



## **Guidelines for the Optimal Care of Patients on Chronic Dialysis in South Africa**

**Parts of this document were revised in April 2011.**

**The revised sections include:**

**\*Haemoglobin and iron therapy in CKD**

**\*Blood Chemistry and Bone disease in CKD**

**(Mainly KDIGO guidelines were followed in this compilation).**

**The BMD changes were approved at the SARS Forum held in Johannesburg on the 6<sup>th</sup> November, 2010.**

**The revisions were done by:**

**C R Swanepoel and circulated amongst the EXCO members for scrutiny.**



## **Guidelines for the Optimal Care of Patients on Chronic Dialysis in South Africa**

**This document was drawn up by a subcommittee of the South African Renal Society.**

**Members:**

M R Moosa (Chair)

S Naicker

I Naiker

M Pascoe

B van Rensburg

# **Guidelines for the Optimal Care of Patients on Chronic Dialysis in South Africa**

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## **Introduction**

The number of patients with endstage kidney failure receiving dialysis treatment in South Africa has increased rapidly over the past decade as a result, mainly, of the expansion of dialysis facilities in the private sector as well as an increased awareness and diagnosis of chronic kidney disease. This has placed an enormous burden on health systems in general and on funders in particular. The cost of dialysis treatment is prohibitive. In order to ensure the provision of a good standard of treatment and optimum utilization of scarce resources the institution of guidelines to ensure quality of treatment is essential.

These guidelines serve to ensure that overall best practices are maintained; that some uniformity and equity in treatment is maintained throughout the country and that some patients are not disproportionately advantaged over others purely on the basis of limited resources; that a level of self-audit be ensured; satisfy funders that resources are optimally and responsibly utilized. Last, but by no means least, implementation of these guidelines should result in overall improvement in the standard of patient care. These guidelines are for implementation in all dialysis units, both in the State and private sector.

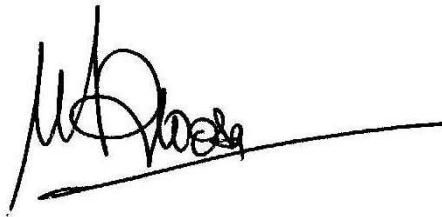
In order to revise these guidelines input was obtained from nephrologists, and renal technologists and nurses affiliated to the South African Renal Society and the Renal Care Society of South Africa, respectively. This is the second draft after the first was circulated to all participants for comment. Extensive use was made of the European Best Practice Guidelines (EBPG) and the Kidney Disease Outcomes Quality Initiative (K/DOQI) guidelines in drawing up the current document. Recommendations pertaining to infection were based on American Centers for Disease Control and Prevention (CDC). Elsewhere,

*SARS Chronic Dialysis Guidelines*

evidence-based recommendations were used wherever possible. It needs to be accepted that best practices will change as new evidence becomes available and it is recommended that these guidelines be **reviewed at least every 2 years**.

An undertaking of this nature requires the effort of several individuals and I am most grateful to all those who made that effort to ensure the success of this important project. I am particularly grateful to the Renal Care Society of South Africa for its very worthy contribution and the high quality of its submission. The final document will be submitted to the National Department of Health as an important guide to ensure that patients around the country receive dialysis treatment of the highest quality at all times.

Signed,

A handwritten signature in black ink, appearing to read 'M R Moosa', with a long horizontal line extending to the right.

M R Moosa

March 22, 2006

Cape Town.

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**NB.:** This document was unanimously adopted at the Annual General Meeting of the South African Renal Society held on **March 20, 2006** at the Cape Sun, Cape Town. These guidelines pertain to adults only; those for children are being drafted.

# **Clinical Guidelines**

## **1. Measurement of renal function**

**The preferred method of estimating the glomerular filtration rate (GFR) in advanced renal failure is the abbreviated Modification of Diet in Renal Disease (MDRD) study equation.**

Note 1: Because of the unreliability of urine-based GFR estimations, these should no longer be used.

Note 2: The Cockcroft-Gault equation over-estimates the GFR and should be limited to use in patients with mild renal failure (GFR > 50 ml/min).

Note 3: The MDRD study equation overestimates the GFR in blacks by 18%. Until further information is available, patients of other race groups default to white, although the formula has not been validated in racial or ethnic subgroups other than Caucasians and African Americans,

Note 4: The MDRD study equation has not been validated in children (age <18 years), pregnant women, the elderly (age >70 years), in individuals with normal kidney function who are at increased risk for chronic kidney disease (CKD) or in normal individuals.

