# Acute Haemodialysis Prescription

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| **Target audience:** | All renal practitioners working in King's Renal Dialysis Unit | | |
| **Stakeholders/ committees involved in guideline development :** | Renal Education Team<br>Haemodialysis Matrons<br>Haemodialysis Unit Managers<br>Haemodialysis Quality Improvement group | | |

**For Clinical Guidelines Groups' use only**

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# Acute Haemodialysis Prescription

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## 1.0: Introduction

Haemodialysis (HD) prescription is crucial for patients commencing HD either as planned and unplanned new starters with end stage renal disease (ESRD), or as patients suffering from acute kidney injury (AKI) requiring renal replacement therapy (RRT). Individualised HD prescriptions are required because of the varied indications for starting patients on HD and patient-specific variables that may affect delivery of HD in this heterogeneous population.

Unlike chronic HD, no strong correlations exist between HD patients' clinical outcomes and HD dose in acute HD. However, formulating individualised HD prescriptions ensures an achievement of its intended therapeutic goal, which is to treat acute complications of AKI and safely commence new starters with ESRD on the chronic HD programme, as well as sustain life in both patient populations.

## 2.0: Purpose and Scope

This guideline will address the components of acute HD prescription that are necessary for an effective and safe treatment regimen that can be individualised for the heterogeneous population requiring acute HD. Therefore this guideline will focus on important areas including choice of dialyser, dialysate composition, blood and dialysate flow rates, length of treatment, amount and rate of ultrafiltration, choice of anticoagulation and total dialysis dose.

## 2.1: Target Audience and Pre – Requisites for Practitioner

The guideline relates to the medical and nursing teams within King's Renal units who are involved in formulating and or amending HD prescriptions as well as staff involved in delivering HD treatment. Delivery of HD in the acute setting needs to be undertaken by a renal-trained practitioner who is deemed competent to perform acute HD by the practice development nurse, the ward manager or an approved assessor. The said competency assessment must include knowledge of principles of HD, measures for promoting HD regime tolerability and efficacy, and an understanding of and competency in completing the acute HD integrated care pathway.

## 2.2: Key changes from previous guideline

This guideline is new having been separated out from a previous guideline "HD prescription".

## 2.3: Key Priorities for Implementation

Given the scope of this current guideline, the key priority for implementation is ensuring accountability and adherence to the integrated care pathway through in-house training.

## 3.0: Indications

### Acute HD prescription

Acute HD is performed in patients diagnosed with either AKI or ESRD requiring RRT; it may also be performed in patients with specific drug overdoses. There is no evidence of superiority of different types of RRT or that timing of initiation of therapy affects outcome in either AKI or ESRD. Absolute thresholds for commencing HD are not well defined and are based on the clinical scenario and clinician's judgement.

The prescription may vary depending on the objective of the treatment; the primary indications for commencing RRT are hyperkalaemia, metabolic acidosis due to renal failure, fluid overload, or uraemia; HD may also be commenced in those patients with asymptomatic ESRD who have a low eGFR (eGFR <10 ml/min).

**3.1: Derangement of biochemical markers**: Acute HD prescription may require adjustment according to the following biochemical disturbances:

- Hypo/hyperkalaemia: Pre-dialysis serum potassium less than 3.5 and greater than 5.0 mmol/L
- Metabolic acidosis: Pre-dialysis serum bicarbonate level less than 20 mmol/L
- Hypo/Hypercalcaemia: Pre-dialysis serum calcium levels less than 2.15 and greater than 2.6 mmol/L
- Hypo/hypernatraemia: Pre-dialysis serum sodium levels less than 135 and greater than 145 mmol/L

**3.2: Fluid overload**: Fluid overload, including pleural and pericardial effusions, not responsive to medical treatment is an indication to commence HD. Target fluid removal during HD treatment should be stated as part of the acute HD prescription.

**3.3: Signs of uraemia**: These include nausea and vomiting, pericarditis, neuropathy, or an otherwise unexplained decline in mental status.

**3.4: Contraindications**: there are no absolute contraindications to starting HD. Relative indications include:

- Recent medical history of an acute event- for example, a cardiac event
- Patients with hypotension
- Clinical scenarios where patients who may not benefit from HD treatment- for example, patients with metastatic malignancy

In unstable patients, an alternative to acute intermittent HD is continuous RRT eg. CVVHF.

## 4.0: Components of the acute HD prescription

When prescribing acute HD many variables should be considered in order to avoid complications, for example disequilibrium syndrome and acute cardiac dysrrythmias.

### 4.1: Acute HD prescription component variables

#### 4.1.1: Patient variables

- Total-body water (urea volume of distribution)
- Urea generation
- Residual renal function
- Fluid accumulation and ultrafiltration rate
- Biochemical status

#### 4.1.2: HD variables

- Type and size of dialyser
- HD frequency and duration
- Dialysate composition
- Dialysate flow rate
- Blood flow rate
- Estimated dry weight or target fluid removal
- Effective anticoagulation type
- Appropriate fistula needle size based on the diameter, depth and maturation of the AVF/AVG

### 4.2: Dialysers

Choice of dialyser for acute HD includes consideration of composition of membrane, dialyser efficiency and dialyser size; for dialyser specifications see appendix 1.

Biocompatible membranes (synthetic or modified cellulosic) may cause less inflammation, with a resultant decrease in infectious complications and a theoretical increase in probability of renal recovery in AKI. Dialysers with biocompatible membranes are used for acute and chronic HD at King's renal unit.

