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Assessment of Peritoneal Dialysis Adequacy – Does it Impact on Patient Outcomes?

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ABSTRACT

The provision of adequate dialysis is important for the survival of Peritoneal Dialysis (PD) patients. Small solute clearance indices of urea and creatinine are widely used as markers of PD adequacy although several other factors are also known to affect optimal outcome in PD patients. Recently there is continued debate on the interpretation and precise prognostic value of small solute clearance in PD patients despite issuance of clinical practice guidelines and recommendations based on the solute clearance indices. We reviewed available literature on solute clearance indices in the assessment of PD adequacy and its association with patient outcome. Electronic data base such as the EMBASE, MEDLINE, OVID and Google internet search engines were used for the search as well as relevant textbooks. Several prospective cohort studies have been published on the effects of small solute clearance and other factors on mortality, morbidity and quality of life of PD patients. There are also some prospective controlled studies that used multivariate analysis to assess the relationship between solute clearance and other variables on patient outcomes. Randomised controlled studies however found that greater clearances did not lead to improved patient survival. Despite the continued debate on the interpretation and precise prognostic value of small solute clearance in PD patients, dialysis recommendations based on the solute clearance have gained acceptance in clinical practice and a target dose of PD was recommended by National International organisations.

INTRODUCTION

Adequate dialysis is defined as the dose of dialysis associated with acceptable morbidity and mortality, while optimum dialysis is defined as the level beyond which the added clinical benefit is not worth the additional patient effort or cost. [1] In the early days of dialysis, assessing adequacy was usually based on the clinical acumen of the physician to pick up signs and symptoms of inadequate dialysis such as nausea and vomiting together with laboratory parameters such as blood urea, creatinine and haematocrit levels. However, while the symptoms and signs are still relevant in this context, they have recognised limitations. First, their quantitative assessment is virtually impossible, secondly other causes of these symptoms and signs must be excluded and thirdly their appearance is usually late hence the opportunity for early detection of inadequate dialysis is usually missed.

Arkouche et al [2] showed that qualitative approach to assessing dialysis adequacy is not sufficient to predict the deleterious effects of under-

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dialysis. There is therefore the need for objective, quantifiable parameters to assess adequacy and early detection of under dialysis before the appearance of symptoms and signs. This would allow for comparison with other patient populations and correlation between the dialysis dose and clinical outcomes to be made.

Small solute clearance indices of urea and creatinine are widely used as markers of peritoneal dialysis (PD) adequacy. However several other factors are also known to affect patient outcome in dialysis patients. These include ultrafiltration, nutritional status, anaemia correction, mineral metabolism, control of lipids and other cardiovascular risk factors as well as acid base homeostasis.

For example, attention has recently been focused on the effect of ultrafiltration as a marker of PD adequacy and studies have shown that fluid removal is an independent factor affecting survival in PD patients.[3]

Urea Kinetic Modeling in Assessment of Peritoneal Dialysis Adequacy

Results of the National Cooperative Dialysis Study (NCDS) and its re-analysis by Gotch and Sargent provided objective parameters for measuring adequacy of dialysis in haemodialysis (HD) patients.[4,5] They showed that indices derived from Urea Kinetic Modeling (UKM) were predictive of clinical outcome. Similarly, the study by Dyck et al of Mayo clinic and more recently the HEMO study attests to the significance of UKM in HD.[6,7] This UKM is a dimensionless measure of fractional clearance of body water for urea. It integrated efficiency of solute clearance (K), treatment time (t) and patient size (V) expressed as Kt/V. It has been validated and accepted as an index of adequacy in HD patients for many years. Attempts were made to extrapolate these same concepts in the assessment of PD patients. Teehan et al [8] were the first to show that measurement of blood urea nitrogen (BUN), normalized protein equivalent of nitrogen appearance (nPNA) and Kt/V provided a rational basis for uniform prescription of PD and allowed comparison between treatment centres as well as optimisation of dialysis and nutrition therapy. Reproducibility of the UKM in PD patients was also reported by Rodby et al.[9] The peak urea concentration hypothesis was later described by Keshaviah et al, [10] who found that a weekly Kt/V of 1.67 in CAPD was equivalent to a three times per week Kt/V of 0.86 for HD and for a three times per week HD Kt/V of 1.3, with the corresponding equivalent weekly Kt/V of 2.0 for CAPD.

Several assumptions were made when applying UKM to PD; the rate of solute removal changes during dialysis in HD patients because the concentration of urea decreases during dialysis while in CAPD, clearance and solute removal stay about the same and are related in a linear fashion because the blood urea concentration is relatively constant. Urea achieves equilibration between dialysate and plasma at the end of the exchange in most CAPD patients, thus drain volume is analogous to urea removal (Kt).

Measurement of Kt/V in CAPD patients involves the measurement of both the renal and peritoneal urea clearances through the determination of the serum urea as well as the 24 h dialysate and urinary urea concentrations. Peritoneal Kt is calculated as the concentration of urea in the 24 hour dialysate sample divided by the serum urea concentration, while the renal Kt is calculated as the 24 hour urinary urea concentration divided by the serum urea concentration. The total Kt is normalized to total body water (V) which is obtained by using the Watson formula[11] which is based on the age, sex, height and weight of the patient. The value obtained is multiplied by 7 to give the weekly Kt/V.

There are versions of the Watson equation one of which is

Men V = 2.447 – 0.09516*age (years) + 0.1074*height (cm) + 0.3362*weight (kg)

Women V = -2.097 + 0.1069*height (cm) + 0.2466*weight (kg)

Normograms have been prepared from these equations as well as computer based calculators.

The urea distribution volume (V) can also be estimated using a fixed percentage of body weight (60 percent of lean body weight in men, 55 percent in women). There are other equation based calculations for the determination of V such as the Hume formula and the Mellits- Cheek formula which is mostly used in children. [12]

The estimation of V has a great impact on the Kt/V equation and it can be inaccurate in some individual patients.[13] Overestimation of V could occur in obese patients while underestimation occurs in underweight patients. These inaccuracies must be taken into consideration when Kt/V targets are interpreted. To overcome these inaccuracies, most

investigators now consider the calculation of V based on the Watson formula as the method of choice rather than estimation as a fixed fraction of body weight. [13]

Creatinine Clearance in the Assessment of Peritoneal Dialysis Adequacy

Creatinine clearance (CrCl) is used less often than UKM as an estimate of PD adequacy. National and international guidelines from the United States, Canada, Europe and the international society for peritoneal dialysis (ISPD) no longer recommend the use of CrCl as the surrogate measure of dialysis adequacy.[13,14,15,16] The exception is in patients on automated PD with low peritoneal solute permeability. In these patients, creatinine clearance will be more representative of the clearance of uraemic toxins. [17] Although it is acknowledged that monitoring the 24 hour dialysate and urine creatinine removal may be relevant because it is an estimation of muscle mass and may reflect phosphate clearance in these patients, certain limitations are known to be associated with CrCl, for example glucose interferes with the biochemical methods for the estimation of creatinine in the dialysate solution. There is controversy regarding the correct method for estimating residual glomerular filtration rate (GFR), though it is now recommended that the average of urea and creatinine clearances should be used.[18] Estimates of CrCl are usually normalised by body surface area (BSA). Creatinine clearance is expressed per 1.73m^2 body surface area and it has been suggested that the systematic error reported for V derived from anthropometric formulae would also apply to BSA derived in a similar manner.[19]

Peritoneal clearance is obtained by dividing the creatinine concentration in the 24hour dialysate (after being corrected for the interference of glucose in the measurement) by the serum creatinine concentration. The renal component is calculated as the average of urea clearance and creatinine clearance in the 24 hour urine. The value of the total clearance is corrected for 1.73m^2 body surface area (BSA) and then multiplied by 7 to get the weekly CrCl. The BSA is normally obtained using the formula of Du Bios which is given as.[20] $A = W^{0.425} \times H^{0.725} \times C$. where A is the surface area in square centimeters; H is the height in centimeters, W the weight in kilograms and C the constant, 71.84.

A chart has been plotted from this formula as well as computer based calculators so that the approximate surface area may be determined at a glance.

Solute Clearance and Patient Outcomes in Peritoneal Dialysis

Several prospective cohort studies have been published on the effects of small solute clearance and other factors on mortality, morbidity and quality of life of PD patients. Blake et al[21] reported a small increase in the probability of death for those with a weekly Kt/V <1.5 among 76 CAPD patients in Canada. Teehan et al[22] reported an increased survival in those with a weekly Kt/V value >1.89. De Alvaro[23] after following 102 CAPD patients for 12 months in a multicentre study in Spain reported that survivors had an average Kt/V of 2.0 compared to 1.7 for those who died. Lameire et al[24] reported a mean Kt/V of 1.89 in 16 patients who had survived 5 years on CAPD. Brandes et al[25] found that good clinical outcomes were associated with a mean weekly Kt/V value of 2.3 compared to 1.5 for poor clinical outcomes. Lo et al[26] in a study of 150 anuric PD patients, showed that Kt/V less than 1.7 was associated with greater mortality. In another prospective observational study on anuric patients in the Netherlands Cooperative Study on the Adequacy of Dialysis (NECOSAD), peritoneal Kt/V below 1.5 and creatinine clearance below 40 L/week/1.73 m^2 were associated with increased mortality. [27]

There are also some prospective controlled studies that used multivariate analysis to assess the relationship between solute clearance and other variables on patient outcomes. Maiorca et al[28] in an Italian study of 68 patients on PD reported that Kt/V less than 1.7, old age, peripheral vascular disease, dyslipidaemia, arrhythmia and initial low albumin were associated with poor outcome. Genestier et al[29] in a study of 201 patients found that lower Kt/V, cardiovascular disease, older age and diabetes were associated with worse survival.