## **2. Who should be tested**

**Individuals at increased risk for chronic kidney disease should be tested at the time of a health evaluation to determine if they have chronic kidney disease. These include individuals with the following:**

- Diabetes
- Human immunodeficiency virus infection
- Hypertension
- Heart failure
- Atherosclerotic coronary, cerebral, or peripheral vascular disease

- Autoimmune diseases
- Systemic infections
- Exposure to drugs or procedures associated with acute decline in kidney function
- Recovery from acute kidney failure
- Age >60 years
- Family history of kidney disease
- Reduced kidney mass (includes kidney donors and transplant recipients).

Note 1: Tests should include the GFR using Cockcroft-Gault or MDRD equations (see above); assessment of proteinuria, and examination of urinary sediment or dipstick for red blood cells and white blood cells.

Note 2: Estimated GFR should be monitored **yearly** in patients with chronic kidney disease, and **more frequently** in patients with:

- GFR <60 ml/min/1.73 m<sup>2</sup>
- Rapid GFR decline in the past ( $\geq 4$  ml/min/1.73 m<sup>2</sup>)
- Risk factors for rapid progression
- Ongoing treatment to slow progression
- Exposure to risk factors for acute GFR decline.

### **3. When to refer to a nephrologist**

- a) GFR < 60 ml/min (recommended); GFR < 30 ml/min (mandatory)**
- b) Serum creatinine > 150  $\mu$ mol/l (more than 2 consecutive readings)**
- c) Persistent proteinuria and/or haematuria**

Note 1: At GFR <60 ml/min interventions to retard or prevent the progression of chronic renal failure should be instituted

Note 2: At GFR < 30 ml/min, options for renal replacement need to be considered. Consider preparing vascular access and working up for transplantation.

Note 3: At GFR < 15 ml/min, be vigilant for complications such as hypertension, fluid overload, electrolyte disturbances and malnutrition.

#### **4. When to initiate dialysis**

**Dialysis must be started when the GFR is ~6ml/min or when the GFR is less than 15 ml/min and the patient has one or more of the following:**

- a) Symptoms or signs of uraemia**
- b) Diuretic resistant fluid overload**
- c) Poorly controlled blood pressure**
- d) Evidence of malnutrition**

Note 1: Diabetics should be initiated on treatment earlier.

Note 2: K/DOQI guidelines recommend starting dialysis at GFR of ~10 ml/min or earlier if there are signs of malnutrition

Note 3: Costs and the inconvenience to patients should be weighed up against the theoretical benefit of improved prognosis

#### **5. Adequacy of dialysis**

##### **a) Dose**

**The dialysis team should routinely measure and monitor the delivered dose of haemodialysis (HD). The dialysis care team should deliver a prescribed HD dose per session:**

- Thrice-weekly schedule, a midweek Kt/V of at least 1.2 minimum and 1.3 optimal, and URR of 65%**
- Twice weekly schedule, a Kt/V of 1.8 and URR of 80%.**

Note 1: Patient survival has been shown to increase in association with increases in Kt/V up to 1.2

Note 2: Twice-weekly schedules are not recommended.

Note 3: Clinical signs and symptoms alone are not reliable indicators of haemodialysis adequacy.

*Technique*

**The delivered dose of haemodialysis should be measured using formal urea kinetic modeling (UKM), employing the single-pool, variable volume model (Kt/V), or at institutions where this is not possible, the urea reduction ratio (URR).**

Note 1: While URR is a practical measurement tool for epidemiological outcome studies, its relative inaccuracy and the incompleteness of the information it provides compromise its use as the sole measure of delivered dialysis doses in individual ESRD patients.

Note 2: URR can vary substantially as a function of fluid removal.

Note 3: Kt/V derived from the percent reduction of urea should not be used since values can be incorrect by approximately 20%.

*Frequency*

**The delivered dose of haemodialysis should be measured monthly or every three months at a minimum.**

Note 1: The frequency of measurement of the delivered dose should be increased when patients are non-compliant with their HD prescriptions or when frequent problems are noted in delivery of the prescribed dose of HD.

*Blood collection*

**To determine Kt/V, blood samples for urea measurement must be drawn at the same HD session, in a specified manner:**

- pre-dialysis urea samples should be drawn immediately prior to dialysis, using a technique that avoids dilution of the blood sample with saline or heparin;
- post-dialysis urea samples should be drawn using the Slow flow/Stop pump technique that prevents sample dilution with recirculated blood and minimises the confounding effects of urea rebound.

### **b) Membranes**

**Dialyser membranes causing the least complement and leukocyte activation should be used. Dialysers with potentially allergenic components should be avoided.**

Note 1: The most potent activation of the complement and leukocyte systems has been demonstrated with the so-called unmodified cellulose membranes, whereas this response is blunted with modified cellulose and synthetic membranes.

Note 2: Dialysers and tubing sterilised with ethylene oxide should be avoided in patients showing otherwise unexplained anaphylactoid reactions.

