laboratory monitoring

(Monthly, quarterly, annual bloods and MRSA & MSSA screening)

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

INTRODUCTION

For haemodialysis to be effective there are is general evidence of recommended scheduling of dialysis and measures of adequacy and efficiency to ensure the patient is receiving optimal treatment, regular monitoring and evaluation of results is required, to provide the patient with a quality of life they expect. Dialysis adequacy is generally monitored monthly, whilst some slower developing and changing factors such as parathyroid hormone (PTH) levels, B^{12}, Folate and aluminium levels are monitored quarterly or annually. The risk of contracting blood borne viruses and healthcare acquired infections (HCAI) is high, regular screening is necessary to ensure all patients are cared for in a safe environment and free from infection.

THIS GUIDELINE IS FOR USE BY THE FOLLOWING STAFF GROUPS:

Nurses and doctors working within renal medicine

Lead Clinician(s)

Alison Shelton	Dialysis Unit Manager
Approved by Renal Specialty Meeting on:	27th February 2023
Review Date: This is the most current document and is to be used until a revised version is available	27th February 2026

Key amendments to this guideline

Date	Amendment	By:
May 2010	Guideline approved	Clinical Effectiveness Committee
25/07/2013	Guideline reviewed and approved by	Dr Martin Ferring
07/08/2015	Document extended for 12 months as per TMC paper approved on 22nd July 2015	TMC
02/12/16	Documents extended for 12 months as per TMC paper approved on 22nd July 2015	TMC
October 2017	Document extended for further two years without changes	Dr Martin Ferring
December 2017	Sentence added in at the request of the Coroner	
January 2020	Document extended for 3 months whilst undergoing approval process	Dr Martin Ferring
14th April 2020	Document extended for 6 months during COVID period	
February 2021	Document extended as per Trust agreement 11.02.2021.	
15th December 2021	Document extended for 6 months to allow for thorough review	Specialist Medicine Divisional Governance
17th March 2022	Document extended until the end of the year to allow for thorough review	Dr Jasper Trevelyan
January 2023	Document reviewed no amendments required	

DETAILS OF GUIDELINE

This guideline is relevant to all staff and individuals performing or caring for patients with end stage renal disease and undergoing haemodialysis. A copy of the guideline will be giving to all relevant individuals and a signature list obtained to confirm understanding and agreement to the guideline.

INTRODUCTION

A number of factors are responsible for the efficiency of dialysis, for example patients access and blood flow, dialyser size and membrane type, method of dialysis and blood litres processed. Patient general wellbeing and nutritional state are also important parts of the overall goal, when monitoring and assessing dialysis adequacy. It is well documented that the more dialysis a patient receives the better their outcome and life longevity. However, as the optimum dialysis would be at least daily in an attempt to match normal kidney function, this also has to be balanced along with trying to live a normal a life as possible. Recommendations and what is considered to patients as an acceptable balance, is to receive haemodialysis thrice weekly for around 4 hours each session. However, this is also dependant on patient size, condition, their wellbeing and may in fact need to be increased or in some cases reduced if the treatment is to relieve symptoms only. Regardless, all treatments require some monitoring, assessment and evaluation.

Dialysis adequacy is a global concept where molecular clearance is measured by the dialysis process. The molecular weights of the solvent and solutes to be cleared by dialysis range over three orders of magnitude, from small (water and urea) to large (β-2- microglobulin). Adequate clearance of the whole range of molecules by dialysis is important. For practicality reasons, haemodialysis adequacy is calculated using a small molecule such as urea.

Haematology and anaemia status of the patient is also extremely important as the patient is at great risk of haemorrhage, intestinal bleeding, anaemia caused from uraemia etc. Regular monitoring and correction ensures the patient suffers no symptoms of anaemia.
Being aware of the patients' blood borne virus status and MRSA and MSSA status is vital for the safety of all patients and staff. Positive status of any kind requires segregation, treatment and more regular monitoring. An uncontrolled outbreak within a unit would have serious consequences.

