



Beaumont Hospital
Department of Nephrology and Renal Nursing

Guideline Name: Haemodialysis treatment Guidelines

Guideline Number: _____14_____

Guideline Version: _____14a_____

6.1: Management of Hypotension on haemodialysis

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6.2: Guideline for dialysate prescribing

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6.3: Management of acute haemodialysis

Developed by	Approved by	Effective from	Review Date
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1.0 Guideline Statement.

To maximise the efficiency and safety of each patient's haemodialysis treatment session. Nursing care will be directed towards patient education, preventing & managing haemodialysis complications and providing psychological and emotional support for the patient.

2.0 Aim / Purpose of Guideline.

To provide guidelines for all staff working within the Nephrology department in improving the patient's haemodialysis treatment sessions. Thus reducing complications, achieving the prescribed adequacy and increasing the patient's wellbeing.

3.0 Scope of Guideline.

This guideline applies to all staff working within the Department of Nephrology within Beaumont Hospital. It is intended as a guide towards best practice for all members of the multidisciplinary team involved in the care of patients receiving haemodialysis.

4.0 Definitions

The Haemodialysis Patient

The 'haemodialysis patient' is a short nondescript term when one considers the patients who present to the unit for dialysis treatment suffering from a variety of renal disorders. The etiology is extensive and often associated with complex multisystem involvement and disabilities. The criteria for entry into renal replacement therapy has

greatly broadened to include all those who would benefit from the treatment. The integrated modalities of haemodialysis treatment offered are intermittent haemodialysis, CVVHD, and therapeutic plasma exchange

5.0 Responsibilities

The nurse looking after the haemodialysis patient must:

- Maximise patient comfort and safety.
- Review patients blood levels, adequacy, prescription and level of well being monthly.
- Participate in monthly team meetings to review patient's progress.
- Liase with members of the monthly disciplinary team in the care each patient.
- Plan & arrange timely vascular access suited for each patient.
- Take preventative measure to eliminate haemodialysis complications.
- Participate in ongoing education which will provide best practice standards for patient care.
- Be involved in the renal guideline committee meetings to establish guidelines that are online with best practice

The health care assistant looking after the haemodialysis patient must:

- Ensure that they liase with the nurse in the appropriate selection of the dialysis concentration when preparing for the dialysis treatment.
- Liase with nurse in identifying the patients at risk of hypotension falls etc and partake in preventative measures.
- Maximise patient comfort and safety.