Low flux dialysers have membranes that allow small molecules to pass such as urea and creatinine, but not larger molecules that also accumulate in renal failure; high-flux dialysers have a membrane that allows middle-sized molecules to pass through but prevents accidental removal of protein from blood therefore giving the theoretical but unproven advantage of enhancing toxin removal and improving outcome.

Low flux dialysers (FX8 and FX10) are initially used for the first 3 sessions of acute HD to allow a more gentle dialysis treatment with a view to minimise complications of acute HD; high flux dialysers are used thereafter for subsequent HD sessions to improve middle molecule removal (see Appendix 2 for acute HD integrated care pathway).

## 4.3: Treatment frequency and duration

The HD treatment duration is the most critical factor in regime efficacy and patient tolerability. It has been argued that 'short thrice weekly HD is inadequate regardless of small molecule clearance', therefore the Renal Association recommends that duration of thrice weekly HD in patients with minimal residual renal function should not be reduced below 4 hours without careful consideration to clinical outcomes.

It is important in acute HD to deliver the desired dose of dialysis; it is equally important to avoid complications of acute HD, such as disequilibrium syndrome and cardiac arrhythmias, which occur following sudden changes in the patient's biochemical status following an HD session.

To ensure adequate dose of HD as well as safeguarding patient safety, King's renal unit offers a short HD of 2 hours duration using a low flux dialyser initially with a view to building up to 4 hours using a high flux dialyser by the 6$^{th}$ HD session. The first session of acute HD is delivered over 2 h, the second session over 2.5 h, and the third over 3 h, with a frequency of at least every other day, if not every day which is recommended in AKI (clinician's choice). For more details of the protocol see appendix 2.

## 4.4: HD solutions and dialysates

HD solutions are prepared from purified water and concentrates (dialysates), the latter containing the electrolytes necessary to provide dialysis solution of the prescribed composition. It is essential for the water used to produce dialysis fluid to have appropriate chemical and microbiological purity as HD patients are exposed to 120-200 litres of dialysis solution during each dialysis treatment. The dialysate used in HD contains highly purified water into which sodium, potassium, magnesium, calcium, chloride, glucose and bicarbonate have been added. Dialysates are specifically altered depending on the clinical scenario namely metabolic acidosis, hyper/hypokalaemia, hyper/hypocalaemia and hypo/hypernatraemia. Table 1 below shows the dialysates that are currently available in King's Renal unit.

**Table 1: Dialysates available at King's renal unit**

| Dialysate | Potassium content | Calcium content |
|---|---|---|
| **A7** | 2.0 mmol/L | 1.5 mmol/L |
| **A10** | 3.0 mmol/L | 1.25 mmol/L |
| **A17** | 1.0 mmol/L | 1.0 mmol/L |
| **A27** | 2.0 mmol/L | 1.0 mmol/L |

### 4.4.1: Dialysate Sodium

Dialysate sodium levels are pre-set at 137 mmol/L as standard. This is because a constant physiological level of sodium in the dialysis fluid induces neither osmotic gradients nor sodium accumulation. It is important to bear in mind that altering dialysate sodium changes the final electrolyte composition of the dialysate.

Sodium profiling (Appendix 3) may be considered in hyponatraemia (sodium level <135 mmol/L) or hypernatraemia (sodium level >145 mmol/L) to avoid neurological complications associated with rapid correction of serum sodium (except in acute dysnatraemias where rapid correction is desirable).

In severe hyponatraemia (serum sodium <120 mmol/L) a shortened HD with reduced blood flow rate (2 ml/kg/min) should be performed and dialysate sodium set to the lowest commercially available setting as agreed by the medical team. Serum sodium should be monitored carefully throughout the HD session. The target is to correct the serum sodium over several days to avoid neurological complications.

In chronic hypernatraemia the use of dialysate sodium concentrations more than 3-5 mmol/l below serum sodium concentration is associated with hypotension, muscle cramps, and, most importantly, disequilibrium syndrome and are best treated with continuous treatments such as continuous haemofiltration.

### 4.4.2: Dialysate Potassium

Hyperkalaemia is a frequent indication to commence HD either in AKI or in patients with ESRD not receiving RRT.

During HD, serum potassium will usually fall by 1 mmol/L after the first hour and then a further 1 mmol/L after the next 2 hours of treatment. Severe hypokalaemia post HD should be avoided due to risk of cardiac arrhythmias. In patients with long-term cardiac conditions, consider maintaining serum potassium levels above 4 mmol/L.

The dialysate potassium concentration is based on the pre-dialysis serum value. Potassium concentration in dialysates should be changed when required according to the recommendations in table 2 below. Note, zero potassium baths are not used in King's renal unit due to the potential risk of hypokalaemia and dialysis-induced cardiac arrhythmias.

**Table 2: Range of pre-dialysis serum potassium levels and potassium dialysate prescription adjustments**

| Level of hyper/hypokalaemia | Serum K | Dialysate |
|---|---|---|
| Severe hyperkalaemia | K ≥7.5 mmol/L | 1 mmol/L K |
| Mild - Moderate hyperkalaemia | K 4 – 7.5 mmol/L | 2 mmol/L K |
| Mild - Moderate hypokalaemia/ normokalaemia | K 3 – 3.9 mmol/L | 3 mmol/L K |
| Severe hypokalaemia | K ≤ 3 mmol/L | 3 mmol/L K + oral / iv potassium supplementation |

In patients with severe hypo/hyperkalaemia using high or low potassium dialysates, serum potassium levels should be checked via blood analyser before commencement of HD, after the first hour of the treatment session and then hourly during the treatment as well as immediately post-HD. These results need to be documented on "Renalware encounters" as well as patient evaluation notes. Note, a blood sample drawn 2-4 hours after HD should also be considered in view of the potassium rebound effect in certain clinical scenarios such as severe hyperkalaemia.