All adequacy and monitoring has set standards to achieve and all these results are collated on a central database – UK Renal Registry. Measuring of adequacy is performed using one or both global measurements – urea reduction ratio (URR) or and clearance, time and volume (Kt/V).

Haemodialysis

Haemodialysis is the removal of toxic wastes and fluid using a dialysis machine, treated water, dialysate concentrates, blood lines and a dialyser.

Frequency

It is recommended that a patient should receive haemodialysis three times weekly and for approximately four hours at each session. The time however is not a set determined figure, as other factors have to be taken into considerations. These being the patients' other medical conditions and health, their size and body weight, the efficiency of their dialysis access and their physical tolerance to treatment. More effectively is to ensure that the patients receive the best tolerated dialysis they can manage, using the best dialysers, with the highest blood flow and dialysate flow they can tolerate, for the longest time they can tolerate, on a dialysis machine that can monitor and recognise problem issues as they appear. The recommended measurement of dialysis is for a URR of > 65% or an eKt/V of > 1.2. However, this still only provides the patient with an average overall eGFR of 10 – 15 mls/min, which is probably at the point that they started dialysis. Unfortunately, they will not return to the level of well-being and biochemical status as they were when their kidneys were functioning normally. However, the more dialysis the patient can tolerate and the more frequently they can receive it, the closer to normal and the greater improvement to their actual GFR they will manage. To ensure the patient receive the best dialysis they can, measuring and monitoring dialysis adequacy is vital.

MONITORING TOOL

Every patient with end-stage chronic renal failure receiving thrice weekly HD should have consistently:

- either urea reduction ratio (URR) > 65%
- or equilibrated Kt/V of >1.2 (or single pool Kt/V of > 1.3) calculated from pre- and post-dialysis urea values, duration of dialysis and weight loss during dialysis.

To achieve a URR above 65% or eKt/V above 1.2 consistently in the vast majority of the haemodialysis population clinicians should aim for a minimum target URR of 70% or minimum eKt/V of 1.4 in individual patients. Aiming for these target doses also addresses the concerns raised by recent data which suggest that women and patients of low body weight may have improved survival rates if the URR is maintained above 70% or eKt/V is at least 1.4. The aim for this guideline will be for all patients to achieve a URR of 70% or eKt/V 1.4

URR – is the simplest monitoring tool.
The percentage of fall in blood urea affected by a dialysis session is measured as follows:

$$\frac{\text{pre dialysis urea} - \text{post dialysis urea}}{\text{pre dialysis urea}} \times 100\%$$

Kt/V urea is also predicated from one of several simple formulae but requires the data of the pre and post dialysis urea, dialysis duration and fluid loss during the dialysis session to be computer calculated.

Haematology and other values are set from national standards by the Renal Association

All results and care issues of all patients will be evaluated and discussed at a multidisciplinary quality meeting with a consultant nephrologist at least monthly. The outcome of these meetings will be recorded and feedback to the patient and patients GP. Outcomes will be endorsed and treatment changes made by the named nurse. A paper trail will confirm results have been actioned, re-evaluated and all parties informed.

Whilst the named nurse is responsible for ensuring their patients monitoring is performed, evaluated and care altered, the unit manager is responsible for ensuring that all monitoring and treatment changes are performed safely and within the guidelines and that results meet the standards and are fed to all the collating database bodies. Quality outcomes will be fed back to the lead nurse in a quality monthly report from the unit manager.