The CANUSA study[30] was a large multicenter prospective study, performed among 680 incident CAPD patients in Canada and the USA with a mean follow up of 1.2 years per patient. The result showed a 6% reduction in the relative mortality risk for every 0.1 increase in Kt/V urea per week and 7% reduction for every 5 l/week/1.73m2 increase in creatinine clearance; also, a Kt/V urea of 2.1 and a weekly creatinine clearance of 70 L/1.73 m^2 body surface area were both associated with a 78%

expected two year survival rate.[30] However in a re-analysis of the CANUSA Study, it was found that residual kidney function had confounded the previous analysis and its interpretation; residual kidney function and not dialysate clearance was associated with improved survival.[31]

Randomised controlled studies however found that greater clearances did not lead to improved patient survival. In the Adequacy of PD in Mexico (ADEMEX) study involving 965 patients, randomly assigned to continue their usual prescription (4 exchanges of 2L) versus a more aggressive dialysis prescription to reach a CrCl greater than 60 L/wk/ 1.73 m^2, survival was found to be the same in both groups. [32] A subsequent randomised controlled trial from Hong Kong showed no difference in survival among three groups of CAPD patients with total Kt/ V of 1.5 to 1.7, 1.7 to 2.0, and greater than 2.0 with minimal residual kidney function. However, patients with a Kt/V <1.7/week had more clinical problems, and higher erythropoietin requirements.[33]

Solute Clearance Targets

There was an evolution of guidelines by various national and international organisations on the target dose of PD based on solute clearance parameters. The National Kidney Foundation (NKF) through the Kidney Disease Outcome Quality Initiative (KDOQI) issued the first guideline on the target dose of PD in 1997 which was revised in 2000, recommending a Kt/V greater than 2.0 and creatinine clearance (CrCl) greater than 60 L/wk/1.73 m2 based largely on the data derived from the CANUSA study[30] as well as the Italian study. [28] The guidelines were later revised in 2006 after the release of data from the ADEMEX and Hong Kong studies, [32, 33] the findings of which supported the recommendation of lower weekly solute clearances. The current recommendation of the K/ DOQI is a minimum Kt/V of 1.7 in anuric patients and eliminated CrCl as a target.[13] This is similar to those recommended by the European Best Practice Guidelines (EBPG), even though the EBPG added a minimum peritoneal target for net ultrafiltration in anuric patients to be 1.0 liter/day.[14] The ISPD has also recommended that the total (renal + peritoneal) Kt/V urea should not be less than 1.7 at any time.[16]

Creatinine Clearance or Kt/V

There are no data to suggest that one index is better than the other. For most patients, total weekly Kt/V and CrCl are highly correlated.[34] However, up to 20% of patients will reach target with one adequacy measure, but not the other.[35] The reasons for these discrepancies are multifactorial, and include the degree of residual renal function present and its relative contribution to total Kt/V or CrCl. The latter is much more dependent on residual renal function. Another factor is the difference in peritoneal transport characteristics and the influence of patient size on normalization for V and also the BSA.[1] With the current guidelines, these arguments need not arise as most of them do not include the creatinine clearance measurement as a surrogate measure for PD adequacy.

CONCLUSION

Despite the continued debate on the interpretation and precise prognostic value of small solute clearance in PD patients, dialysis recommendations based on Kt/V have gained acceptance in clinical practice with the issuance of practice guidelines by national and international organisations on the target dose of PD based on the Kt/V value achieved.

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Overcoming Challenges of Glycaemic Management in Diabetic Patients with Kidney Disease

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ABSTRACT

A common occurrence encountered in clinical practice is the patient with hyperglycaemia and chronic kidney disease (CKD). Many times there are challenges with achieving and/or maintaining stable glycaemic control with patients' blood glucose swinging from hyperglycaemia to hypoglycaemia. There is alteration in glucose homeostasis in patients with worsening kidney disease due to decreased renal and hepatic clearance of insulin, decreased renal gluconeogenesis, poor dietary intake, increased half-life of insulin, loss of body weight and fat mass, decreased levels of cathecolamines, effects of dialysis and presence of other co-morbidities. HbA1c in spite of some limitations is still regarded as a good long-term measure of glycaemic control in patients with progressive renal failure, especially in well dialysed subjects. Although not finally settled, a HbA1c target between 7-8% (or fasting blood glucose of 120-140 mg/dl) would be appropriate during treatment. Insulin is the most commonly used anti-hyperglycaemic drug once renal failure has set in. This is probably because the drug does not have deleterious effect on the kidney per se, and it is easier to titrate for stabilization or withheld if hypoglycaemia occurs. Treatment should be individualized in every case based on such factors like age of the patient, duration of diabetes, stage of kidney disease and whether on renal replacement therapy (RRT) or the type of RRT. Among the non-insulin drugs, extreme caution is indicated in the use of metformin because of its potential to cause lactic acidosis. Most of these drugs require dose adjustment in the context of advancing renal failure. As far as glycaemic management is concerned low protein diet still has a beneficial effect in diabetic patients with renal failure.

INTRODUCTION

A common occurrence encountered in clinical practice is the patient with hyperglycaemia and chronic kidney disease (CKD). The kidney condition may have resulted from diabetes or from other aetiology. Indeed diabetes is now the leading cause of End Stage Renal Disease (ESRD) in industrialized countries[1]. Diabetes is also now a leading cause of CKD in Nigeria[2]. Many reports indicate higher co-morbidity and poorer outcomes among diabetic patients undergoing dialysis compared with non-diabetics [3,4]. In the US, approximately two-thirds of patients die within 5 years of initiating dialysis[5]. The mortality rate is even higher in low-resource countries like Nigeria because very few are able to afford regular dialysis. Many times there are challenges with achieving and/or maintaining good glycaemic control. It is not uncommon for a patient's metabolic state to swing between hperglycaemia and hypoglycaemia. Both metabolic states can be injurious to the well-being of these patients. The objective of this review is to highlight the various challenges encountered in managing patients with both diabetes and CKD particularly in resource-poor countries like ours, and suggest ways in which they can be overcome.

Importance of good glycaemic control

Large scale randomised intervention trials have demonstrated that good glycaemic control prevents

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the development of microvascular complications such as retinopathy, peripheral neuropathy and nephropathy in diabetic patients [6, 7]. In the UKPDS (United Kingdom Prospective Study), more intensive glycaemic control resulted in a 33% reduction of microalbuminuria and clinical grade nephropathy at 12 years[8]. Duration of diabetes and levels of HbA1c were the only significant risk factors for nephropathy and retinopathy in 269 Swedish type 1 diabetic patients[9]. Optimal glucose control also slows down the rate of progression of these complications once they have set in. Evidence showed that maximal benefits of good glycaemic control are seen in those with microalbuminuria compared with macroalbuminuria[8]. Indeed once overt or clinical proteinuria has set in, improved glycaemic control may not be beneficial.

Altered glucose homeostasis in patients with diabetes mellitus and CKD

In these patients, glucose levels can be at any of end of the spectrum- hyperglycaemia or hypoglycaemia. Abnormal glucose tolerance and fasting hyperglycaemia has been observed in patients with progressive kidney disease, particularly those receiving haemodialysis, even in the absence of pre-existing diabetes[10]. On the other hand many patients with established diabetes and advancing CKD have a reduced insulin requirement and frequently suffer hypoglycaemia during course of renal disease[11-12]. There are many reasons for these alterations in glucose homeostasis in patients with worsening kidney disease. This include decreased renal and hepatic clearance of insulin, decreased renal gluconeogenesis, poor dietary intake, increased half-life of insulin, loss of body weight and fat mass, decreased levels of cathecolamines, effects of dialysis- both haemodialysis and peritoneal dialysis treatment and presence of other co-morbid conditions[13]. The effects of the diminished insulin resistance is somewhat mitigated by a concomitant decrease in insulin secretion, probably due to hyperparathyroidism and activated Vitamin D deficiency[14-15].

What glycaemic targets should be aimed at in patients with diabetes mellitus?

Krolewski and co-workers in a study among patients with type 1 reported that increasing microalbuminuria was noticed from HbA1c of 8.1% upwards[16]. The DCCT landmark study however indicated a continuous reduction in the risk of diabetic nephropathy as the HbA1c levels fell[17]. The number of subjects with hypoglycaemia however increased in the DCCT study the stricter the HbA1c target aimed at. The American Diabetes Association and the American Association of Clinical Endocrinologists recommended <7% and <6.5% respectively as HbA1c targets in their guidelines. The ADA in particular advised a less strict HbA1c target for patients with reduced life expectancy[18]. Recently the ACCORD (Action to Control Cardiovascular Risk in Diabetes) Trial researchers in a study designed to test the hypothesis that diabetic patients with additional cardiovascular risk factors who underwent intensive glucose treatment had less cardiovascular end-points, reported increased mortality in patients with intensive arm[19]. Bearing in mind that many diabetic patients with chronic kidney disease fit this description, it is reasonable to be cautious in setting glycaemic targets for these patients. HbA1c target between 7-8% are considered acceptable for patients with diabetes mellitus on chronic dialysis. Where facilities are not available for HbA1c testing like in our environment, the fasting blood glucose, ranging between 120-140 can reasonably be used as a corresponding guide.