Life-threatening dialysis-induced cardiac arrhythmias following potassium removal are independently associated with coronary artery disease, LVH, digoxin use, hypertension, and advanced age. Patients at risk of cardiac arrhythmias should be placed on a cardiac monitor during HD. Furthermore, in patients with poor systemic perfusion, HD causes a larger drop in serum potassium levels followed by a reduced potassium rebound due to decreased potassium efflux; therefore consideration should be given to measuring serum potassium levels 2-4 h post HD in this patient group.

### 4.4.3: Dialysate Calcium

Serum calcium levels can be deranged in AKI, and disturbances in mineral and bone metabolism are highly prevalent in patients with ESRD. It is the **corrected** serum calcium level (or ionised form) that should be used when determining if an adjustment to calcium levels in the dialysate is needed. Reference values for corrected calcium are 2.15-2.6 mmol/L, however, the "ideal" range has been set by the Renal Association as 2.2-2.5 mmol/L with a recommended avoidance of hypercalcaemic episodes for patients on HD.

Indications for manipulating serum calcium during HD include the treatment of hypocalcaemia that may be life-threatening, and treatment of hypercalcaemia. Calcium movement from dialysate to blood is desirable in patients with hypocalcaemia as hypocalcaemia is associated with cardiovascular instability during HD due to poor myocardial contractility. Caution should be applied when prescribing lower calcium dialysates (<1.25 mmol/L) as they may prolong and increase the variability of the QTc interval, both risk factors for sudden death.

HD prescriptions requiring calcium content amendment should follow the recommendations in table 3 below:

**Table 3: Range of pre-dialysis serum calcium levels and calcium dialysate prescription adjustments**

| Level of hyper/hypocalcaemia | Serum Corrected Calcium | Dialysate |
|---|---|---|
| Severe hypercalcaemia | Corr Ca++ >2.8 mmol/L | 1 mmol/L Ca |
| Moderate hypercalcaemia | Corr Ca++ 2.5 - 2.79 mmol/L | 1.25 mmol/L Ca |
| Normocalcaemia/ hypocalcaemia | Corr Ca++ < 2.5 mmol/L | 1.5 mmol/L Ca |

### 4.4.4: Dialysate Bicarbonate

Dialysate bicarbonate levels are pre-set at 32 mmol/L. If the pre-dialysis serum bicarbonate level is <10 mmol/L (ie severe metabolic acidosis), then increasing the bicarbonate setting to 40 mmol/L can be considered. However, it should be noted that similar to alteration in sodium concentrations, altering the dialysate bicarbonate level will affect the final concentration of the dialysate, hence profiling bicarbonate is limited to acute settings. Clinical effects of increasing serum bicarbonate include decreased respiratory drive due to higher pH, altered mental status, weakness, cramping and lethargy due to metabolic alkalosis.

In case of alkalaemia consideration should be taken to reducing dialysate bicarbonate concentration which can be done incrementally on the dialysis machine; the concentration should not be set below 25 mmol/L.

## 4.5: Blood flow rate (Qb)

In acute HD, blood flow rates are initially maintained at a slow rate in order to prevent complications associated with rapid drops of blood urea and rapidly changing biochemistry (Appendix 4). Blood flow rates are maintained at 200 ml/min for the first 3 sessions of HD, with duration of HD increasing from 2 hr to 2.5 h then 3 h, respectively, over the 3 sessions. Blood flow rate is then increased to 250 ml/min in the 4$^{th}$ and 5$^{th}$ sessions, these sessions lasting 3 h and 3.5 h, respectively. Thereafter, blood flow rates should be targeted at 300-400 ml/min unless contraindicated medically (eg cardiac disease) or technically (eg poor access or HD via a line); HD sessions should be of 4 h duration unless there is a clinical indication to reduce number of hours. Please refer to Appendix 2 for the acute HD integrated care pathway for further details.

## 4.6: Dialysate flow rate (Qd)

The dialysate flow rate is the rate at which the dialysate solution passes through the dialyser. In acute HD (first 3 sessions), dialysate flow rates are maintained at 400 ml/min because of the risk of complications following sudden changes in a patient's biochemical markers (Appendix 5). This can usually be increased between 500 - 800 ml/min in subsequent sessions (Appendix 2).

## 4.7: Ultrafiltration Rate (UFR)

Acute and chronic fluid overload not responsive to medical treatment are indications to commence HD. However, consideration to amount of fluid removal is important as the overall aim may be different in patients with AKI compared to those with ESRD; for example, in AKI, volume expansion is frequently necessary to maintain optimal circulatory and oxygenation status and the relationship of blood volume/fluid removal and hypotension not well defined. The target volume of fluid removal should be specified prior to commencement of HD by the medical team (Appendix 2) and should not usually exceed 3 L in a single session or 10 ml/kg/hr.