Note 3: The combination of dialysis with AN69 membranes and medical treatment with ACE-inhibitors should be avoided because of the possibility of severe haemodynamic reactions.

Note 4: Differences in thrombogenicity should be considered in the choice of the dialyser.

### **c) Anticoagulation**

**The use of anticoagulation during haemodialysis is mandatory to prevent clotting of the extracorporeal circuit.**

Note 1: Routine anticoagulation is performed with heparin that is administered at using a loading dose of 50IU/kg followed by 800-1500 IU per hour.

Note 2: The route of administration of heparin is intravenous boluses or continuous infusion.

Note 3: The efficacy of heparin therapy can be evaluated by measuring whole blood clotting time or activated partial thromboplastin time (APTT)

Note 4: The use of erythropoetin may increase heparin requirements

Note 5: Overdosing or active bleeding may be counteracted by protamine (1 mg for 100 IU heparin). Thrombocytopenia may be a problem with heparin.

### **d) Dialysate**

**Bicarbonate-based dialysis is the treatment of choice, but costs and lack of appropriate equipment may limit its use. Ideally all new equipment**

**should be bicarbonate-compatible and units should aim to phase in bicarbonate dialysis in time. Efforts to make bicarbonate dialysis affordable should be investigated.**

Note 1: Bicarbonate is technically more difficult to use – poor control of dialysate pH (high pH) will lead to precipitation of calcium and magnesium salts.

Note 2: Bicarbonate concentrate is more susceptible to bacterial growth because the concentrate is not bacteriostatic or bacteriocidal.

#### **e) Water treatment and purification**

**Contemporary haemodialysis requires the use of pure water complying at a minimum with the Association for the Advancement of Medical Instrumentation (AAMI) standards that takes into consideration both chemical and bacteriological purity:**

- Bacteria: <200CFU/ml
- Inorganic contaminants: Total solutes <20mg/ml and aluminium <10ppm
- Endotoxins: <10EU/ml
- Conductivity: <5uS

Note 1: Pure water is the basic form of treated water that is suitable for conventional haemodialysis modalities.

Note 2: Purified water is obtained from a purification system consisting of pre-treatment (softener, activated carbon, downsizing microfilters), and a reverse osmosis (RO) unit, implemented in series.

Note 3: Monitoring during the validation phase of a new system is weekly; monitoring during the surveillance and/or maintenance phase is quarterly.

Note 4: The microbiology of the water feeding dialysis machines should be monitored routinely. Monitoring during the validation phase of a new system is weekly; monitoring during the surveillance and/or maintenance phase is monthly.

Note 5: Regular and effective disinfection procedures are an integral part of the hygienic maintenance of the water treatment system (including RO and/or deioniser, and distribution loop) and should be performed at least once per month.

## **6. Reprocessing of dialysers**

**Economic constraints dictate the reuse of dialysers in the South African setting. Patients should be informed that reuse is being practiced.**

Note 1: Evidence suggests that haemodialyser performance and the delivered dose of dialysis may decline as a result of dialyser reuse.

Note 2: The patients with following should be excluded from re-use:

- sepsis;
- acute hepatitis;
- hepatitis B surface antigen-positive
- HIV

Note 3: Patients infected with hepatitis C may continue with re-use.

Note 4: Reprocessed dialysers must be used on the same patient; labelling must identify the patient and include pertinent information about the reprocessing procedure.

Note 5: Staff should be vigilant for any complications that could be due to reprocessed dialysers.

Note 6: During each reprocessing, the total cell volume (TCV) of reused dialysers should be monitored and those having a TCV <80% of original measured value should be discarded.

Note 7: Peracetic acid or heated citric acid should be preferred sterilants.

Note 8: Reuse water should have the same standards as dialysis water.

## **7. Patient well-being and health**

### **a) Nutrition**

#### **(i) General basic requirements**

- Energy 35Kcal/day
- Protein 1.2g/kg/day
- Lipids: American Heart Assoc. step 1 diet: < 30% total calories from fat and < 10% from saturated fat
- Phosphate, sodium, potassium according to patient needs and residual renal function
- Interdialytic weight gain < 5% of dry weight, but should not impede adequate nutrition
- Supplementation of water soluble vitamins

Note 1: Poverty may preclude the implementation of dietary modification. Assistance should be given to patients as far as possible.

Note 2: A dietician should be involved in the care of these patients and diet should be individualized as far as possible.

Note 3: Avoid purified carbohydrates as far as possible

#### **(ii) Basic monitoring:**

- Global clinical assessment, including assessment of average dry body weight at monthly visits.
- Follow-up patient interview and assessment of food intake by the dietician if needed
- Anthropometry or bioimpedance only if needed
- Laboratory tests (3-monthly at least, in stable patient):
  - Serum albumin, urea, creatinine, electrolytes including calcium and phosphate
  - Urinary nitrogen appearance (UNA), normalized protein equivalent of nitrogen appearance (nPNA) evaluation only if needed.