Definition and stages of CKD

Kidney disease is said to be present when there is either structural damage to the kidneys as shown by e.g. albuminuria, or GFR is d"60mls/min/1.73m^2. Accordingly, 5 stages of CKD are clearly defined (see table1)[20]. In stages 1 and 2 where the GFR is greater than 60mls/min/1.73m^2, there is usually little alteration in the glucose homeostasis. In diabetic patients who also have CKD with stages 3-5 (GFR is <60mls/min/1.73m^2) there is increased risk of

Table 1: Definition and stages of kidney disease

Stage	Definition
Stage 1	Normal GFR (greater than 90 mL/min per 1.73 m2) and persistent albuminuria
Stage 2	GFR between 60 to 89 mL/min per 1.73 m2 and persistent albuminuria
Stage 3	GFR between 30 and 59 mL/min per 1.73 m2
Stage 4	GFR between 15 and 29 mL/min per 1.73 m2
Stage 5	GFR of less than 15 mL/min per 1.73 m2 or end-stage renal disease

hypoglycaemia or worsening hyperglycaemia. This is due to alterations in glucose metabolism and pharmacokinetics of anti-diabetic agents. Glycaemic monitoring and stabilization can be quite challenging for patients in these stages.

Monitoring glycaemia in CKD patients with diabetes

Monitoring diabetic patients with progressive CKD poses significant challenges. Haemoglobin A1c is widely accepted as the best measure of long-term glycaemic control in patients with diabetes. During their lifespan of about 120 days, the haemoglobin chain in the red blood cells is exposed to carbohydrate molecules in the blood. There is progressive adduction of glucose to HbA the degree of which corresponds to the level of glucose concentration in the blood. Among the minor fractions of HbA1, i.e. a, b and c, HbA1c is the largest fraction and also demonstrate consistently the ambient concentration of glucose milieu. Thus a standard measure of HbA1c could be used to assess level of glycaemic control over a period of 2-3 months. As a result of sustained effort at standardizing assays of HbA1c, recently, the test is now recommended not only for monitoring but also for diagnosis of diabetes[21-22]. However the use of HbA1c in diabetic patients with CKD is confounded by formation of carbamylated haemoglobin, metabolic acidosis and other possible factors (see table 2)[23-24].

Table 2: Haemoglobin A1c confounders in CKD patients with diabetes

1. Carbamylation of haemoglobin
2. Metabolic acidosis
3. Frequent blood transfusion
4. Shortened erythrocytes lifespan
5. Erythropoietin-induced accelerated erythropoiesis

These limitations notwithstanding, HbA1c is still considered as a good long-term measure of glycaemic control in patients with progressive renal failure, especially in well dialysed subjects[25-26]. The problem in Nigeria like many other countries of Africa is that HbA1c is not available in most health care facilities. Since the relationship between HbA1c and prevalent retinopathy (a microvascular complication of diabetes like nephropathy) is similar to that of plasma glucose, fasting and 2-hour plasma glucose can still be reasonably used as a measure of monitoring in these patients[27].

Other alternative markers of long-term monitoring proposed include fructosamine and glycated albumin. Fructosamine, which is formed by a non-enzymatic reaction between the carbonyl group of glucose and amine group of protein has been found to correlate well with mean blood glucose and HbA1c[28]. However fructosamine is not available for routine clinical use and can only reflect glycaemic state in a shorter period of 2 or 3 weeks compared with HbA1c. In addition fructosamine may also be unreliable in patients with renal failure[25, 28]. Glycated albumin has been shown to be superior to HbA1c[29-30]. Its use is however limited in peritoneal dialysis and there is no clear consensus regarding its therapeutic target level for glycaemic control.

Treatment with hypoglycaemic agents

Non-insulin drugs:

More options are now available for oral hypoglycaemic treatment of diabetic patients. In our environment, sulphonylureas and metformin are still widely used for treating hyperglycaemia in patients with diabetes. The metabolism or excretion of these drugs to varying extent involves the kidneys, so there is need for careful consideration in the choice of use of any non-insulin based drug. Most of these drugs require dose adjustment in the context of advancing renal failure (as shown in table 3). Extreme caution is indicated in the use of metformin because of its potential to cause lactic acidosis. Perhaps its use should only be considered for CKD patients in stages 1-2. The administration of sulphonylureas in patients with chronic kidney disease requires careful attention to dosing and the routes of elimination. There is a significant risk of profound hypoglycemia with the use of sulphonylureas in patients with end stage kidney disease. Thiazolidinediones (TZDs) are relatively new class of hypoglycaemic agents. They enhance insulin sensitivity at the sites of action of insulin through binding to peroxisome proliferator activated-receptor (PPAR-¥). The most notable side effect of these agents is hepatotoxity because their majorly metabolized in the liver. In fact the first drug in this class- troglitazone- was withdrawn on account of severe hepatotoxity. The newer agents such as Rosiglitazone and Pioglitazone are much less hepatotoxic. They also cause weight gain and oedema through accumulation of fat and fluid; hence they are

not advisable in patients with heart failure or renal patients with significant fluid retention. However pharmacokinetics of TZDs do not change with decreasing renal function and so no dose adjustment may be required in patients with chronic kidney disease.

I would suggest a little paragraph about use of Thiazolidinediones in CKD and potential dangers as well. While I agree they are less commonly used in Nigeria, these drugs are available and sold in the Nigerian drug market.

On the other hand there is little or no need for dose adjustment with meglitinides, particularly nateglinide. It is still early to know the effect on the kidney of a novel hypoglycaemic drug, Sodium-Glucose co-transporter inhibitor (dapagliflozin and sergliflozin), which hopefully will soon be licensed for clinical use[31]. These agents lower blood glucose by increasing renal excretion of glucose[32]. Moreover they do not induce insulin secretion, hypoglycaemia or weight gain[33].

Insulin:

Insulin is the most commonly used anti-hyperglycaemic drug once renal failure has set in. This is probably because the drug does not have deleterious effect on the kidney per se, and it is easier to titrate for stabilization or withheld if hypoglycaemia occurs. The reason for high rate of hypoglycaemia in patients with CKD on insulin therapy is because of the decrease in dose requirement as kidney function declines. It is difficult to generalize dosage and regime of insulin; treatment should be individualized in every case based on such factors like age of the patient, duration of diabetes, stage of kidney disease and whether on renal replacement therapy (RRT) or the type of RRT. Interestingly, administration of insulin through the peritoneum in patients receiving haemodialysis has been associated with better insulin sensitivity and fewer hypoglycaemic and hyperglycaemic episodes[34]. Patients treated with continuous ambulatory peritoneal dialysis or continuous cycler peritoneal dialysis (CAPD and CCPD) can be treated with intraperitoneal insulin. This regimen has some potential advantages; It provides a continuous insulin infusion. It eliminates the need for injections. It may provide a more physiologic route of absorption, since the exogenous insulin is absorbed into the portal vein which mimics the action of pancreatic insulin. However adverse conditions including peritonitis and low HDL cholesterol have been reported in intraperitoneal delivery of insulin[35-36].

Dietary Measures

Traditionally these patients are placed on protein restriction but accumulating evidence has not supported the usefulness of this measure in management of decline in renal function[37-38]. In a meta-analysis involving eight randomised controlled trials, Yu Pan and co-workers showed that a change in weight mean differences (WMD) for GFR or Creatinine Clearance was not significantly associated with low protein diet. However a decrease in WMD for HbA_{1c} was significant in the Low Protein Diet group ($P = 0.005$). Thus as far as glycaemic management is concerned low protein diet still has a beneficial effect in diabetic patients with renal failure. There is a need though, to balance this benefit against possible malnutrition caused by enhanced protein breakdown due to insulin deficiency.

Conclusion

Good glycaemic control is established as an essential strategy to prevent or slow down progression disease in patients with coexistent diabetes and kidney failure. However, management is associated with a number of challenges particularly with respect to glycaemic monitoring and the choice of, or handling of agents used for treating hyperglycaemia. In our resource-poor environment, these patients can still be effectively monitored with plasma glucose. There is need for careful consideration in choosing among the plethora of available non-insulin agents and, in particular, extreme caution is necessary in the use of metformin and sulphonylureas. Insulin treatment with an individualised approach based on the age of the patient, duration of diabetes and stage of kidney disease is probably the best mode of treatment of hyperglycemia.

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Guidelines for the Detection and Management of Chronic Kidney Disease (CKD)

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PREFACE

Chronic Kidney Disease (CKD) has become a global epidemic with attendant high morbidity and mortality which is particularly worse in developing countries including Nigeria. Data on the magnitude and burden are often times unavailable while those available are very limited in scope hence have limited interpretation and applicability or generalizability.

Majority of CKD patients present late and are unable to sustain renal replacement therapy for mainly economic reasons. Early detection of cases would allow institution of measures to retard CKD progression as well as reduce cardiovascular, haematologic, metabolic and social complications.