UF-related hypotension is a common complication of UF in HD and, in this clinical scenario, the following interventions can be considered by the medical team:

- Decrease in UFR
- Isolated/sequential UF
- Increased frequency/duration of HD
- Cool-temperature HD*
- Higher dialysate calcium concentration
- Midodrine
- Sodium and UF profiling (not recommended)

*Note, in AKI hypothermia may be undesirable because of adverse effects on myocardial function, end-organ perfusion, and blood clotting.

### 4.7.1: Alterations in UFR

The UFR can be changed from a constant rate to UF profiling or isolated/sequential UF (IsoUF) to provide better cardiovascular stability. In UF profiling, the UF rate could be intensive at the commencement of the session and slower towards end or vice versa based on patient tolerability. IsoUF can be performed during an HD session, or can be prescribed as a stand alone therapy when only fluid is removed. Where possible, IsoUF should be conducted after an hour of HD session to reduce possible complications related to electrolyte imbalance, especially hyperkalaemia (K higher than 5 mmoL).

During IsoUF no more than three litres in total should be removed and no more than 1 litre per hour as IsoUF will remove fluid rapidly from the intravascular space and plasma refill might not augment fluid loss, resulting in haemodynamic instability. Some fluid can be removed using IsoUF and the remaining can be taken off more slowly during HD.

Patients should not be on IsoUF for longer than 90 minutes at a time; hypothermia may occur as the dialysate is in bypass. The IsoUF should be followed by the full number of dialysis hours normally prescribed for the patient.

IsoUF should not be used as a chronic strategy for fluid removal as it may encourage some patients to drink more on a regular basis, it should be used for symptom control only.

## 4.8: Anticoagulation

Anticoagulation is not prescribed routinely for the first 3 acute sessions of HD. However, should the patient require some form of anticoagulation, do refer to the HD anticoagulation guidelines.

## 5.0: Accountability and Reporting Structures

All health care professionals involved in the prescribing and altering of HD prescriptions, as well as those assessing and monitoring the efficacy of the HD regime, are expected to act in accordance with their professional standards and codes of conduct in relation to promoting patient safety. Although the initial HD prescription is written by the medical team, the regular assessment of its efficacy is assessed by the nurse. The nurse commencing the HD session is required to ensure that the appropriate HD components such as dialyser size, dialysate composition, blood and dialysate flow rate, and URF are used.

The aim of nursing care pre, intra and post HD treatment is to monitor the treatment and prevent the occurrence of complications through comprehensive assessments and planning. Named nurses and team leaders are required to liaise with the unit consultants regarding HD prescription issues. Nevertheless, unplanned events will happen and the role of the nurse is then to ensure early recognition and prompt intervention to protect the patient from harm. Named nurses and team leaders are to liaise appropriately with other multidisciplinary members in order to ensure patient receives timely intervention.

Given the significance of acute HD prescription, it is important to utilise a standardised communication and handover of assessment findings to all required members of the multidisciplinary team members in order to ensure timely intervention and improve patient safety. Standardisation of handover will ensure effective, concise and complete communication in all clinical situations and facilitate care delivery. Recently, the Renal Association Patient Safety Project adopted and amended the SBAR into an SBARD Handover tool incorporating a decision-making component following the recommendation. Communication should include previous HD prescription, current alterations instituted and outcomes achieved. Renal practitioners are required to provide patient with information related their HD dose requirement and any potential complication associated with inadequate HD.

## 6.0: Related Guidelines:

This guideline is to be used in conjunction with the following:

1. Commencement & Discontinuation of haemodialysis via temporary / permanent CVC
2. Commencement & Discontinuation of haemodialysis via AVF/AVG
3. Holistic assessment of the haemodialysis patient
4. Fluid assessment in the patient undergoing haemodialysis
5. Safer sharps devices policy
6. Anticoagulation to Maintain Patency of Haemodialysis Extracorporeal Circuit
7. Health and safety
8. Waste management policy and procedure

## 7.0: Dissemination and Communication

Successful delivery of this policy requires clear, strong and effective communication. This will need to be at all levels within the King's Renal /dialysis units. A copy of the policy will be distributed to all Haemodialysis Quality Improvement Group members, Renal Medical team, Renal Dieticians, HD Matrons and Ward Managers and all clinical staff. This will ensure that all stakeholders and their staff are aware of their responsibilities contained within this policy. The policy will be made available on Cliniweb.

## 8.0: Continuous Professional Development (CPD)

It has been recommended that renal practitioners should be trained, and deemed as competent, in assessing and altering HD prescription. It is important that renal practitioners understand the patient and HD variable components of HD prescription. Ward managers, named mentors and renal education need to ensure that HD prescription related clinical competence are regularly assessed and recorded in Haemodialysis competency document. Theoretical knowledge will be gained either through a formal study session for example renal course, or in a one-to-one/small group sessions with the PDN and the team leaders.

## 9.0: Monitoring & Clinical Audit

Adherence to this policy will be monitored through Audits, Renal Risk and Governance meetings. See Table 4 for monitoring strategy and Appendix 6 for audit data collection.