**b) Haemoglobin**

**Patients on chronic dialysis should ideally have haemoglobin levels of 11g/dl - 12g/dl. At least 75% of a cohort of patients should have haemoglobin levels of 11g/dl. No patient should have a haemoglobin level of less than 10g/dl.**

Note 1: If the haemoglobin is below 11g/dl:

- Exclude other causes of anemia that are not due to lack of erythropoietin (EPO) by:
  - Clinical assessment
  - Standard investigations (additional tests may be needed):
    - FBC
    - Reticulocyte count
    - Serum ferritin
    - Transferrin saturation
  
- If transferrin saturation < 20% and serum ferritin < 200ng/ml
  - Administer iv iron 20mg test dose, then 100mg/week x 8-10 weeks and re-assess iron stores
  - Maintenance (iv) iron is usually needed (100mg -200 mg /month)
  - Continue to monitor iron status regularly (once a month until target levels are stable for 2 months then 3 monthly) and maintain:
    - Transferrin saturation: 20-50%
    - Serum ferritin: 200-800ng/ml

Note 2: If the patient has sufficient iron stores, administer an ESA (erythrocyte stimulating agent).

- Use short or long acting ESAs according to label; monitor haemoglobin regularly until stable on target. Titrate the dose of EPO up or down by dose reduction or less frequent injection.
- If large doses of ESA are required, then evaluate for EPO resistance:
  - Inflammation
  - Hyperparathyroidism

- Trace metal (particularly aluminium) overload, check dialysis water quality and reasons for occult haemolysis
- Recheck for other causes of anaemia again

Note 3: The management of anaemia should not occur in isolation but should take into consideration factors such as the nutrition of the patient and the adequacy of dialysis

Note 4: Blood transfusions should be avoided as far as possible and should be reserved for symptomatic chronic anaemia unresponsive to EPO, for acute haemodynamic instability and in preparation for surgery that cannot safely be postponed. Written signed consent is required for each transfusion.

### **c) Clinical evaluation**

**Every patient on dialysis should have a full clinical evaluation performed by a doctor at least 3-monthly and the results recorded in his/her patient notes.**

Note 1: Particular attention should be paid to cardiovascular risk factors as cardiovascular disease is the main cause of mortality. Interventions aimed at reducing risks should be instituted including cessation of cigarette smoking, correcting dyslipidaemia, and optimizing blood pressure control.

Note 2: This patient contact session should also be used to detect any social problems, nutritional deficiencies and inform the patient of his/her suitability or otherwise for renal transplantation, and establish his/her readiness for transplantation.

### **d) Blood pressure**

**Target blood pressure for CVD risk reduction in CKD should be <130/80 mm Hg. Aim for pre-dialysis BP <140/90 and post dialysis BP <130/80.**

Note 1: Antihypertensive agents should, whenever possible, be prescribed as follows:

- Diuretics should be included in the antihypertensive regimen in most patients.

- Choose additional agents based on cardiovascular disease-specific indications to achieve therapeutic and preventive targets and to avoid side-effects and interactions.
- The antihypertensive regimen should be simplified as much as possible.
- Long-acting (once-daily agents) should be used when possible.

**e) Vascular access**

**An arteriovenous fistula (AVF) is the vascular access of choice in haemodialysis patients and should be fashioned timeously (when GFR < 25 ml/min) to ensure maturity (1-4 months) when required.**

Note 1: The order of placement of AVF is wrist and then elbow starting with the non-dominant arm. The advantages of AVF include: excellent patency once established, improved flow over time, and a lower incidence of stenosis, infection and vascular steal phenomenon.

Note 2: If it is not possible to establish a fistula, access may be established using:

- An arteriovenous graft of synthetic material (preferably PTFE) or
- A transposed brachial basilic vein fistula

Note 3: Cuffed tunneled central venous catheters should be discouraged as permanent vascular access.

Note 4: The initial cannulation of a native AVF must be performed by an experienced person.

Note 5: Patients with AVF must adopt good personal hygiene habits; clean technique should be used before cannulation of AVF. (EBPG)

Note 6: The placement of subclavian vein catheters for acute dialysis should be avoided as should venepuncture of antecubital fossa veins, in patients who are potential candidates for haemodialysis.

Note 5: The AVF should be monitored for adequacy of flow which should be in excess of 600 ml/min. AVF can be monitored by: (DOQI)

- Physical examination of an access graft should be performed **weekly** and should include, but not be limited to, inspection and

palpation for pulse and thrill at the arterial, mid, and venous sections of the graft.