Approved sampling must also be ensured, for example post urea blood sampling must be taken according to a recommended method, which all staff and patients follow and which is confirmed to the renal registry as the chosen method of post urea sampling. The post-dialysis sampling method used within WAHT and as most widely used by UK renal units is the ***Stop-dialysate-flow method***, (Mactier et al 2000)

Stop-dialysate flow post urea sampling method

Once the dialysis time is completed:

- Stop the dialysate flow
- Maintain the patients normal blood flow
- Wait 5 minutes
- Sample from either the venous or arterial sampling port
- Wash back as normal

STANDARDS	%	CLINICAL EXCEPTIONS
For all patients to receive the minimum documented monitoring of adequacy of treatment	100% of all patients	For all patients adequacy to be within the expected national quality standard limits

Pre dialysis monthly bloods and sampling

Test	Bottle	Lab	How	When
U/E Bone Bicarb,	gold	Chem.	Before flushing with saline (for RDC following removal of lumen locking agent and before flushing with saline)	1st
FBC	purple	Haematology	Before flushing with saline	2nd (after filling gold top)
MSSA + MRSA	swab	Microbiology	Renal dialysis catheter (RDC) exit site, nares and any other wounds (patients only)	Before cleaning of exit site or wound

Post dialysis monthly bloods

Test	Bottle	Lab	How	When
Urea	gold	Chemistry	**Stop-dialysate-flow method** 1. Stop dialysate flow, but keep blood pump running for five minutes. 2. Take a blood sample from anywhere in the blood circuit	1st

Pre dialysis three monthly bloods and sampling (all monthly samples +below)

Test	Bottle	Lab	How	When
Liver function, cholest, CRP,	gold	Chemistry	Before flushing with saline (for RDC following removal of lumen locking agent and before flushing with saline)	1st
PTH	purple	Chemistry	Before flushing with saline	After U/E
Ferritin	gold	Chemistry	Before flushing with saline. No less than two weeks after the last dose of IV iron	After U/E
HBsAg, HCV	gold	Serology	Frequency will increase if the patient has recently returned from a high risk overseas area. Patients consent required	After U/E
MSSA + MRSA	swab	Microbiology	All patients. Nares, access, wounds	Before cleaning of access or wounds & 2 days after taking any antibiotics or Mupiricin nasal ointment

Pre dialysis annual bloods

Test	Bottle	Lab	How	When
HIV	gold	Serology	Following other sampling. Patients consent required	After U/E
B_{12} + Folate	gold	Haematology	Following other sampling	After U/E
Aluminium	green	Chemistry	Following other sampling	After U/E

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of non-compliance)*	Frequency of reporting:
	WHAT?	**HOW?**	**WHEN?**	**WHO?**	**WHERE?**	**WHEN?**
	These are the 'key' parts of the process that we are relying on to manage risk. We may not be able to monitor every part of the process, but we MUST monitor the key elements, otherwise we won't know whether we are keeping patients, visitors and/or staff safe.	What are we going to do to make sure the key parts of the process we have identified are being followed? (Some techniques to consider are; audits, spot-checks, analysis of incident trends, monitoring of attendance at training.)	Be realistic. Set achievable frequencies. Use terms such as '10 times a year' instead of 'monthly'.	Who is responsible for the check? Is it listed in the 'duties' section of the Policy? Is it in the job description?	Who will receive the monitoring results? Where this is a committee the committee's specific responsibility for monitoring the process must be described within its terms of reference.	Use terms such as '10 times a year' instead of 'monthly'.

REFERENCES

- Renal Association (2007): Treatment of adults and child with renal failure
- Mactier, Geddes and Troynor at Stobhill Hospital, Glasgow: Slow-dialysate-flow method
- Geddes CC, Traynor J, Walbaum D et al. (2000) A new method of post-dialysis blood urea
- sampling: the 'stop dialysate flow' method. *Nephro Dial Transplant* 2000;15(4):517-23
- WAHT Pathology Handbook

CONTRIBUTION LIST

Key individuals involved in developing the document

Name	Designation
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Grace Malabanan	Ward Sister, RDU, KTC

Circulated to the following CD's/Heads of dept for comments from their directorates / departments

Name	Directorate / Department

Circulated to the chair of the following committee's / groups for comments

Name	Committee / group

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and included as an appendix to key document when submitted to the appropriate committee for consideration and approval.