**Table 4: Strategy for monitoring**

| Measurable policy objectives that will be monitored | Monitoring audit method | Frequency | Responsibility for performing monitoring | Monitoring reported to groups responsible for action plans |
|---|---|---|---|---|
| ❖ Completion of Acute HD integrated care pathway<br>❖ Adherence to acute HD integrated care pathway<br>❖ Proportion of HD patients who have ultrafiltration rates in excess of 10ml/kg/hour<br>❖ Proportion of patients reaching 4 h dialysis by session 6<br>❖ Correct prescription of anticoagulation | Audit on HD units using an audit tool attached (See appendix 8) | 1 yearly | PDN and Renal Matron and ward manager | Haemodialysis Quality Initiative group, Renal Matrons and HD ward managers |

## 10.0: Patient Information

All acute HD patients are provided with a Welcome Pack, where appropriate, and an information booklet relating to salt, potassium and fluid intake, as well as useful resources on managing thirst and control of bone disease as part of ongoing patient education.

## References

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# Appendices

## Appendix 1. Dialyser Specification Information

| | | | FX8 | FX10 | FX CorDIAX 60 | FX CorDIAX 80 | FX CorDIAX 100 | FX CorDIAX 120 |
|---|---|---|---|---|---|---|---|---|
| 1 | Qb/Qd | | 300/500 | 300/500 | 300/500 | 300/500 | 300/500 | 300/500 |
| 2 | Clearance | Urea | 254 | 261 | 271 | 280 | 283 | 284 |
| | | Cr | 225 | 231 | 252 | 261 | 272 | 274 |
| | | PO4 | 194 | 210 | 237 | 248 | 258 | 262 |
| | | B12 | 120 | 138 | 175 | 190 | 207 | 213 |
| | | Inulin | | | 116 | 127 | 144 | 149 |
| 3 | Ultrafiltration coefficient (KUF; ml/h x mmHg) | | 12 | 14 | 47 | 64 | 74 | 87 |
| | Blood flow range (ml/min) | | 150 – 400 | 200 - 500 | 150 – 400 | 200 – 500 | 250 - 600 | |
| 4 | Priming volume (ml) | | 74 | 95 | 74 | 95 | 116 | 132 |
| 5 | Sterilisation method | | Steam | Steam | Steam | Steam | Steam | Steam |
| 6 | Effective surface area (m2) | | 1.4 | 1.8 | 1.4 | 1.8 | 2.2 | 2.5 |
| 7 | Dialyser mass transfer area coefficient (KoA) Urea (ml/min) | | | | 1164 | 1429 | 1545 | 1584 |

## Appendix 2. Acute HD integrated care pathway

| PATIENT DETAILS | UNIT DETAILS |
|---|---|
| Name: ……... | Ward / Main unit (please circle) |
| Hospital no.: …… | Name of ward if inpatient ……. |
| Date of birth: ……... | Nurse completing checklist:…… |
| Inpatient / outpatient (please circle) | Consultant: ……... |

**Indication to start HD**

| AKI | ESRF |
|---|---|
| **Please circle those that apply**<br><br>Hyperkalaemia >6.5 mmol/l<br>Serum urea >30 mmol/l<br>Metabolic acidosis<br>Fluid overload<br>Electrolyte imbalance<br>Drug overdose<br>Other (please specify) | **Please circle those that apply**<br><br>Hyperkalaemia >6.5 mmol/l<br>Serum urea >30 mmol/l<br>Metabolic acidosis<br>Fluid overload<br>Electrolyte imbalance<br>Other (please specify) |

| **VASCULAR ACCESS** (please circle) | |
|---|---|
| **Definitive** | Arterio-venous fistula<br>PTFE graft<br>Tunnelled line RIGHT/LEFT |
| **Temporary** | IJ Vascath RIGHT/LEFT<br>Femoral vascath RIGHT/LEFT |
| **EXPOSURE TO BLOOD BORN VIRUSES (BBV)** (Please circle) | |
| **Known carrier of a BBV** | YES / NO<br>If yes, please specify…<br>HIV / Hepatitis B / Hepatitis C / HTLV |
| **Risk factors for BBV** | Foreign travel in last 3 months<br>If yes, please specify where<br>……..<br>HD in last 3 months<br>Blood transfusion last 3 months |

| **Historical virology results** | | |
|---|---|---|
| | **Date** | **Result** |
| **Hepatitis B surface Ag** | | |
| **Hepatitis B core total Ab** | | |
| **Hepatitis C virus Ab** | | |
| **HIV 1&2 Ab/HIV-1 p24 Ag** | | |
| **HTLV type 1&2 Ab** | | |

**1st HD Session** **Date: ……..**

| **Pre-dialysis bloods** | **Na:** | **K:** | **Ur:** | **Cr:** | **Ca:** | **Hb:** | **Plts:** | **INR:** |
|---|---|---|---|---|---|---|---|---|

| **HD prescription** | | **Comments** |
|---|---|---|
| **Treatment mode** | HD | |
| **Duration** | 2 h | |
| **Dialyser** | FX 8 | |
| **Dialysate** | (please circle)<br>A7 / A10 / A17 / A27 | |
| **Blood flow rate** | 200 ml/min | |
| **Dialysate flow rate** | 400 ml/min | |
| **Heparin** | Nil | |
| **Saline flushes** | Every 30 – 60 min (Shorter duration if required) | |
| **Ultrafiltration** | …….ml + 500 ml washback | |
| **Observations** | Every 15 min | |
| **Virology bloods taken?** | (please circle) Y / No | |
| **Machine number** | | |

**Monitoring during HD**

| **Time** | **BFR** | **AP** | **VP** | **BP** | **HR** | **Temp** | **sats** | **EWS** | **BM** |
|---|---|---|---|---|---|---|---|---|---|
| **PRE** | | | | | | | | | |
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|---|---|
| **Total UF:** | **Litres processed:** |
| **Wt pre:** | |
| **Wt post** | |