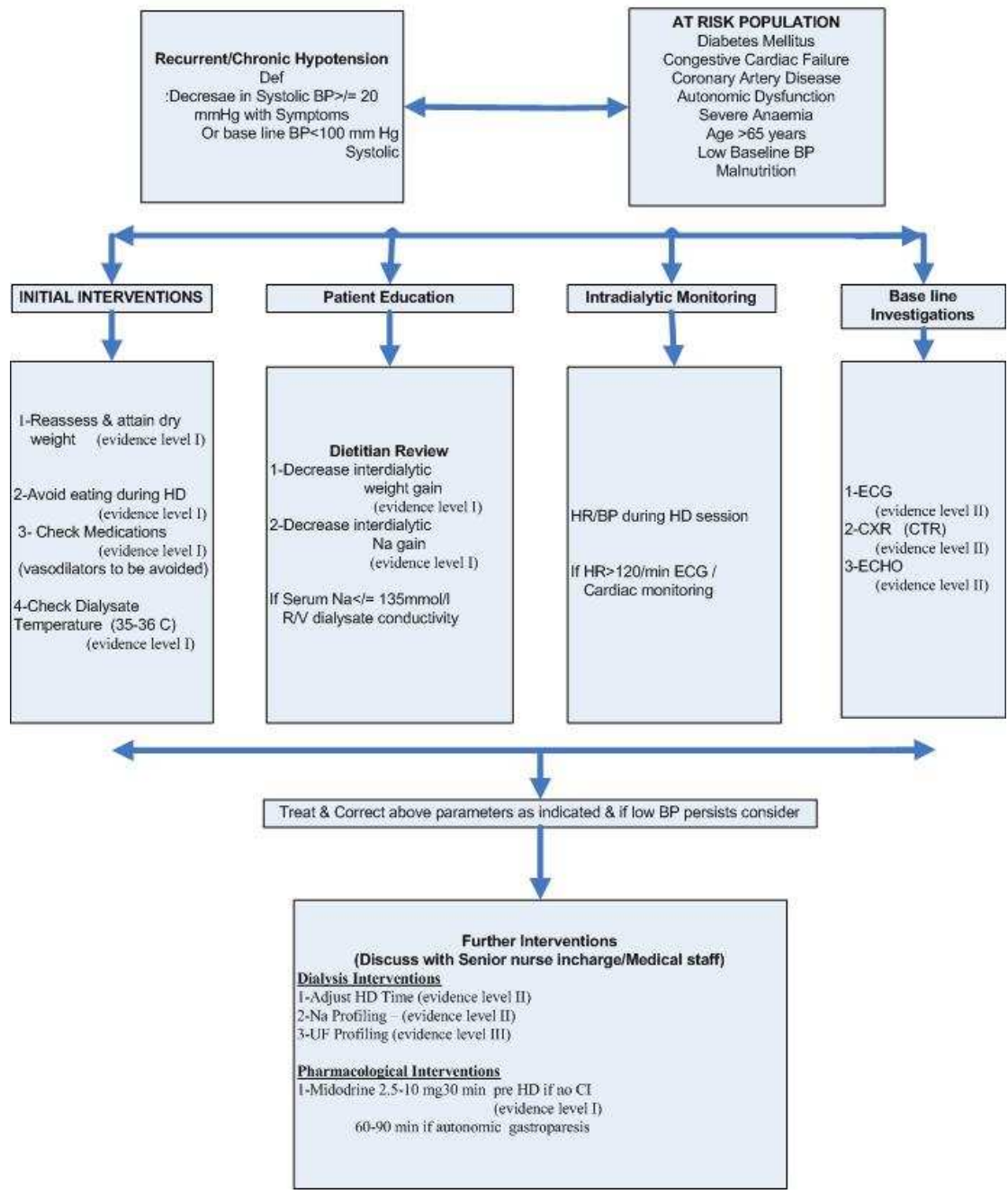
Members of the renal team must:

- Participate in monthly team meetings to review patient's progress.
- Participate in patient assessment and prescribe appropriate treatment accordingly.
- Be involved in the renal guideline committee meetings to establish guidelines that are online with best practice.

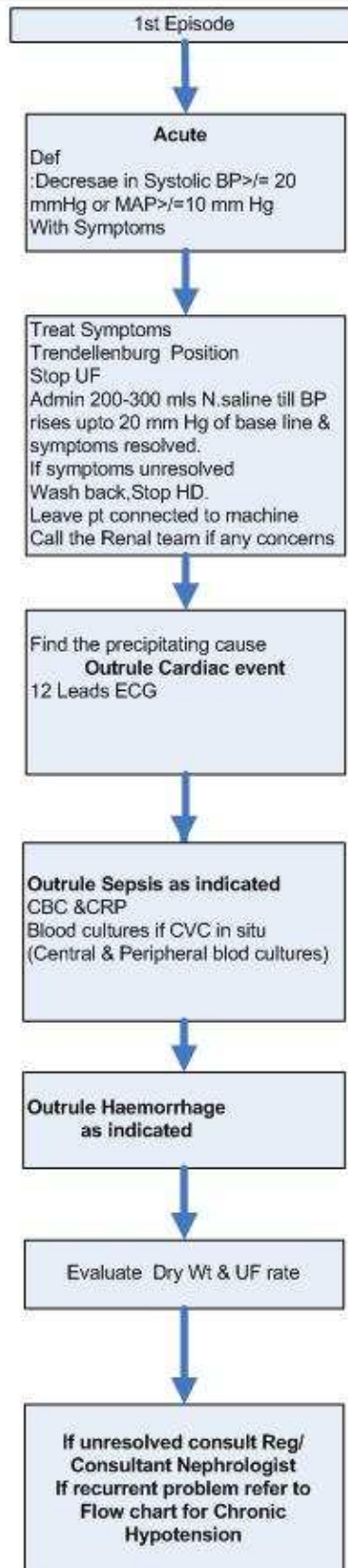
6.0 Procedure:

6.1: Management of hypotension on haemodialysis

Management of Recurrent Hypotension during a Haemodialysis treatment



Management of Acute Hypotension during a Haemodialysis treatment



6.2: Guideline for Dialysate Prescribing in the Maintenance Dialysis Patients

Standard prescription	Potassium	Calcium	Glucose
<3.0mmol	2.0mmol/L	1.25	11.1

Prescribing Potassium Concentrate

Serum Potassium	Dialysate potassium
<3.0mmol	K3.0
3.0 – 5.5mmol	K2.0
> 5.5mmol	K1.0
>5.5mmol	K0

❖ This is for named patients **only**. (**As Prescribed**)

- ❖ 1K and 0K dialysate to be used on NAMED patient's only as prescribed by the Nephrologist.
- ❖ 4K with a calcium of 1.75 for named patients only as prescribed by the nephrologist. Indicated when there are cardiac concerns in terms of high arrhythmic potential and haemodynamic instability. Aim is to maintain Potassium greater than 4.0mmol.
- ❖ Persistent Hyperkalaemia for review by CNM, Dialysis Renal Registrar and, Dieticians and weekly potassium to be monitored.

Prescribing Calcium Concentrate

Serum Calcium	Dialysate Calcium
<2.0	1.75
2.0 - 2.4	1.25
2.4 - 2.6	1.25
>2.6	1.0

PTH <150, calcium >2.6.
Patient not on calcium products or Vitamin D.

- Concentrates to be reviewed with monthly bloods and prescribed by Dialysis Renal Registrar unless there are specific concerns by nursing staff.
- There is a monthly review of bone metabolism and potassium control in all dialysis patients and the above guidelines will be used.

Guideline for Dialysate Prescribing in the Acute Dialysis Patients

Standard prescription	Potassium	Calcium	Glucose
	2.0mmol/L	1.5	11.1

Variability for potassium baths

The goal is not to lower the total body potassium burden (as nutritional consequences) but to normalise for 24hrs this will be dependant on the serum level pre dialysis and the rate of rise.

If any ECG changes (tall waves, short QT widened QRS, sine wave) or dangerous arrhythmias thought to be secondary to Hyperkalaemia independent of serum potassium commence dialysis on 1 mmol K bath with additional acute medical management i.e. calcium gluconate especially if delay in initiation of haemodialysis and cardiac monitoring .

Serum potassium	Acid concentration bath
<3	3mmolK/L
3 -5.5	2mmolK/L
5.5-6.5	At least 1 hour of 1mmolK/L
>6.5	At least 2 hours of 1mmolK/L

In patients at risk of cardiac arrhythmias or on digoxin try to increase the total time on dialysis rather than relying on reduced dialysate baths
0mmolK baths not recommended unless ordered by renal consultant

Special considerations rhabdomyolysis and resistant hyperkalaemia
Consider SLEDD

Note dialysate glucose concentration can also aid potassium removal
If serum potassium > 8 / life threatening circumstances consider 5.5mmol/L concentration

AIM post dialysate potassium concentration 4

Post dialysis measurements should be undertaken in patients with poor systemic perfusion/ resistant hyperkalaemia at two and four hours.

**REF for above limited literature Hou et al Am J Kidney Disease 1989; 13:137
Ahmed et al Semin Dial 2001; 14:348, Morrison et al Kidney int 1980; 17:811**

Variability for calcium concentrations

Considerations that with correction of acidosis calcium levels will fall therefore in all cases use a higher calcium bath than is utilised in chronic dialysis patients (1.5 mmol Ca) Also using higher concentrations can improve intradialytic hypotension. **REF Alappan et al Am J Kidney Disease 2001 : 37:294**

Recommend ionised calcium measurements in acutely unwell patient's pre dialysis if not possible need to ensure calcium is a corrected figure (this would predominately encompass intensive care poorly perfused patients)

Serum calcium	Acid concentration Bath
<2	1.75mmol/L
2-3	1.5mmol/L
>3	1mmol/L

Always consider a longer length of time on dialysis especially if persistent or grossly elevated calcium levels (SLEDD)

Also consideration if interdialytic hypotension a large issue increasing calcium bath.