- Prospective surveillance of AV grafts for haemodynamically significant stenosis, when combined with correction, improves patency and decreases the incidence of thrombosis.

Techniques, not mutually exclusive that can be used in surveillance for stenosis in AV grafts include, in order of decreasing preference:

- Intra-access flow
- Static venous dialysis pressure
- Dynamic venous pressures. In addition:
- Measurement of access recirculation using urea concentration
- Measurement of recirculation using dilution techniques
- Unexplained decreases in the measured amount of haemodialysis delivered (URR, Kt/V)
- Physical findings of persistent swelling of the arm, clotting of the graft, prolonged bleeding after needle withdrawal, or altered characteristics of pulse or thrill in a graft
- Elevated negative arterial pre-pump pressures that prevent increasing to acceptable blood flow
- Doppler ultrasound

Persistent abnormalities in any of these should be followed up with a venogram.

#### **f) Blood chemistry**

**Blood results should be checked on all patients on haemodialysis at least 3-monthly and the predialysis serum targets to be aimed for are as follows:**

- Potassium 3,0 - 5,5 mmol/l
- Phosphate 0.8 - 1.4 mmol/l
- Calcium 2,05 - 2,5 mmol/l
- iPTH <2 - 9 times normal

- Albumin >35g/l (minimum), optimal >40g/l
- All patients should have a complete lipid profile measured at the initiation of dialysis and then 6 monthly thereafter.

**g) Bone disease**

**Most patients on chronic dialysis have some form of renal osteodystrophy (only diagnosed on bone biopsy). However, secondary hyperparathyroidism and renal osteodystrophy occur very early in the course of CKD (stage 3 to 4).** Note 1: Types of renal osteodystrophy:

- **high turnover** – characterized by very high PTH and alkaline phosphatase levels and on X-ray changes of osteitis and cysts.
- **low turnover** – characterized by slightly elevated PTH levels and looser zones on X-ray.
- **adynamic bone disease** - characterized by the presence of normal or low PTH and normal or high serum calcium levels.

Note 2: Because of resource constraints - and lack of studies demonstrating outcome advantages - it is not possible to ensure adequate control of PTH secretion and the bone disease at the earlier stages of CKD. Wait until CKD stage 4 before instituting a management plan (this may also avoid overcorrection with the possible consequent development of adynamic bone disease). This management plan must include dietary advice, a phosphate binder and possibly the prescription of vitamin D3. The dietary advice must start before dialysis therapy (stage 5) and should be particularly focused on foods with high potassium and phosphorus content.

Note 3: Serum target levels in CKD stages 4 and 5 are:

- Phosphorus 0.8 - 1.4 mmol/l
- Calcium 2,05 - 2,5 mmol/l

Note 4: Allow the serum iPTH level to be approximately 2 - 9 x normal. Beware, however of the patient, with elevated or high-normal serum calcium, who has a rising iPTH level. Watch trends. Note 5: Serum alkaline phosphatase should be measured at the same time as the calcium and

inorganic phosphorus , to gauge osteoblast activation (not always accurate, but a reasonable indicator of bone turnover. One needs to follow trends in individual patients).

Note 6: Frequency of blood sampling 3- monthly. One may wish to take samples more frequently initially in order to judge response to calcium binding or vitamin D3 therapy.

Note 7:

Phosphate binders.

Use of calcium carbonate: the dose of calcium carbonate is generally 2 tabs to be taken just **before** meals. It may be reasonable to adjust the dose according to the phosphorus “load” in the meal (eg, 2,1,3).

Aluminium hydroxide, Fosrenol or Renagel should be used when:

- Serum phosphate AND calcium levels are high and rising.
- iPTH levels below target level (on 2 consecutive measurements).
- severe vascular calcification.

Note 8: The use of aluminium hydroxide should be in short bursts (1-2 weekly periods only) whilst every effort must be made to improve the patient’s dietary habits. Repeated use is to be discouraged to avoid aluminium toxicity.

Note 9: The reduction in the exposure to calcium on dialysis must be considered as part of the management of those who are not able to take calcium carbonate. The calcium concentration used in the dialysate (haemodialysis or peritoneal dialysis) must be the lowest available.

Note 10: Vitamin D3 should be prescribed under the following conditions:

- target phosphorus level achieved but calcium low or low normal range
- iPTH higher than target (and calcium low or low-to-middle-of - normal range).
- the dose is dependent on the response expected and urgency of the clinical condition.
- Vitamin D3 can be given 3 times a week (timed with dialysis) or a weekend skip program – also dependent on urgency of clinical condition.