**Nursing Notes** **Dialysis session commenced by: Name: ……..** **Signed:**

**Dialysis session discontinued by:** **Name: ……..** **Signed: ……**

**2nd HD session** **Date: ……..**

| **Pre-dialysis bloods** | **Na:** | **K:** | **Ur:** | **Cr:** | **Ca:** | **Hb:** | **Plts:** | **INR:** |
|---|---|---|---|---|---|---|---|---|

| **HD prescription** | | **Comments** |
|---|---|---|
| **Treatment mode** | HD | |
| **Duration** | 2.5 h | |
| **Dialyser** | FX8 | |
| **Dialysate** | (please circle)<br>A7 / A10 / A17 / A27 | |
| **Blood flow rate** | 200 ml/min | |
| **Dialysate flow rate** | 400 ml/min | |
| **Heparin** | Nil | |
| **Saline flushes** | Every 30 – 60 min (Shorter duration if required) | |
| **Ultrafiltration** | …….ml + 500 ml washback | |
| **Observations** | Every 15 min | |
| **Virology blood results available?** | Hep B (core Ab+SAg)<br>Hep C<br>HIV<br>HTLV | Y / N<br>Y / N<br>Y / N<br>Y / N |
| **Machine number** | | |

**Monitoring during HD**

| **Time** | **BFR** | **AP** | **VP** | **BP** | **HR** | **Temp** | **sats** | **EWS** | **BM** |
|---|---|---|---|---|---|---|---|---|---|
| **PRE** | | | | | | | | | |
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| **POST** | | | | | | | | | |

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| **Total UF:** | **Litres processed:** |
| **Wt pre:** | |
| **Wt post** | |

**Nursing Notes** **Dialysis session commenced by: Name:……..** **Signed:**

**Dialysis session discontinued by:** **Name: ……..** **Signed: ……**

**3rd HD session** **Date: ……..**

| **Pre-dialysis bloods** | **Na:** | **K:** | **Ur:** | **Cr:** | **Ca:** | **Hb:** | **Plts:** | **INR:** |
|---|---|---|---|---|---|---|---|---|

| **HD prescription** | | **Comments** |
|---|---|---|
| **Treatment mode** | HD | |
| **Duration** | 3 h | |
| **Dialyser** | FX10 | |
| **Dialysate** | (please circle)<br>A7 / A10 / A17 / A27 | |
| **Blood flow rate** | 200 ml/min | |
| **Dialysate flow rate** | 400 ml/min | |
| **Heparin** | Nil | |
| **Saline flushes** | Every 30 – 60 min (Shorter duration if required) | |
| **Ultrafiltration** | …….ml + 500 ml washback | |
| **Observations** | Every 15 min | |
| **Virology blood results available?** | Hep B (core Ab+SAg)<br>Hep C<br>HIV<br>HTLV | Y / N<br>Y / N<br>Y / N<br>Y / N |
| **Machine number** | | |

| **Time** | **BFR** | **AP** | **VP** | **BP** | **HR** | **Temp** | **sats** | **EWS** | **BM** |
|---|---|---|---|---|---|---|---|---|---|
| **PRE** | | | | | | | | | |
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| **POST** | | | | | | | | | |

| | |
|---|---|
| **Total UF:** | **Litres processed:** |
| **Wt pre:** | |
| **Wt post** | |