The introductory pages of this document espoused the magnitude and epidemiology of CKD in Nigeria while its detection and management are subdivided into five sections. Section I highlighted the definition and detection of CKD while Section II discussed the management of CKD under different sub headings. Sections III, IV and V focused on guidelines for haemodialysis, peritoneal dialysis and kidney transplantation respectively.

It is hoped that this document would improve awareness of CKD by all practicing medical doctors and not only internal medicine specialists (physicians). It would allow early detection and management of affected individuals and further standardize the

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practice of nephrology. It would also highlight areas needing further research that may encourage development of new proposals particularly from nephrologists or nephrology trainees.

These CKD detection and management guidelines would benefit practicing doctors in all specialties, specialist physicians and physicians in training.

Guidelines development process

A Committee of Nephrologists was selected during the Annual General Meeting in Zaria, February, 2010. Communications were mainly electronic, after the initial discussions, members were assigned topics to discuss available data or practice in Nigeria and compare with global best practices.

The committee had a retreat from 19th – 21st May, 2010 during which major areas to be covered were highlighted. Areas covered included definition and detection of CKD, conservative management of CKD, Haemodialysis, Peritoneal Dialysis and Kidney Transplantation.

Members presented available data on different topics and this was followed by group discussions that further highlighted deficiencies that needed to be covered. A sketch of important subsections under the different topics was drawn up.

A second meeting was held between 29th and 31st October, 2010, during which the draft guidelines were designed. Subsequent revisions were done electronically.

The first draft practice guidelines were sent to leading Nephrologists in Nigeria and abroad for their appraisal, criticisms and suggestions.

A final version was thereafter produced with the proviso that it should be revised every 5 years when it is hoped that some research areas/questions highlighted would have been answered.

INTRODUCTION

The global burden of Chronic Kidney Disease (CKD) is enormous. The World Health Report 2002 and Global Burden of Disease project reports show that diseases of the kidney and urinary tract caused one million deaths in 2002, ranking twelfth in the list of world's major causes of death [1,2]. The global incidence and prevalence of CKD have increased exponentially in the last decade and now assume epidemic proportions in both developed and developing countries [3].

In Nigeria, like in many other developing countries, accurate data on the prevalence of CKD is lacking principally due to unavailability of a national renal registry. Small scale community studies in Nigeria found that the prevalence of CKD in adults ranges between 19% and 30% while in paediatric population it was estimated to be 15 per million population [4,5,6]. Hospital prevalence studies reported that End Stage Renal Disease (Advanced CKD) represents 6-12% of medical admissions [7,8,9]. A major peculiarity in the epidemiology of CKD in Nigeria is the fact that it affects young individuals aged between 25-40 years, which are the most economically productive years [5,8].

It is established that CKD is largely unrecognized and inadequately diagnosed. Patients with end stage renal disease (ESRD) are thought to represent the tip of the iceberg of the entire burden of CKD.

Apart from the direct implications of CKD on renal function, it is a major risk factor for the development of accelerated atherosclerosis, ischaemic vascular disease, and cardiovascular death. Individuals with even the earliest signs of CKD are at increased risk of cardiovascular disease and may die long before they reach end-stage renal disease[10].

The burden of CKD is therefore not limited to its impact on demand for Renal Replacement Therapy (RRT); it is paralleled by the high cost of healthcare services for these patients, which is unsustainable by governments even in developed countries [11]. This cost includes direct costs such as dialysis and transplant cost as well as indirect costs such as lost man hours from work.

The rising prevalence of CKD can be stemmed and the progression retarded. Preventive measures, early detection and proper management are imperative in achieving regression of CKD (incidence & prevalence) and retardation of its progression to ESRD.

Rationale for management guidelines:

- To improve the awareness and diagnosis of CKD and institute preventive measures, early detection and management among healthcare workers

- To standardize management and decision making in the approach to CKD at various levels of healthcare expertise.
- To adapt the global best practices to management of CKD to patients in Nigeria considering our peculiarities.
- To highlight areas for further research in the epidemiology and management of CKD and its complications in Nigeria.

Research areas identified

1. Well designed community studies that would be sufficiently powered to represent National figures.
2. Studies to define Rural / Urban differences in the incidence and prevalence of CKD
3. Studies to define aetiology of CKD in Nigeria

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EPIDEMIOLOGY OF CHRONIC KIDNEY DISEASE IN NIGERIA

CKD in Nigeria principally affects young individuals in their economically productive years thereby constituting a drain on the economy. Peak age range involved varies between 25 and 45 years [1,2]. The principal causes of CKD in adult Nigerians include Chronic Glomerulonephritis, Hypertension (Essential or malignant), Diabetes Mellitus, Obstructive uropathies and Tubulointerstitial Nephritis [3,4,5]. Other documented but rare causes include Cystic Renal Diseases, Pre-eclampsia / Eclampsia, Chronic Pyelonephritis, Connective Tissue Disease and Analgesic Nephropathy [3,4,5].

In paediatric populations however, acquired disorders were the major causes of CKD. Glomerulopathies (Chronic glomerulonephritis and Nephrotic syndrome) were the commonest causes while congenital disorders, of which only posterior urethral valve was second. No child with hereditary renal disorders as a cause of CRF was identified in a report [6].

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SECTION I

Chronic Kidney Disease (CKD)

Definition

Glomerular filtration rate (GFR) less than 60ml/min or presence of markers of kidney disease for 3 months or more [1].

The GFR should be determined from serum creatinine using Cockcroft-Gault or MDRD equations for adults and Schwartz equation in children [2,3,4].

Formulae for calculating the GFR

Cockcroft-Gault Equation [2]- which has been validated in Nigerians [5].

If using µmol/l as a measure of serum creatinine, use the following formula:

$$GFR = \frac{1.23 \times (140 - Age) \times weight\ (kg)}{serum\ creatinine\ (\mu mol/l)} \quad (\times 0.85 \text{ if female})$$

If using mg/dl for serum creatinine, use the following formula:

$$GFR = \frac{(140 - age) \times weight\ in\ kg}{72 \times serum\ creatinine\ (mg/dl)} \quad (\times 0.85 \text{ if female})$$

To convert µmol/l to mg/dl, multiply by 0.0113
To convert mg/dl to µmol/l, multiply by 88.4

MDRD Formula [3]

The MDRD formula was derived from the Modification of Diet in Renal Disease Trial and has been validated in Nigerians [6,7]

$$GFR = 186.3 \times Serum\ Cr\ (\mu mol/L)^{[-1.154]} * age^{[0.203]} * 1.212 \text{ (if patient is black)} * 0.742 \text{ (if female)}$$

Original Schwartz Equation [4]
GFR (mL/min/1.73 m^2) = k (Height) / Serum creatinine

1. k = Constant
   (i.) k = 0.33 in preemie infants
   (ii.) k = 0.45 in term infants to 1 year of age 3. k = 0.55 in children to 13 years of age 4. k = 0.70 in adolescent males (not females because of the presumed increase in male muscle mass, the constant remains .55 for females)
2. Height in cm
3. Serum creatinine in mg/dL

Markers of kidney disease include:
- Persistent proteinuria
- Dipstick positive proteinuria
- Haematuria - by dipstick and/or urine microscopy
- Abnormal renal imaging - by various techniques such as ultrasonography, Computerised Tomography Scan, intravenous urography or plain radiograph, renal scintigraphy.

Screening for CKD
General Population
Who to screen?
- All adults, on first contact with a Medical Practitioner .
- In children, at birth for those at high risk of CKD (Low birth weight babies, asphyxiated, HIV infection, antenatal diagnosis of congenital anomalies) and at first contact after the age of 3 years.

What to Screen for first contact
- Blood pressure
- Urinalysis
- Serum creatinine and calculate eGFR
- Blood sugar

What to Screen for - Annually
- Blood pressure
- Urinalysis
- Serum creatinine and eGFR for > 25 years (Local data suggest higher prevalence of CKD at earlier age [8,9,10]
- Blood sugar for > 40 years

What to Screen for at 2-5 year intervals for those less than 25 years
- Blood sugar
- Serum creatinine and eGFR
- Children:

Stages of CKD
Table 1: Definition of the five stages of Chronic Kidney Disease

Stage	Description	GFR (ml/min/1.73m^2)	Action
1	At increased risk- Kidney damage with normal or increased GFR	= 90 (with CKD risk factors) = 90	Screening, CKD risk reductionDiagnosis and treatment, treatment of co-morbid conditions, slowing progression, CVD risk reduction.
2	Kidney damage with mild decrease in GFR	60 - 89	Estimating progression
3	Moderate decrease in GFR	30 - 59	Evaluating and treating complications
4	Severe decrease in GFR	15 - 29	Preparation for kidney replacement therapy
5	Kidney failure	<15 (or dialysis)	Replacement (if uraemia present)

(Adapted from the US National Kidney Foundation [1])

High Risk Group

These include the elderly (>60 years) and people with hypertension, diabetes, family history of kidney disease, HIV infection, sickle cell anaemia, obesity and those who regularly use herbal medicines, analgesics and bleaching creams.

- To be screened on first contact with physician and thereafter every six months.
- For diabetics, screen for microalbuminuria at least annually.

What to do when CKD is detected:

0 Stage the disease

0 Take appropriate measures depending on the stage:

(1) *Stage 1 – 2* : where the cause of CKD is known, treat underlying cause and institute measures to retard progression

(2) *Stage 1-2* : where cause is unknown, refer to Nephrologist.