Note 11: Parathyroidectomy must be considered when the iPTH is higher than target and it has failed to respond to phosphate lowering, vitamin D3 and calcimimetics.

Note 12: **Cautionary:** Adynamic bone disease is a potential complication of all measures that oversuppress iPTH (including aggressive use of vitamin D, chronic positive calcium balance, or following parathyroidectomy).

#### **h) Rehabilitation and emotional support**

**The emotional and social/economic support of patients is integral to the holistic approach of the care given to patients on dialysis. In order to provide this care it is recommended that:**

- Each Renal Unit has access to a social worker.
- All patients on dialysis should be seen by the Social Worker prior to being commenced on dialysis as well as thereafter to provide ongoing support and education regarding diagnosis, choice of treatment and nature of treatment.
- Each patient to be assessed prior to dialysis to gauge their emotional, economic and social coping skills so that appropriate intervention can be given.
- Patients and family members and significant others meet with the social worker to discuss treatment and gauge family dynamics and support structures.
- Patients with emotional and psychological issues should be referred for appropriate assistance.
- Group discussion should be held if possible with patients.
- Patients should be encouraged to return to work wherever possible and the social worker should negotiate with employer for patients to maintain employment.

#### **i) Transplant work-up**

**Kidney transplantation is the treatment of choice for end-stage renal disease. Pre-transplant assessment should be carried out before the**

**patient is entered on the transplant waiting list. The assessment serves to evaluate and prepare a patient for transplantation.**

- *Clinical examination* (Include urinalysis, breast, testes and prostate)
- *Haematology*: FBC, INR, PTT.
- *Biochemistry*: Renal function, calcium, phosphate, albumin, liver function tests.
- *Serology*: - HIV, Hepatitis B & C, VDRL/RPR and cytomegalovirus status.
- *Radiology*: Chest X-ray,
- *Tissue immunology*: HLA typing and PRA. Blood for cross-matching needs to be done monthly
- *Miscellaneous*: ECG. Any other appropriate tests that may be indicated in a specific case.

Note 1: The following are accepted contraindications to transplantation:

- HIV infection. (HAART may change this)
- Untreated current infection
- Active malignancy with short life expectancy
- Chronic illness with life expectancy of less than one year
- Poorly controlled psychosis
- Active substance abuse

Note 2: The following conditions will need careful pre-transplant assessment and may require prior therapy or may be regarded as a contraindication for a particular patient.

- Active infection
- Coronary heart disease
- Active hepatitis
- Active peptic ulcer disease
- Cerebrovascular disease
- Proven habitual medical non-compliance

Note 3: Advanced age, prior transplantation, and renal diagnosis are

**not** contraindications to transplantation, except in special circumstances.

## **8. Infection control measures in HD units**

**To reduce the susceptibility to infection, optimal adequacy of HD should be attained, malnutrition should be prevented or treated, optimum haemoglobin concentration should be maintained, iron overload should be avoided and a dialysis membrane with the lowest degree of complement and leukocyte activation should be used.**

### **a) Preventing bacterial infections and antimicrobial resistance**

Note 1: Diagnose and treat infections effectively. Prevention of antimicrobial-resistant bacterial infections depends in part on the avoidance of unnecessary antimicrobial use and the selection of optimal antimicrobial therapy.

Note 2: Elimination of nasal *Staph. aureus* carriage and reduce haemodialysis catheter use.

Note 3: The numerous contacts between staff members and patients in the dialysis unit provide the opportunity for transmission of these pathogens from patient to patient. Universal precautions for prevention of transmission should be rigorously respected in all HD units:

- cleaning and disinfecting of instruments, machines and environmental surfaces after each treatment;
- avoidance of sharing articles among patients;
- frequent hand washing and use of disposable gloves;

Note 4: When designing a haemodialysis unit, the key principles of adequate space, traffic flow from clean to dirty, and a functional design appropriate to the patient population must be taken into account. Key areas to which attention must be paid include the following:

- patient care rooms/area
- space availability
- storage
- isolation rooms

- soiled utility rooms
- dedicated hand-washing sinks
- reprocessing rooms
- invasive procedure rooms
- plumbing

Note 5: Vaccinate patients annually against influenza

Note 6: A high index of suspicion for tuberculosis must be maintained in all patients on treatment in South Africa.

**b) Prevention and management of HBV, HCV and HIV in HD patients**

Note 1: *Hepatitis B Virus:*

- Screening for HBV markers should be performed in all patients starting HD or transferring from another unit whether they received anti-HBV vaccination or not.
- Screening should be repeated every 3 months on HD.
- Dialysed HBs Ag-positive patients should be treated in separate rooms with dedicated machines.
- Patients with progressive chronic renal failure should be vaccinated against HBV preferably before they start on HD.
- HD patients not immune to HBV should be vaccinated.
- Anti-HB antibody testing is recommended 1-2 months after the primary series has been completed and 6-12 months thereafter. If antibody titre levels are not adequate, a booster vaccination should be administered
- Active immunisation against HBV should be undertaken in all HD staff members and thereafter according to a set schedule.