Variability for sodium concentrations

Sodium modelling recommended in the acute renal failure patients at high risk of haemodynamic instability i.e. in the setting of ICU/CCU patients on intermittent haemodialysis 150-140

REF Paganini et al Nephrol Dial Transplant 1996; 11 Suppl 8:32

Serum sodium	Acid concentration Bath
<130	Set dialysate sodium at no higher than 20meq/l ,hourly measurements of sodium
130-155	Use 137mmol Na (standard prescription)
>155	Set dialysate concentration within 2meq/l of plasma sodium

REF Daugirdas et al handbook of dialysis 2007

Note uraemia may provide some protection against osmotic demyelination

In patients with high risk disequilibrium

There is some limited studies re the use of mannitol.

Special considerations those with marked azotemia underlying neurological conditions

Dose 12.5g/hr

6.3 Management of acute haemodialysis

6.3.1: Definition

Acute renal failure can be defined as 'a sudden fall in glomerular filtration rate (GFR) associated with a loss of excretory function and accumulation of metabolic waste products and water' (Blakely & Smith, 2003).

6.3.2: Responsibilities

The medical team:

- Asses the patient to ensure they are haemodynamically stable daily for acute haemodialysis or whether they still need continuous venovenous haemodialysis (CVVHD).
- Asses and monitoring the vital signs for haemodynamic stability.
- Asses the laboratory values of the patient in prescribing the acid concentration (see prescription od acid concentration guidelines)
- Assess the intake and urinary output of the patient in prescribing the ultrafiltration rate.
- Order and assess the chest x-ray post temporary/permanent internal jugular or subclavian line insertion. Check the position of the line and document in the medical notes that the line is ready for use.
- Assess for sepsis and sepsis related problems
- Send the bloods for virology to lab. (All virology admissions tests to be preformed according to virology guide lines)
- Consent to be taken / and talk to the family members regarding haemodialysis
- Inform the CNM in St.Martins Dialysis unit about the need of haemodialysis in acute area. (Advisable to inform as early as possible to organise staff and machine for haemodialysis)

Prescribe the Acute Haemodialysis Treatment

- Duration of Dialysis
- Dialyzer size and membrane of dialyzer

- Ultra Filtration(UF) volume to be removed/need of isolated UF if the patient is overloaded
- Blood flow rate
- Acid concentrate to be used (See Bloods)
- Anticoagulation for haemodialysis
- Dialysate flow rate
- Need for Sodium modelling
- Bicarbonate Haemodialysis

The Dialysis nurse:

- Be a registered general nurse
- Intravenous training course completed
- Have one year haemodialysis experience
- Competent in the administration of acute HD
- Have knowledge and understanding of the water treatment and RO system
- Skills in managing central venous catheters and vascular access. Competent in the use of vascular access and correct knowledge in handling Central Venous Catheters
- Be aware of the virology screens for the acute patients
- Competent in assessing and managing the unstable patients on HD
- Knowledge of the management of clotting circuits and ensure the safety of the patient
- Competent in trouble shooting the haemodialysis machines
- Should know how to call the emergency team/ and inform patients medical team about any concerns regarding the patient prescription
- Competent to make decisions in an acute setting
- Should know how to reserve machine and isolate machine according to the virology policy
- Adhere to the disinfection of the haemodialysis machine cleaning equipment as per infection control hospital guidelines

6.3.3: Procedure for Acute Haemodialysis

- ❖ Patient assessment daily to ensure hemodynamic stability and need for haemodialysis.
- ❖ All acute haemodialysis should take place between the hours of 9am and 5pm.
- ❖ Check vascular access for patency and documented ready for use
- ❖ Check virology status of patient (virology guidelines)
- ❖ Check the orders for dialysis and the patient's recent blood results.

6.3.4: Requirements for Acute Dialysis

- ❖ Dialyzer – 2
- ❖ Blood Tubing's – 2
- ❖ Concentrate (decide after seeing blood results)
- ❖ Bicart – 2
- ❖ I.V Set – 2
- ❖ Y Connector – 2
- ❖ Gloves Sterile – 2
- ❖ Unsterile Gloves
- ❖ Normal Saline 1000ml – 2
- ❖ Normal Saline 500ml – 2
- ❖ Interlink – 2
- ❖ Spike -2
- ❖ Heparin (5000IU) 5ml -1
- ❖ Heparin (25000IU) 5ml -1
- ❖ Normal Saline 10ml – 6
- ❖ Clamps
- ❖ Dressing packs – 2
- ❖ Syringes (10ml - 4, 5ml - 4, 20ml - 2, needles - 3, gauzes – 2pkt, yellow caps - 4, mepore dressing -4)
- ❖ Tape – 1