**Nursing Notes** **Dialysis session commenced by: Name: …….. Signed:……**

**Dialysis session discontinued by: Name: …….. Signed: ……**

**Subsequent HD sessions**

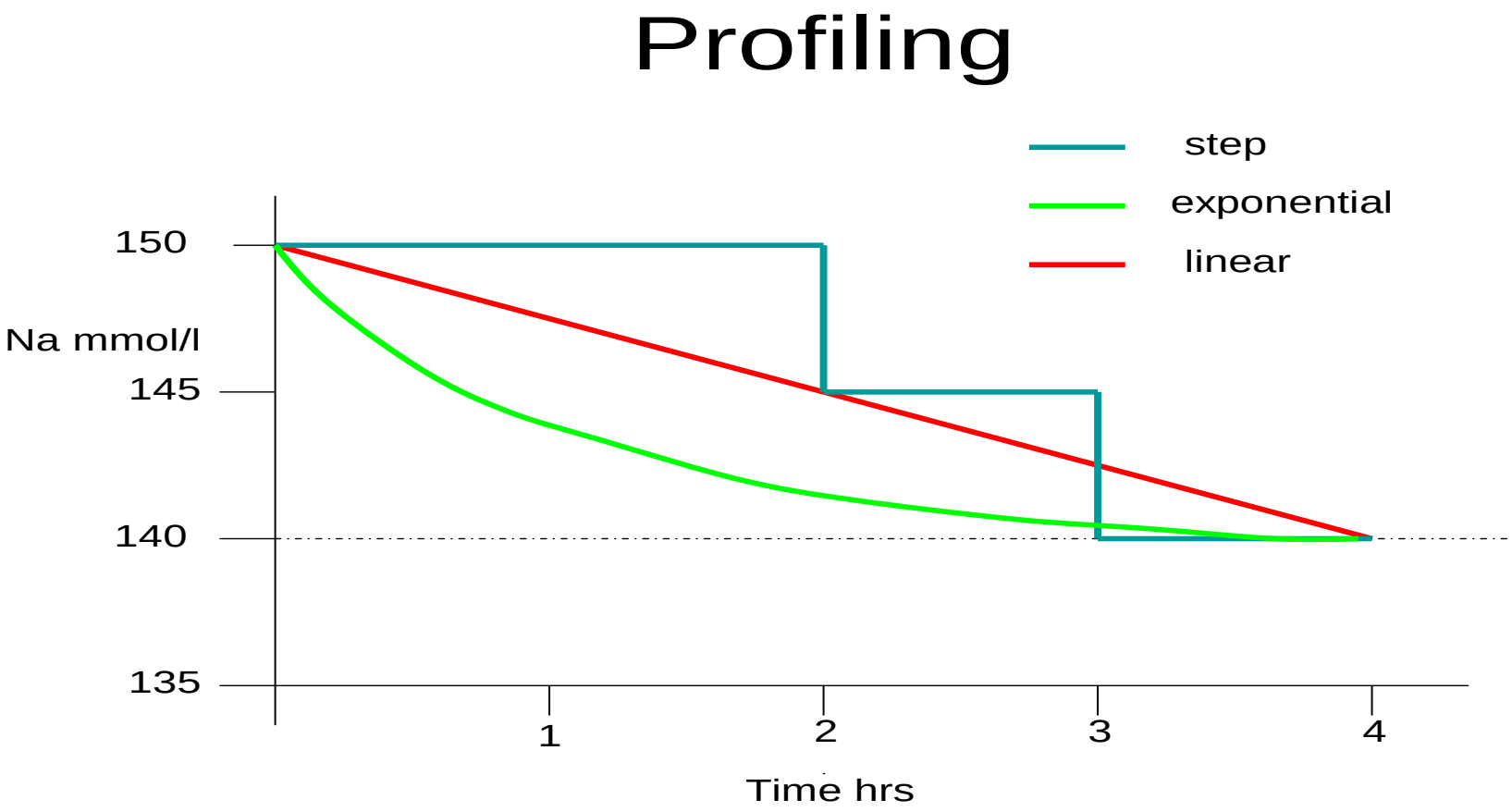
| 4th HD prescription | | 5th HD prescription | |
|---|---|---|---|
| **Duration** | 3 h | **Duration** | 3.5 h |
| **Dialyser** | FX60 | **Dialyser** | FX60 |
| **Blood flow rate** | 250 ml/min | **Blood flow rate** | 250 ml/min |
| **Dialysate flow rate** | 500 ml/min | **Dialysate flow rate** | 500 ml/min |
| **Heparin/enoxaparin** | As per protocol | **Heparin** | As per protocol |

| 6th and subsequent HD prescription | |
|---|---|
| **Duration** | 4 h |
| **Dialyser** | FX60 |
| **Blood flow rate** | 250 - 400 ml/min |
| **Dialysate flow rate** | 500 - 700 ml/min |
| **Heparin/enoxaparin** | As per protocol |

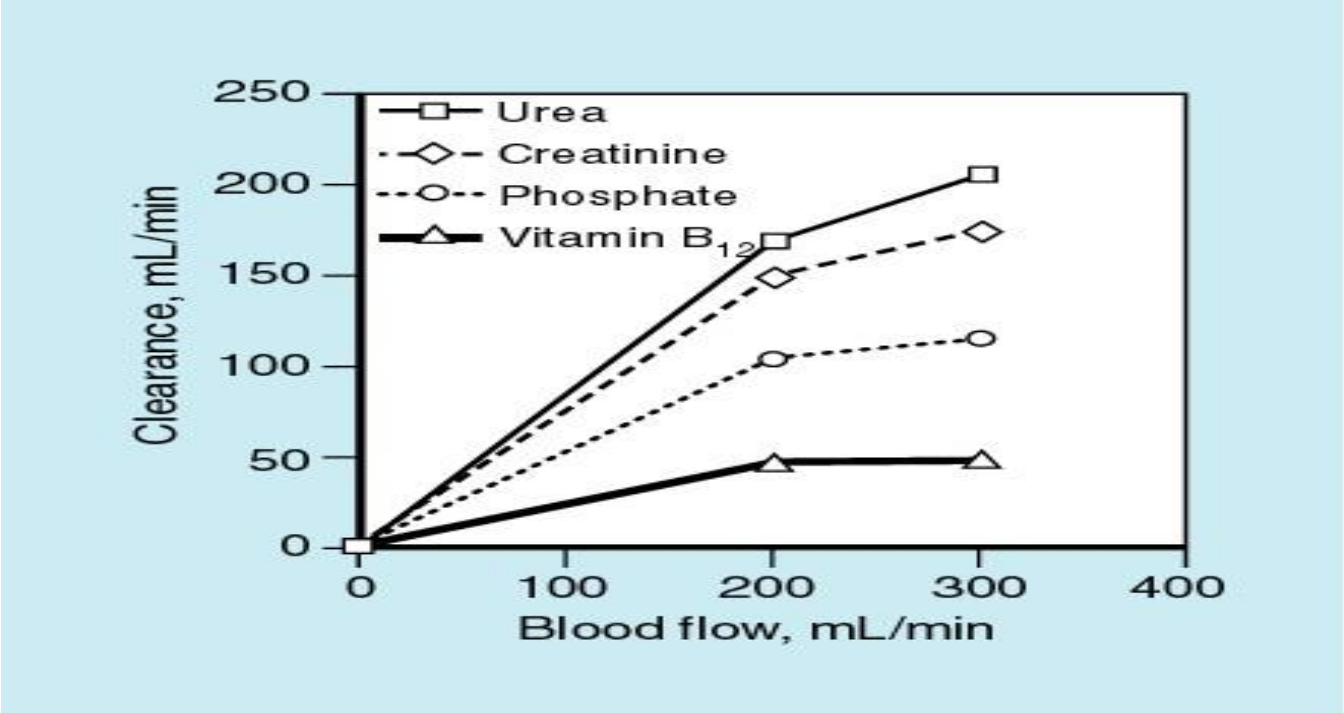
**Checklist before transfer to a satellite unit**