Note 2: *Hepatitis C Virus*

- Screening for HCV antibodies should be performed in all patients starting HD or transferring from another unit. A positive test should be confirmed with a hepatitis C PCR (false positive antibody tests do occur)
- Screening should be repeated at least every 6 months once on HD.
- HCV patients need not be treated separately but universal precautions must be employed throughout the unit

Note 3: *HIV infection*

- Screening for HIV infection should be done in all patients starting HD and annually thereafter as well as when transferring from another unit after getting informed consent.
- Only the usual body fluid precautions attendant to routine dialysis, need be followed, and no special dialysis machine be set aside.
- A combination of AZT, lamivudine, and a protease inhibitor should be recommended for HD staff members accidentally exposed to HIV.

## **9. Peritoneal dialysis**

### **a) Suitable candidates**

**Peritoneal dialysis has several advantages over haemodialysis and should be considered very seriously in certain patients who may benefit from it because of its convenience, lack of need for vascular access, cardiovascular-friendliness, gentleness and flexibility. It may allow patients to continue working and is somewhat less disruptive of their lives than haemodialysis. However, not all patients are suitable for**

#### **CAPD:**

- The patient should be physically capable of doing bag changes for continuous ambulatory peritoneal dialysis (CAPD), particularly as pertains to visual acuity and limb dexterity.

- The patient should be psychologically able to perform repetitive bag changes per sterile protocol for CAPD
- Patients must agree to the therapy and be educated about other options, bearing in mind limited resource availability in the state sector
- A minimum requirement for peritoneal dialysis should be storage space for dialysate and adequate hand washing facilities.
- Ideally the patient should have had no significant abdominal surgery.
- The abdominal musculature should be reasonable, i.e, exclude those with significant obesity and/or hernias.

#### **b) Initiating Peritoneal Dialysis**

- It is advised to initiate CAPD when GFR is ~10 ml/min.
- It is possible to delay dialysis in the above circumstances when the patient has no symptoms of uraemia, oedema-free weight is stable and albumin level is not decreasing.
- Peritoneal equilibration testing (PET) is a useful tool and should be performed soon after initiation of PD. Adjustments to the dialysis prescription can be made based on transporter status.
- Various strategies are available for initiation of PD depending on urgency of need for dialysis and availability of temporary haemodialysis during 'breaking in' period.

#### **c) Forms of Chronic Peritoneal Dialysis**

- In most state institutions in South Africa, only CAPD will be available.
- Should the patient be medically insured or able to afford APD cycled bag exchanges overnight is the ideal.
- As noted above knowledge of transporter status is useful in individualizing prescriptions.
- Residual renal function must also be formally assessed and preserved at all costs.

**d) Dose Recommendation**

- The total dose of delivered dialysis to be aimed for is weekly  $Kt/V_{\text{urea}}$  of at least 2.0 or creatinine clearance ( $C_{\text{Cr}}$ ) of 70l/week/1.73 m<sup>2</sup>. This includes the clearance delivered by residual renal function.

**e) Frequency of Delivered Dose Measurement (DOQI)**

- Assess  $Kt/V$  2 to 3 times in the first 6 months after initiating dialysis (including one measurement 2 weeks after dialysis begins).
- Thereafter dose, measurements should be made 4 monthly unless there are changes in clinical status or prescription.

**f) Indications for Switching from PD to HD**

**The decision to transfer a PD patient to HD should be based on clinical assessment. Indications for switching from PD to HD include:**

- Consistent failure to achieve target  $Kt/V_{\text{urea}}/C_{\text{Cr}}$  when there are no medical, technical, or psycho-social contraindications to HD.
- Inadequate solute transport or fluid removal.
- Unacceptably frequent peritonitis, persistent peritonitis or other PD-related complications.
- Development of technical/mechanical problems.
- Severe malnutrition resistant to aggressive management (relative).
- Unmanageably severe hypertriglyceridemia.

**g) Nutrition: General basic requirements (K/DOQI)**

- Energy 35Kcal/day
- Protein 1.2g/kg/day
- Lipids: American Heart Assoc. step 1 diet: < 30% total calories from fat and < 10% from saturated fat
- Supplementation of water soluble vitamins

Note 1: Nutritional status of adult CAPD patients should be assessed on an ongoing basis in association with  $Kt/V_{\text{urea}}$  and  $C_{\text{Cr}}$  measurements using the PNA and SGA.