(3) *Stage 3-5*: refer to Nephrologist.

(4) Special conditions irrespective of stage such as – Nephrotic range proteinuria (3+ and above, 24 hour urine protein > 3.5g/ 1.73m^2 BSA/ Day); polycystic kidney disease, ectopic kidneys, children, pregnancy, bone disease and anaemia (Hb <11g/ dl); haematuria where a urological or other cause is not evident – refer to Nephrologist.

Research areas identified:

1. Well designed community studies to define the epidemiology (prevalence, pattern and aetiology) of CKD in Nigeria that would be sufficiently powered to represent National figures.

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SECTION II
MANAGEMENT OF CKD

(A) Patient Counselling and Psychosocial Issues

- Educate patient about the aetiology and natural history of the disease
- Intervention strategies to prevent progression as in (B) below
- Preparation for eventual RRT

(B) Conservative Management of CKD

- Identify and treat underlying cause and intercurrent illness
- Weight management in all patients
- Optimize nutrition in undernourished patients to achieve ideal BMI
- Cessation of smoking
- Avoidance of nephrotoxic agents such as NSAIDs, COXIBs, aminoglycosides, radiocontrast agents and herbal preparations.
- Adjust doses of all medications as appropriate for patients' GFR.
- Dynamic exercise such as brisk walking / treadmill, jogging, swimming, cycling for 30 – 45 minutes at least 3 times a week.
- Low salt diet (2 grams daily)
- Low protein diet (0.6-0.8 g/Kg body weight per day)
- Control of hypertension.
- Control of blood sugar in diabetics.
- Lipid control.

(C) Identification an treatment of primary disease and underlying cause of ckd

The recognition, identification and treatment of the primary or underlying cause of CKD is of paramount importance in its management.

Glomerulonephritides

Minimal Change GN: In adults with Minimal Change GN commence prednisolone 1mg/kg/day up to maximum of 80mg/day for 1 week then taper to half for 8 weeks and if there's remission taper to stop within 4-6 weeks. If there is relapse repeat full dose for 5 days then reduce to half for 1 week and thereafter taper to stop in 4 weeks. If there are 2-3 relapses in 6-9 months then commence second line drugs. Either cyclophosphamide 2mg/kg for 12 weeks or cyclosporine 150mg/m^2 or 3-6mg/kg/day and titrate to achieve target trough plasma level of 50-125ng/ml for 12 months, thereafter taper over 3-6 months. If multiple relapses then commence third line drugs either MMF or anti CD 20 monoclonal antibody - Rituzimab [1, 2].

For children with Minimal change GN steroids are the initial treatment of choice prednisolone 60mg/m^2/day up to maximum of 80mg/day given in 3 divided doses for 2-4 weeks thereafter reduced to 40mg/m^2/day for 4-6 weeks. Non responders or relapsers should be commenced on cyclophosphamide or cyclosporine [3,4].

Membranous GN: If there is mild or non-nephrotic proteinuria, ACEIs and ARBs should be used and patient monitored. If there is nephrotic range proteinuria then use of steroids in combination with cyclophosphamide or cyclosporine. If there's worsening proteinuria and reduced renal function then use calcineurin inhibitor (cyclosporine) or cyclophosphamide and steroids [5, 6]. Rituximab and ACTH could be used if both fails [7]. However steroids alone are not recommended [8].

Focal Segmental Glomerulosclerosis (FSGS): If there is mild non-nephrotic proteinuria, ACEIs and ARBs should be used and patient monitored. If there is nephrotic range proteinuria or worsening proteinuria and reduced renal function commence steroids (prednisolone 1-2mg /kg/day for 6-8 weeks with subsequent tapering but maintained for 6 months. If patient becomes steroid resistant, then commence cyclosporine (3-6mg/kg/day for 4-6months) or cyclophosphamide (2mg/kg/day for 2-4 months) or Mycophenolate mofetil 1-1.5g twice daily for 2-4 months [9,10].

Immunoglobin A Nephropathy (IgA Nephropathy): Though IgA Nephropathy is rare in renal histological biopsy reports from Nigeria, the occasional patients must be managed according to internationally recognised guidelines [11]. Patients with hypertension or non nephrotic proteinuria should be placed on ACEIs or ARBs. Children with nephrotic range proteinuria should be commenced on steroids (0.5-1mg/kg/day up to maximum of 60mg/m^2/day) for 8 weeks and then taper. Those with

crescentic transformation should be commenced on same doses of steroids in combination with cyclophosphamide (2mg/kg/day) for 8 weeks during the induction phase and tapered steroid dose with Azathioprine 2.5mg/kg/day during maintenance phase [11].

Secondary Glomerulonephritis: In secondary glomerulonephropathies, the secondary cause (s) must be treated along with general conservative treatment modalities.

Hypertensive Nephrosclerosis: In hypertension, strict blood pressure control would also assist in retarding progression of nephropathy. Recommended drugs as well as targets for control are outlined in section 2, subsection D.

Diabetic Nephropathy: Once a patient manifests early (incipient) diabetic nephropathy either complicating type I or II DM, intensive glycaemic control using insulin therapy has been shown to retard progression hence this should be encouraged[12,13].

Research areas identified:

1 Defining the histopathology of primary glomerulonephritis in Nigerians.

2 Defining diagnostic criteria for hypertensive nephrosclerosis in Nigeria.

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(D) MANAGEMENT OF HYPERTENSION IN CKD

Hypertension is in itself a cause and a complication of CKD [1]. It is also a cardiovascular disease risk factor which is the single most important cause of death in CKD. Meticulous control of blood pressure to target is perhaps the most important single measure in retarding the progression of CKD [2].

Blood Pressure Targets [3]

Proteinuria < 1g/24hrs 130/80mmHg
Proteinuria >1g/24hrs 120/75mmHg
CKD with diabetes 120/75mmHg
In children ..... Less than 90th percentile for the age, sex and height.

**Paramount factor is the control of blood pressure irrespective of agent used. Most patients would require a diuretic for blood pressure control and correction of fluid overload. However, thiazides are ineffective at low levels of GFR (<25mls/min) and in this situation, loop diuretics are preferred [4]. The use of ACE inhibitors, ARBs or renin inhibitors in diabetics and those with proteinuria is recommended and dihydropyridine Ca antagonists should be avoided in proteinuric states[5]. Ultimately, most patients will require more than one agent to achieve control [3,5].*

Research areas identified:

1. Management of hypertension in CKD patients in Nigeria.
2. Essential hypertension and CKD – hypertensive nephrosclerosis phenotyping.
3. Control of hypertension and proteinuria in glomerulonephritides
4. Genetics of hypertensive CKD

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(E) ANAEMIA AND ITS MANAGEMENT IN CKD

Anaemia is the commonest hematological complication of CKD and worsens with deterioration of renal function [1,2]. In spite of this, it is inadequately recognised and managed.

All CKD patients should be screened for anaemia at time of diagnosis and thereafter, at least every 3 months.

Characteristics of anaemia of CKD

(1) Most patients have normocytic, normochromic anemia
(2) Some patients could have microcytic, hypochromic anemia

Investigations

- FBC with red cell indices
- Reticulocyte count
- Blood film appearance
- Iron studies - Serum iron, ferritin, TIBC and transferrin saturation.

- Hb electrophoresis
- Fecal occult blood
- Serum Vitamin B12 and Folic Acid

Targets for anaemia treatment [3]

(1) Predialysis: Hb - 11 – 12g/dl, serum ferritin 100-500ng/ml, TSAT≥ 20%

(2) Dialysis: Hb - 11 – 12g/dl, serum ferritin 200 – 500ng/ml, TSAT ≥ 20%

(3) In all patients, avoid Hb level > 13g/dl because of risk of haemoconcentration and its effect on morbidity and increased cardiovascular mortality [4].

Treatment of anaemia

(1) Identify and treat non renal causes of anaemia such as bleeding, nutritional deficiencies, hypothyroidism, iron deficiency and haemolysis.

(2a) In predialysis patients and patients receiving peritoneal dialysis or home haemodialysis, optimize iron balance before Epoetin therapy using oral iron. If poor response (TSAT is < 20% and serum ferritin < 100ng/ml for 4 weeks), switch to parenteral iron.

Dose of oral iron: Ferrous sulphate 200mg or Ferrous gluconate 600mg three times daily (approx. 65mg elemental iron) or 2-6 mg /kg /day of elemental iron for paediatric patients

Dose of parenteral iron: Iron sucrose intravenously 200mg weekly for 5 weeks (total of 1000mg) or Iron dextran intravenously 250mg weekly for 4 weeks. For patients in whom adherence may be difficult, total dose infusion should be considered as its been found to be effective and safe [5,6].

(2b) For patients on in-center haemodialysis, start with parenteral iron at 100mg in the last 30-60 minutes of the dialysis session to a total of 1000mg.In cases of poor or inadequate dialysis , higher doses may be given to ensure achieving 1000mg within 4 weeks.

- *Test dose of iron dextran should be administered before the full dose.*
- *For patients that have received blood transfusions, check iron stores (serum ferritin) before giving supplemental iron because of risk of iron overload.*

(3) Erythropoiesis Stimulating Agents (ESAs) [7]
These should be administered preferably after iron deficiency has been corrected and BP controlled.