Please complete assessment form on next page;

Herefordshire & Worcestershire STP - Equality Impact Assessment (EIA) Form
Please read EIA guidelines when completing this form

Section 1 - Name of Organisation (please tick)

Herefordshire & Worcestershire STP		Herefordshire Council		Herefordshire CCG	
Worcestershire Acute Hospitals NHS Trust		Worcestershire County Council		Worcestershire CCGs	
Worcestershire Health and Care NHS Trust		Wye Valley NHS Trust		Other (please state)	

Name of Lead for Activity	

Details of individuals completing this assessment	**Name**	**Job title**	**e-mail contact**
Date assessment completed			

Section 2

Activity being assessed (e.g. policy/procedure, document, service redesign, policy, strategy etc.)	**Title:**			
What is the aim, purpose and/or intended outcomes of this Activity?				
Who will be affected by the development & implementation of this activity?	❑ ❑ ❑ ❑	Service User Patient Carers Visitors	❑ ❑ ❑ ❑	Staff Communities Other _____
Is this:	❑ Review of an existing activity ❑ New activity ❑ Planning to withdraw or reduce a service, activity or presence?			
What information and evidence				

have you reviewed to help inform this assessment? (Please name sources, e.g. demographic information for patients / services / staff groups affected, complaints etc.	
Summary of engagement or consultation undertaken (e.g. who and how have you engaged with, or why do you believe this is not required)	
Summary of relevant findings	

Section 3

Please consider the potential impact of this activity (during development & implementation) on each of the equality groups outlined below. **Please tick one or more impact box below for each Equality Group and explain your rationale**. Please note it is possible for the potential impact to be both positive and negative within the same equality group and this should be recorded. Remember to consider the impact on e.g. staff, public, patients, carers etc. in these equality groups.

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
Age				
Disability				
Gender Reassignment				
Marriage & Civil Partnerships				
Pregnancy & Maternity				
Race including Traveling Communities				
Religion & Belief				
Sex				
Sexual Orientation				
Other Vulnerable and Disadvantaged Groups (e.g. carers;				

Equality Group	Potential positive impact	Potential neutral impact	Potential negative impact	Please explain your reasons for any potential positive, neutral or negative impact identified
care leavers; homeless; Social/Economic deprivation, travelling communities etc.)				
Health Inequalities (any preventable, unfair & unjust differences in health status between groups, populations or individuals that arise from the unequal distribution of social, environmental & economic conditions within societies)				

Section 4

What actions will you take to mitigate any potential negative impacts?	Risk identified	Actions required to reduce / eliminate negative impact	Who will lead on the action?	Timeframe
		.		
How will you monitor these actions?				
When will you review this EIA? (e.g. in a service redesign, this EIA should be revisited regularly throughout the design & implementation)				

Section 5 - Please read and agree to the following Equality Statement

1. Equality Statement

1.1. All public bodies have a statutory duty under the Equality Act 2010 to set out arrangements to assess and consult on how their policies and functions impact on the 9 protected characteristics: Age; Disability; Gender Reassignment; Marriage & Civil Partnership; Pregnancy & Maternity; Race; Religion & Belief; Sex; Sexual Orientation

1.2. Our Organisations will challenge discrimination, promote equality, respect human rights, and aims to design and implement services, policies and measures that meet the diverse needs of our service, and population, ensuring that none are placed at a disadvantage over others.

1.3. All staff are expected to deliver services and provide services and care in a manner which respects the individuality of service users, patients, carer's etc., and as such treat them and members of the workforce respectfully, paying due regard to the 9 protected characteristics.

Signature of person completing EIA	
Date signed	
Comments:	
Signature of person the Leader Person for this activity	
Date signed	
Comments:	

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	
2.	Does the implementation of this document require additional revenue	
3.	Does the implementation of this document require additional manpower	
4.	Does the implementation of this document release any manpower costs through a change in practice	
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	
	Other comments:	

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.