| Criteria for transfer | Achieved (sign and date) | Comments |
|---|---|---|
| Chronic HD prescription uploaded onto renal ware | | |
| Blue chart completed (EPO, iron, paracetamol PRN, urokinase PRN) | | |
| Appropriate anticoagulation prescribed | | |
| Referred to access team for definitive access if needed | | |
| Renal dietician review | | |
| Referred to renal counsellor if appropriate | | |
| MRSA/CPE status complete | | |
| Virology status complete | | |

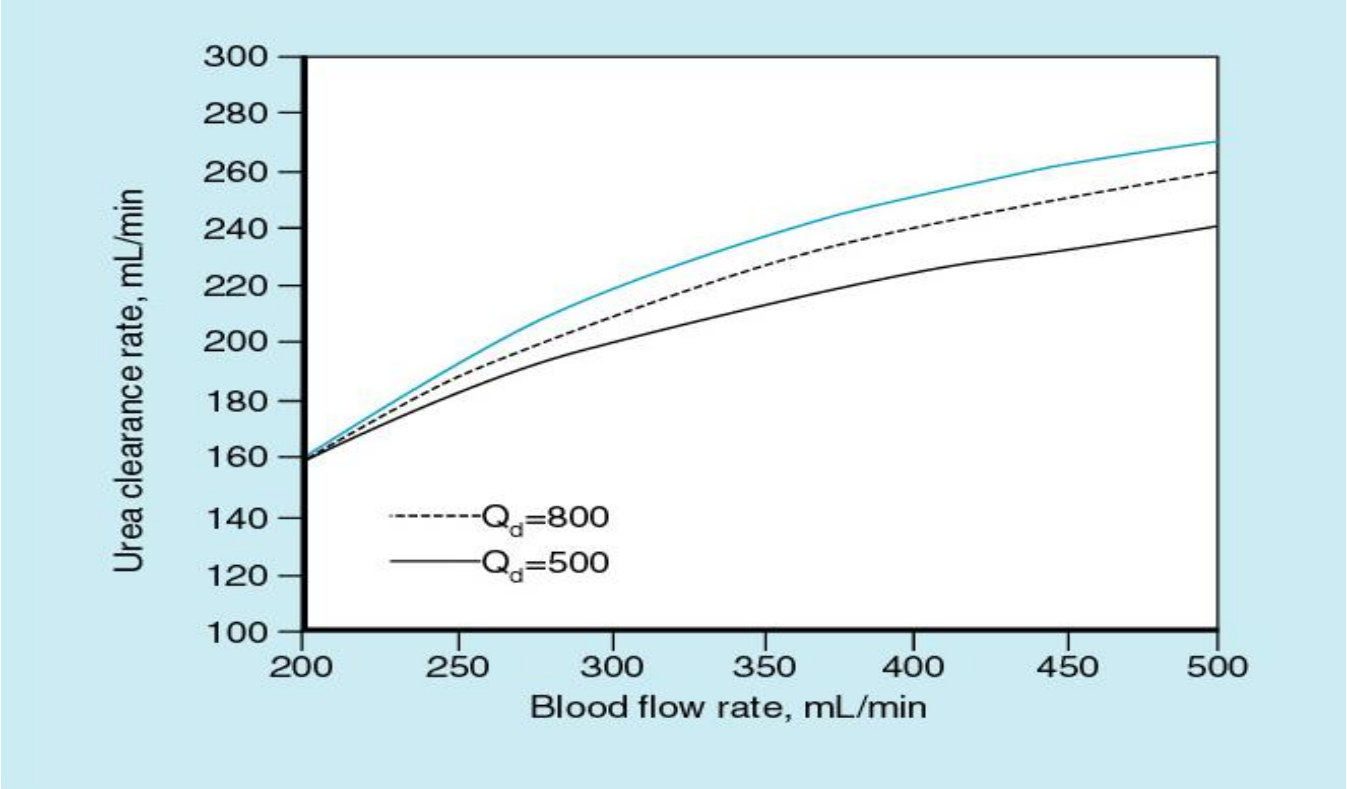
**Appendix 3. Sodium Profiling**



## Appendix 4: Effects of blood flow rate and diffusion of solutes




## Appendix 5: Effects of blood flow rate (Qb) and Dialysate flow rate (Qd) and clearance



## Appendix 6: Audit Tool

| Haemodialysis Prescription |
|---|

**OBJECTIVE:** **To ensure that all patients are treated in accordance with the Trust guidelines**

| ASPECT OF CARE BEING AUDITED | EXCEPTION (S) | SOURCE FOR DATA | NOS. AUDITED | GOAL ATTAINED | ACTION PLAN |
|---|---|---|---|---|---|
| • | • | • | | | |
| • | • | • | | | |
| • | • | • | | | |
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