Choice of ESAs:

For predialysis patients, patients receiving peritoneal dialysis or home haemodialysis and transplant patients, intermediate and long acting ESAs are preferred for practical reasons.

For patients receiving in- centre haemodialysis, the short acting ESAs are preferred.

In situations where the cold chain cannot be guaranteed, the more heat stable ESAs are preferred.

Owing to the frequent reports of pure red cell aplasia (PRCA) associated with the use of epoetin alpha when administered s.c, the i.v route is recommended for the administration [6].

(3a) For predialysis patients and patients receiving peritoneal dialysis, the ESAs may be administered subcutaneously for patient convenience, need to preserve veins and also because lower doses may be required. For doses and frequency of administration, see table 3a.

(3b) For patients receiving haemodialysis, the ESAs could be given either intravenously or subcutaneously at the end of the dialysis session. For doses and frequency of administration, see table 3b.

(3c) For transplant patients, ESAs should be given when indicated in the same doses and routes as in predialysis patients.

Table 3a: Types of ESAs and their characteristics [7]

ESA	Class	Half - Life	Storage Conditions	Risk of PRCA
Erythropoietin alpha	Short acting	6.8 hours	2-8°C strictly	Several cases reported when administered subcutaneously
beta	Short acting	8.8 hours	2-8°C normally, but can be kept at 25°C for 3-5 days	minimal
Darbepoietin alpha	Intermediate acting	48 hours	2-8°C strictly	minimal
Continuous Erythropoiesis Receptor Activator (CERA)	Long acting	134 hours	2-8°C normally, but can be kept at 25°C for up to 28 days.	None

- *Short acting ESAs – Epoetin alfa and Epoetin beta.*
- *Intermediate acting ESAs – Darbepoetin alfa-*
- *Long acting ESAs – CERA*

Table 3b: Doses, routes and frequency of administration of ESAs [3,7]

Product	Route of Administration	Correction Dose	Maintenance Dose
Erythropoietin alpha i.v s.c (not recommended for haemodialysis patients)	50 – 100i.u/kg/ week, in 2-3 divided doses.	Increase dose monthly by 25%. up to a maximum 300 iu/kg/week or 20,000 iu/ week if Hb increase is less than 1g/mont.	Reduce correction dose by 25 % if Hb level approaches 12g/dl Reduce dose by 25 % if Hb increase is more than 2g/ month.
Erythropoietin beta i.vs.c	Subcutaneous administration Initially 3 x 20 IU/kg body weight/week.	Dosage may be increased every 4 weeks by 3 x 20 IU/kg /week if the increase in PCV is<0.5%/ week. Intravenous administration: Initially 3 x 40IU/kg/week. Dosage may be increased after 4 weeks to 3x80 IU/kg/ week and if further increments are needed by 3 x 20 IU/kg/ week at monthly intervals.	For both routes of administration the maximum dose should not exceed 720 IU/kg/week. Reduce dose by 25 % if Hb increase is more than 2g/month. Reduce correction dose by 50% of last correction dose when Hb approaches 12g/dl
Darbepoietinalpha i.v/s.c	0.45mcg/kg once weekly	Adjust to 25% of last correction dose once weekly if Hbapproaches 12g/dl.	It may also be administered once every two weeks using dose equal to twice the previous once weekly dose.
CERA i.v/s.c	0.6mcg/kg once every two weeks	Adjust to 25% of last correction dose and administeronce every	It may be administered once every month using dose equal to twice the previous two-weekly dose. two weeks if Hb approaches 12g/dl.

In case of poor response to ESAs, assess the following:

- Iron deficiency due to nutritional deficiency, GI blood loss etc
- Infections/inflammation
- Haemoglobinopathies
- B12 or folate deficiency
- Inadequate dialysis
- Inadequate dosing
- Poor ESA adherence
- Haemolysis
- Severe uncontrolled hyperparathyroidism
- PRCA
- Occult malignancies
- ACEI or ARB therapy.
- Poor storage (poor maintenance of cold chain)

Treatment monitoring

- During correction phase, blood pressure should be monitored closely.
- Hb levels should be monitored every 2-4 weeks during the correction phase and monthly during the maintenance phase.
- Patients with intercurrent diseases that might influence the Hb concentration will require more frequent monitoring

Androgen Therapy [8]

Androgen therapy may be used in patients aged over 50 years who cannot afford ESA.. Intramuscular nandrolone decanoate 200mg once weekly may alleviate symptoms of anaemia and has associated beneficial effects on nutritional status. Recognized side effects include virilisation, hepatic adenoma, hirsutism and acne in women.

Blood Transfusion

Blood transfusion should be considered in the following situations:

(1) In symptomatic anemia such as heart failure, coronary artery disease.

(2) HD patients with Hb < 7g/dl, if immediate treatment with ESAs is not possible.

(3) Acute worsening anemia due to blood loss.

(4) Severe resistance to ESA therapy.

Research areas identified:

1 Optimal haemoglobin target that would provide good quality of life at lower cost.

2 Optimal doses of ESAs in Nigerians with CKD.

3 Role of parenteral iron and other adjuvants in the management of renal anaemia.

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F. MANAGEMENT OF CKD MINERAL AND BONE DISORDER

Chronic kidney disease (CKD) is inevitably associated with alterations of bone and mineral metabolism as residual kidney function declines [1]. These alterations have been found to be associated with cardiovascular diseases as well as increase in morbidity and mortality in CKD patients[2].

Definition

A systemic disorder of bone and mineral metabolism due to CKD manifested by either one or a combination of the following [3]:

- Abnormalities of calcium, phosphorus, parathyroid hormone (PTH), or vitamin D metabolism
- Abnormalities in bone turnover, mineralization, volume, linear growth, or strength (renalosteodystrophy).
- Vascular or other soft tissue calcification

Diagnosis and follow-up

Diagnosis of CKD-MBD should be done by assessing serum levels of calcium, phosphorus, PTH, and alkaline phosphatase beginning in CKD stage 3. Serum levels of calcium, phosphorus, alkaline phosphatase and serum PTH should be monitored every 3 months while serum PTH should be monitored every 6 months.

In CKD patients with persistent bone pain, unexplained fractures, unexplained hypercalcemia, unexplained hypophosphatemia, bone biopsy may be required to diagnose bone disorders.

Presence of vascular calcification should be ruled out by a lateral abdominal radiograph or other appropriate methods, echocardiogram should be used to detect the presence or absence of valvular calcification.

Goals of treatment

Serum phosphorus should be maintained in the normal range for the laboratory. Serum calcium (adjusted for albumin concentration) should be maintained within the normal reference range for the laboratory [4].

Individual values of serum calcium and phosphorus should be used to guide patients' management rather than the calcium–phosphorus product (Ca X P) [4]. Target value for serum PTH levels is 2-9 times upper reference limit for the assay [4].

Management

Dietary phosphate intake should be limited in patients with hyperphosphatemia. The use of phosphate-binding agents are required in the treatment of hyperphosphatemia.

For choice of phosphate binder, it is reasonable to take into account serum calcium, CKD stage, presence of other components of CKD-MBD, concomitant therapies and side-effect profile of the drug. The dose of calcium- based phosphate binders should be restricted in the presence of arterial calcification and/or adynamic bone disease. In such instances the use of non-calcium based phosphate binders (eg Sevelamer HCl, lanthanum carbonate etc) could be used.

Hypocalcaemia, is treated with calcium salts and active vitamin D analogues. Calcium intake should however, be restricted in patients with hypercalcemia, soft tissue calcification, low PTH and in patients with adynamic bone disease.

The dose of calcitriol or vitamin D analogue should be restricted in the presence of persistent or recurrent hypercalcemia [3].

Calcitriol or vitamin D analogs, or calcimimetics, or a combination of calcimimetics and calcitriol or vitamin D analogs may be used to lower PTH to two to nine times the upper normal limit for the assay in treated patients. Parathyroidectomy is indicated when medical therapy fails.

In children, screening for CKD-MBD should start in CKD stage 2. Treatment is recommended with Human growth hormone when additional growth is required after first addressing malnutrition and biochemical abnormalities of CKD-MBD [3].

Research areas identified:

1. A multicentre study on pattern of CKD-MBD, parathyroid function in CKD and bone histomorphometry.
2. Analysis of various phosphate lowering drugs in Nigerians
3. Dietary modification in CKD aimed at lowering hyperphosphataemia
4. Assessment of phosphate content of our common meals.

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G . CKD AND DYSLIPIDAEMIA

Chronic Kidney Disease causes profound dysregulation of lipoprotein metabolism, resulting in major pro-atherogenic lipid abnormalities. Although lipid profile in CKD patients is complex, the most common abnormalities are hypertrigliceridaemia and low HDL-C (high density lipoprotein-C) [1,2].

Dyslipidaemia in CKD patients should be investigated and treated in view of the fact that cardiovascular disease is extremely common in this population.

Diagnosis

Diagnosis of dyslipidaemia should be made by obtaining a fasting lipid profile (total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides)

It is recommended that evaluation of dyslipidaemia should be made at presentation, or after a change in CKD/nutritional status, or at least annually.

Assessment for secondary causes of dyslipidaemia such as medications and co-morbid illnesses should be carefully undertaken and treated appropriately.