## **10. Auditing**

Until a formal structure to audit dialysis in the country is established, it is recommended that all units perform a self-audit annually. In the future all data should be captured on a National Registry of Dialysis (preferably controlled by the same structure that will be responsible for the National Organ Transplant Registry) and the compliance of units with the National Guidelines will be monitored.

## **11. Supervision of dialysis units**

Legislation that is currently being drafted will make it illegal for any unit to operate unless it is under the supervision of a nephrologist. In the event of a nephrologist not being available then a physician approved by the South African Renal Society and ratified by Department of Health will be allowed to supervise.

## **12. Staffing of chronic dialysis units**

Medical staff should be readily available to attend to any emergencies. The overall care of patients on dialysis should be under the supervision of a nephrologist. The responsibilities of the nephrologist will be:

- Regular examinations as prescribed above
- Reviewing of relevant laboratory results
- Ensuring adequate quality of treatment
- Informing patients of treatment options including CAPD and kidney transplantation
- Preparing patients for renal transplantation
- Ensure a safe, secure working environment
- Motivating staff and preventing burnout
- Remain informed of new developments

Other staff: The staff to patient ratio for chronic dialysis should be 1:4 (including nurses and clinical technologists). A registered nurse with experience in haemodialysis should be present in the dialysis unit at all times. The responsibilities of the nurses and technologists will be:

*SARS Chronic Dialysis Guidelines*

- Provide and maintain an efficient dialysis service
- Respect the privacy and confidentiality of patients
- Inform physicians promptly of any problems detected
- Treat all patients with dignity and respect
- Create a pleasant and nurturing environment
- Maintain and care for expensive equipment

**Summary Practice Guidelines**

<b>Component</b>	<b>Recommendations</b>
How to measure GFR	Use abbreviated MDRD formula
When to refer to nephrologist	GFR < 60 ml/min
AV Fistula	To be fashioned when GFR 25ml/min
When to start HD	GFR ~ 6 ml/min or if symptomatic
Adequacy of HD	Kt/V > 1.2; URR > 65%
Anaemia	Target Hb: 11g/dl
Indications for IV Fe replenishment	If transferrin saturation < 20% and serum ferritin < 200ng/ml
Erythropoietin	Dose: 25u/kg 3x/week subcutaneously
Routine clinical and biochemical evaluation (minimum)	3-monthly
Blood pressure target	< 130/80
Bone disease	Maintain Pi < 1.4 and Ca 2.05-2.50
When to start CAPD	GFR ~ 10 ml/min or if symptomatic
Dose of CAPD	weekly Kt/V of at least 2.0 or creatinine clearance of 70l/1.73 m <sup>2</sup> .

**The abbreviated MDRD equation:**

$$eGFR = 186 \times ([SCR/88.4]^{-1.154}) \times (age)^{-0.203} \times (0.742 \text{ if female}) \times (1.210 \text{ if African-American})$$

**The modified Cockcroft-Gault equation:**

$$eGFR = [140 - age \times weight] / SCR \quad (x0.85 \text{ if female})$$

where eGFR = estimated glomerular filtration rate (mL/min/1.73m<sup>2</sup>),

SCR = serum creatinine concentration (µmol/L), weight in kilograms and age is expressed in years.

An automated calculator for eGFR can be found on-line at:

<http://www.kidney.org/professionals/kdoqi/gfr.cfm>.

**HAEMODIALYSIS QUALITY INITIATIVES ANNUAL REPORT**

Unit:

Region:

Period:

<b>HUMAN RESOURCE</b>		
Supervising Nephrologist/s:		
Sisters in charge:		
Number of dialysis stations:		
Number of chronic patients:		
Staff to patient ratio:		
No. on 3 sessions/week:		
No. on 2 sessions/week :		
<b>HAEMODIALYSIS ADEQUACY</b>		
*Kt/v 3x /week		
*URR 3x / week		
*Kt/v 2x/week		
*URR 2x/week		
Reuse	Yes	No
Vascular access (number)	AV Fistula: Grafts:	Catheters:
Water assessment report		
Bicarbonate Dialysis (% of sessions)		
<b>CAPD</b>		
Total no. of patients on CAPD		
No. with Kt/V $\geq$ 2.0		
<b>ANAEMIA MANAGEMENT</b>		
Number on erythropoietin		
Number on IV Iron		
*HB		
*TSAT		
<b>BIOCHEMISTRY</b>		Lab Range
*Albumin		
*Phosphate		
*Calcium		
*PTH		
<b>VIROLOGY</b>		
Hepatitis B screenings (3monthly)		
Facility for Chronic HBVpatients	Yes	No
<b>TRANSPLANTATION</b>		
Number on waiting list		
Number of transplants		

\*Annual audit: Mean of four 3 monthly measurements