6.3.5: Dose of Dialysis on Acute Renal Failure

- ❖ **First Haemodialysis - 2 Hrs Duration**
 - Blood flow 200ml/min
 - Dialysate flow 500 ml/min

- Heparin free dialysis (Post line insertion)
- Dialyzer – small size preferably 14L polyflux
- Bicarbonate HD
- No ultra filtration (Depending on patient's conditions)
- Cool dialysate temperature
- Sodium modelling as prescribed
- Concentrate – as prescribed (Review patients blood results bloods and guideline for prescription of acid concentration in the acute setting)

❖ **Second Dialysis – 2.5 Hrs Duration**

- BFR 200-250 ml/min
- Minimal Heparinisation, as per the anticoagulation guidelines.
- Dialyzer same size (14L polyflux)
- Bicarb HD
- UF as prescribed.
- Concentrate as prescribed (see bloods and guideline for prescription of acid concentration in the acute setting)

❖ **Third Dialysis – 3 Hrs Duration**

- BFR 250-300/min
- Dialysate flow 700/min
- Minimal Heparin
- Dialyzer size may be increased as prescribed.
- UF as prescribed
- Bicarb HD

6.3.6: Monitor patient for adverse reactions

❖ **Disequilibrium Syndrome**

This is a set of systemic and neurologic symptoms. Characteristic electroencephalographic findings that can occur either during or followed by HD. Early manifestations include nausea, vomiting, restlessness and headache. Sometimes serious manifestations include seizures and coma.

When the plasma solute level is rapidly lowered during dialysis the plasma becomes hypotonic with respect to brain cells and water shifts from the plasma in to brain tissue. Very rarely occur as early identification and initiation of treatment modalities are implemented at earlier stage for acutely ill patients. Still mild form of disequilibrium can occur when an acutely uremic patient is dialyzed too aggressively.

❖ Dialyzer reactions

In the past many of these reactions are known as 'first use syndrome'. Symptoms usually begin during the first few minutes of dialysis. Proper priming of the dialysis machine should be done to prevent these reactions when ethylene oxide is used; anaphylactic reactions can be avoided with the use of Piriton, cortico steroids.

❖ Hypotension

It is common complication seen in haemodialysis (refer hypotension management guidelines).

❖ Arrhythmia

Can occur as a result of too aggressive first time dialysis treatment or as a result of hyper/hypokalaemia.

❖ Haemolysis

It is a medical emergency. Symptoms of haemolysis are back pain, tightness in the chest and shortness of breath. Port-wine appearance of the blood in the venous blood line and pink discolouration of plasma in centrifuged blood samples, and marked fall in the hematocrit are seen in haemolysis.

❖ Seizures

❖ Air embolism

Air embolism is a potential catastrophe that can lead to death unless detected and treated quickly.

- ❖ Clotting and Blood Line Obstruction

- ❖ Hypoxemia

- ❖ Electrolyte Imbalances (Hypokalaemia, Hypocalcaemia)

To reduce Hypotension

- Minimum rate of UF and increase frequency of HD
- Sodium/Ultra filtration profiling
- Cool dialysate
- Higher dialysate calcium
- Midodrine (Alpha 1 adrenergic agonist) can be used

7.0 Distribution

The Divisional Nurse Manager will circulate a copy of the policy to the relevant areas. The Clinical Nurse Manager in each area is responsible to ensure all staff access and read the policy. The policy will also be available on a designated computer in each of the renal clinical areas under *Renal Policy Folder June 2008* and on the nursing policy page of the intranet.

8.0 Filing

A copy will be filed in the policy and procedure book folder in each unit. The master copy will be filed in the Divisional Nurse Managers office.

9.0 Review

This policy will be reviewed in two years, March 2011.

10.0 Superseded/ Obsolete Documents

This is the first haemodialysis treatment guidelines document.

11.0 References

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For Dialysate prescribing

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2. *1Dialysezentrum Karlstrasse, Duesseldorf, Germany; 2Heinrich-Heine - Universitaet, Duesseldorf, Germany; 3Insitut fuer Biometrie und Epidemiologie, Deutsches Diabetes-Zentrum, Duesseldorf, Germany; 4Klinikum Fulda, Fulda, Germany*