Management

Most of the lipid lowering drugs have excellent safety and efficacy profiles. In addition, available evidence suggests that statin therapy may reduce inflammation and slow the decline in glomerular filtration rate in patients during the earlier stages of CKD [3].

In patients with high total cholesterol who are unresponsive to dietary therapy and LDL-C > 100mg/dl, statin therapy should be initiated. Drug dosage should be titrated as required, depending on the severity of dyslipidaemia.

Pre-dialysis patients with fasting triglycerides $\geq$ 500 mg/dl at any stage of CKD should be treated with recommendation of lifestyle changes and adding gemfibrozil or niacin. Drug dosage should be titrated as required [3,4,5].

Medication safety and adverse effects

Serial monitoring of creatine kinase and alanine aminotransferase should be done in patients treated with moderate to high doses of statins every 3 months.

Co-administration of statins and fibrates should be avoided in patients with CKD due to the risk of rhabdomyolysis [6].

Gemfibrozil is safe to use in patients with CKD. Other fibrate preparations however, should be avoided or the dose significantly reduced in view of an increased risk of toxicity.

In post pubertal paediatric patients adult recommendations as above can be followed. In younger children NCEP-C (ATP III) guidelines should be adopted [3].

Research areas identified:

1. Long term study of the implications of dyslipidaemia and hyperlipidaemia in Nigerians (Adults and paediatric patients).
2. Assessment of common cardiovascular risk factors.
3. Dietary management of hyperlipidaemia in low resource settings.

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H. NUTRITION

Malnutrition is very common in patients with CKD. It occurs in more than 50% of CKD patients starting dialysis [1]. Malnutrition is often associated with chronic inflammation and it is a predictor of mortality in CKD patients on dialysis[2,3,4,5]. Dietary modification is considered one of the cornerstones in the treatment of CKD. The overall aim is to prevent malnutrition, alleviate uraemic symptoms and metabolic derangements such as hyperkalaemia and hyperphosphataemia.

Pre-dialysis CKD patients should be screened for malnutrition at presentation or after a change in CKD status and at least every 3-4 months throughout the follow-up period [6,7]. All patients with CKD stage 3-5 should be referred to a dietician (experienced in the management of nutrition in CKD patients) for assessment and dietary management.

Diagnosis

It is recommended that a panel of tests be utilized in the assessment of nutritional status of patients with CKD rather than relying on a single evaluation [2,6,7].

Clinically relevant assessment of nutritional status should be obtained through

1. Dietary interviews and/or diaries
2. Anthropometric measurements
   a. Actual body weight (dry weight)
   b. Percent standard body weight
   c. Body Mass Index (BMI)
   d. Skin fold thickness
   e. Estimated percent body fat
   f. Mid-arm muscle area, circumference, or diameter.
3. Subjective Global Nutritional Assessment (SGA)

Laboratory assessment should include:

1. Serum Albumin: Patients with serum albumin levels lower than 3.0g/dl should be evaluated for malnutrition.
2. Serum Cholesterol: Patients with total LDL-cholesterol levels less than 30mg/dl should be evaluated for malnutrition.

Serum Albumin level is influenced by a variety of factors (e.g inflammation) apart from nutrition. Therefore, screening for co-morbid illnesses should be done in CKD patients with low albumin level. Low or declining serum cholesterol concentrations are predictive of increased mortality risk in CKD patients.

Goals of treatment

Dietary treatment in CKD patient should aim at achieving desirable weight and adequate nutritional status.

In addition, it should include dietary management of co-morbidities such as good glycaemic control in diabetics, fluid and sodium control in hypertensives and oedematous patients, lipid control in patients with dyslipidaemia, phosphate control in hyperparathyroidism, and weight management in obese patients.

Recommended dietary intake

Energy

Ideal energy intake should be determined based on age, gender, BMI and level of physical activity of the patient. Recommended caloric intake is 30-40 kcal/ Kg ideal body weight (IBW)/day [2,6,7,8,9].

Protein

Moderate protein restriction should be commenced in patients in stage 4 CKD. Protein intake should however not be less than 0.8 g/kg IBW/day. At least 50% should be of high biological value

Fat / Carbohydrate.

Aim of dietary treatment is to prevent protein-energy malnutrition. Fat content of diet should be reduced to less than 30% of daily energy intake, with saturated fat limited to less than 10% of energy requirements. Carbohydrate should be utilized to make up the balance of required energy intake.

Sodium

Sodium intake should be less than 100 mmol / day (<6g of NaCl/day) if the patient is hypertensive or oedematous.

Potassium

Potassium intake should be reduced (50-70 mmol/ day) in hyperkalaemic subjects or patients on medications that may predispose to increased serum potassium levels.

Phosphate

Phosphate intake restricted to 800-1000 mg/day and/ or use of phosphate binders is recommended if serum phosphate is high (>1.49mmol/l).

Vitamins

Vitamin supplements are recommended in accordance with the recommended daily allowances. However caution should be exercised in the use of Vitamin C supplements in view of the risk of Oxalosis.

Fluid

Fluid intake needs to be adjusted in oedematous patients. Dehydrated patients should be hydrated appropriately in accordance with the estimated degree of dehydration. Fluid intake in anuric patients should be restricted to insensible losses.

Nutrition in children

Dietary management is of paramount importance in children with CKD. The challenge for the paediatrician is to optimize the growth and development of these children and make the diet interesting and palatable in order to ensure compliance. Recommended allowance for protein is 1.1-1.2 g/kg IBW/day.

Research areas identified

1. Prevalence and pattern of malnutrition in Nigerian CKD adult and paediatric patients
2. Caloric value of major food products in Nigeria.
3. Dietary management of CKD in low resource settings.

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I. PREPARATION FOR RENAL REPLACE MENT THERAPY

It is important to ensure a smooth transition to RRT in CKD patients requiring renal replacement therapy [1,2].

Counselling and patient education

Patients in stage 4 CKD or stage 5 CKD not on renal replacement therapy (RRT) and their families should be counselled on all available Renal Replacement Therapies.

An informed decision on the best RRT modality for the patient should be made based on availability, affordability by patient or his/her financial support plan, and other relevant issues.

A multidisciplinary, multifaceted, educational approach tailored to the needs of the patient, should be employed to inform him/her of the management of his/her renal condition. This includes individual conversations, interactive group discussion and counseling, written educational materials, videos and DVD/CDs [1,2].

Dialysis access

Timely placement of vascular access or PD catheter should be done in patients with CKD stage 4 in whom a firm decision on dialysis therapy as the most appropriate RRT has been made [1,2,3]. Appropriate counselling and training of patient on access care should also be undertaken.

Insertion of catheters in peripheral veins in the non dominant arm should be avoided as much as possible once GFR < 30ml/min.

J. END OF LIFE CARE

Care in the last days of life is essential in patients who continue to deteriorate on dialysis, or are moribund in view of coexisting co-morbidities, or cannot afford dialysis for financial and other reasons. This should be undertaken with utmost care and empathy for the patient and his/her family [1,2,3,4]. Therapy should aim at achieving good symptomatic relief. In addition, psychological, spiritual and culturally sensitive care for the dying patient and their family should be provided by the managing unit [3,4].

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SECTION III

HAEMODIALYSIS THERAPY

Haemodialysis (HD) is the most common form of renal replacement therapy (RRT) worldwide, 90% of patients starting dialysis start on HD. In Nigeria, most dialysis centres are located in the major cities therefore HD therapy is not readily accessible to those in the rural communities [1].

Choice of dialysis modality

Haemodialysis
Peritoneal dialysis

Choosing an initial mode of renal replacement therapy (RRT)

Choice of treatment is influenced by a range of factors which include financial, medical, psychosocial and availability of RRT modality.

Haemodialysis

When to start haemodialysis (HD)

No universal agreement on optimal time for starting dialysis. Dialysis should be instituted whenever GFR is < 10mls/min^2. However dialysis should be commenced in patients with higher GFR if there is one or more of the symptoms or signs of uraemia, inability to control BP or fluid overload or a progressive deterioration in nutritional status.

Quality assurance

Personnel

It is very important that the quality of dialysis treatment delivered be closely monitored by a regulatory body given the proliferation of dialysis units in the country. To this end, all dialysis units must be run by qualified personnel who comprise of:

a. qualified Nephrologist.
b. Nephrology/dialysis nurses
c. Dialysis technicians
d. Counsellors and social workers
e. Renal dieticians

Water treatment

Water for HD must be treated and must meet a minimum standard as recommended by the AAMI [3,4]. The feedwater therefore requires to be treated by a combination of methods including the use of particulate filters, activated charcoal, water softeners, de-ionizers, use of reverse osmosis, ultraviolet rays and bacterial. **Culled from AAMI website :** . http://www.aami.org/

Achieving this standard of purity requires that feed water should be processed by the following methods:

- Softening: this process removes most of the calcium and magnesium
- Carbon filtration: removes organics and other impurities such as chloramines and chlorine.
- Reverse osmosis: Removes aluminium, bacteria, endotoxin, etc
- Effective disinfection programme for pipework between the treatment plant and dialysis machines

Clinical evaluation and preparation for HD

Vascular access

Reliable vascular access is the cornerstone of HD therapy and timely planning for vascular access is an essential and important part of pre-dialysis management.

Types of vascular access:

- Arterio-venous fistula (AVF).
- Polytetrafluoroethylene (PTFE) graft
- Tunnelled and cuffed dialysis catheter (permcath)
- Temporary dialysis catheter in internal jugular or femoral catheter for immediate use; ideally should be left in place for≤ 2 weeks (femoral < 5 days) [4].

An arteriovenous fistula (AVF) is the optimal form of vascular access and should be created well before the predicted time that dialysis will start and to give enough time for it to mature. Maturation time 4 – 8 weeks minimum. PTFE graft is the second best. Useful if veins are inadequate to create AVF [5,6].

Viral screening and immunisation

All patients for HD therapy should be screened for HIV, HBsAg and HCV infection

Those who are HBsAg negative should be immunized with hepatitis B vaccine. To maximize efficacy, the dose should be doubled in dialysis patients

(40ìg HBsAg), four doses administered to the deltoid region at intervals 0, 1, 2, 6 months [6]. Measure antibody levels; if still not adequate (if <20iu/) give booster doses. This vaccination programme should ideally be instituted pre-dialysis.

Blood pressure

The recommended target immediate predialysis BP should be 140/90mmHg and 130/80mmHg postdialysis. Management of hypertension in HD patients should include normalisation of extracellular fluid (ECF) and dry weight as well as optimisation of dialysis prescription.

Dry weight evaluation

The dry weight is the post dialysis weight at which all or most excess fluid has been removed or clinically defined as the lowest weight a patient can tolerate without intra-dialytic symptoms and hypotension. There is no gold standard for dry weight assessment. In practice the dry weight is determined on a trial-and –error basis. The dry weight changes periodically and should be re-evaluated monthly.

Anaemia

Guidelines for the management of anaemia in CKD should follow the recommendations on Section 2 subsection C. The requirement in HD patients include a target serum ferritin greater than 200ìg/L (200 – 500ìg/L).

Nutrition

Refer to Section 2 subsection H.

Requirement for nutritional management in HD patients include recommended daily vitamin supplement of

- Vitamin C 100mg daily
- Folic acid 5mg daily
- Vitamin B6, 10mg daily
- Thiamine 1.1 – 1.2mg daily
- Riboflavin 1.1 – 1.3mg daily
- Cobalamin 2.4ìg daily
- Niacin 14 – 16mg daily
- Biotin 30ìg daily
- Pantothenic acid 5mg daily
- Alpha – Tocopherol (vitamin E) a daily supplement of 400 – 800IU is recommended for secondary prevention of cardiovascular events

Protein intake 1.2g/kg ideal body weight per day is recommended for patients on HD.

Normalised protein catabolic rate (nPCR).

nPCR is a measure of urea generation rate which is a reflection of nutritional status. It can only be used in patients who are stable. A nPCR > 1.0g/kg/day is required.

Bone disease

Refer Section 2 subsection F.

Haemodialysis prescription

HD prescription should be individualised to achieve adequate dialysis. Variables in the dialysis prescription should include:

Number of sessions per week: ideally 3 four-hour sessions per week and a total duration of 12 hours. (*Unless there is significant residual renal function)*

An increase in frequency and time should be considered for the following category of patients:

- Patients with haemodynamic instability
- Patients with cardiovascular instability
- Patients with uncontrolled hypertension despite maximum possible fluid removal
- Patients with impaired phosphate control

Blood flow rate: a higher blood flow rate is desirable; 300 to 500ml/min through AVF or graft. A blood flow rate of < 250ml/min is suboptimal.

Dialyzer size and type: The larger the surface area of the dialyzer the greater the delivered dose of dialysis per unit time. High flux dialyzers are able to deliver better middle molecule clearance. Dialyzers with biocompatible membranes are preferred (modified cellulose and synthetic membranes).

- Dialysate: Bicarbonate is the preferred buffer
- Anticoagulation: Heparin is usually used given as a bolus injection followed by a constant hourly infusion or a bolus followed by repeated bolus doses as necessary. The heparin infusion is stopped 1 hour before the end of dialysis.

Low molecular weight heparin can also be used for anticoagulation during dialysis.

- For actively bleeding patients, acute stroke, uraemic pericarditis and Heparin Induced Thrombocytopaenia heparin-free dialysis is recommended.
- Shorter duration of HD session of 2-3 hours, is preferred for the first session to prevent disequilibrium syndrome [9].

Prevention and management of complications during HD

The most common complications during HD are: hypotension, cramps, nausea and vomiting, headache, chest pain, back pain, itching, and fever & chills. Other less common complications are seizures, haemolysis, severe disequilibrium syndrome, first use syndromes, air embolism.

1. Intradialytic hypotension

Intradialytic hypotension (IDH) is the most frequent complication observed during haemodialysis and occurs in 15 – 50% of dialysis sessions[10,11]. The causes are numerous ranging from patient specific factors to treatment specific factors.

Management and prevention of IDH include:

Stratified approach to prevent IDH

- Counsel patient to limit salt intake (Sodium restriction)
- Refrain from food intake during dialysis
- Clinical reassessment of dry weight
- Use of bicarbonate dialysis buffer
- Use of a dialysate temperature of 36.5^{o} C
- Check dosing and timing of antihypertensive agents (**give drugs after dialysis**)
- Perform cardiac evaluation
- Prescribe a dialysate calcium concentration of 1.50mmol/L
- Limit weight gains between sessions, limit to 1kg/day.
- Increase haemoglobin, ensure that haematocrit is > 33%
- Keep dialysate sodium level at or above plasma sodium
- Use HD machines with ultrafiltration controller
- Consider use of á –adrenergic agonists midodrine prior to dialysis
- Blood volume monitoring

Treatment of IDH

- Place patient in the Trendelenburg position (head-down) if respiratory status allows this.
- Ultrafiltration should be stopped or reduced to near zero during an episode of IDH
- 100ml of isotonic saline should be infused via the venous line in patients unresponsive to stopping ultrafiltration and Trendelenburg's position
- Infusion of colloid solutions and inotropes should be considered in patients who remain unresponsive to saline. Use of hypertonic solutions appears to offer no benefit over normal saline.
- Intra nasal oxygen may also be of benefit
- If blood pressure does not respond to above measures, exclude other problems like cardiac causes, GI bleeding and sepsis

Other preventive measures

Slower, longer dialysis hours enable slower fluid removal.

Sodium profiling also minimizes hypotensive episodes

Sequential UF and dialysis helps some patients achieve dry weight without hypotension

2. Muscle cramps

Pathogenesis is unclear. The 3 most important predisposing factors are hypotension, patient below dry weight, use of low sodium dialysis solution. Other causes are carnithine deficiency.

Management

- Prevent intra dialysis hypotension
- Use higher sodium dialysate or sodium profiling
- When hypotension occurs with muscle cramps give normal or hypertonic saline and 50% dextrose.
- Carnithine supplementation and quinine sulphate have been used though recently shown to be of little benefit [12].
- Vitamiin E 400IU nocte has been shown to be as effective as quinine
- Other drugs include oxazepam 5 – 10mg given 2 hrs prior to dialysis
- Massage and stretching exercises

Table 1: Maximum recommended concentration of chemical and microbial contamination in water for dialysis for which routine testing is mandatory [3,4]

Contaminant	Maximum recommended	Standards on which	
Initial test frequency	concentration mg/L	limit is based	3-monthly
Aluminium	0.01	EP, AAMI, ISO	3-monthly
Calcium	2 (0.05mmol/L)	EP, AAMI, ISO	
Not less than monthly			
Total chlorine	0.1	EP	3-monthly
Copper	0.1	AAMI, ISO	3-monthly
Fluoride	0.2	EP, AAMI, ISO	3-monthly
Magnesium	2 (0.08mmo/L)	EP	3-monthly
Nitrate	2 (9mg/L)	AAMI, ISO	3-monthly
Potassium	2 (0.05mmol/L)	EP	3-monthly
Sodium	50 (2.2mmol/L)	EP	3-monthly
Chloramines	0.1mg/L	AAMI	3-monthly
Bacteria (total viable count)	100cfu/mL	EP, ISO	Not less than monthly
Endotoxin	0.25IU/mL	EP	Not less than monthly

3. Nausea, vomiting and headache

Common and usually associated with hypotension, hypertension, infection and may be a minor manifestation of disequilibrium syndrome.

Management includes identification and treatment of the cause.

4. Chest pain and back pain

Cause unknown. No specific management or prevention strategy. Angina must be considered in the differential diagnosis of chest pain

Assessment of haemodialysis adequacy

What constitutes optimal HD remains controversial. Urea kinetic modelling is a useful tool to determine adequacy of dialysis despite its limitations. The single-pool Kt/V assumes that at the end of dialysis the concentration of intracellular and extracellular urea are equal. Kt/V is a measure of urea clearance. K = dialyzer clearance; t is the dialysis time; V is the urea volume distribution. The urea reduction ratio (URR) is a simpler measurement of urea clearance which does not take into account the amount of fluid removed by ultrafiltration. URR = 100 x $(1-C_t/C_o)$. Co is the predialysis urea; C_t is the post dialysis urea [1,3].

Assessment of the adequacy of dialysis is based on delivered dose of dialysis rather than prescribed HD treatment. Both clinical and biochemical assessment is recommended [1, 3, 8].

1. The clinical assessment of patients should include:
   General wellbeing
   Nutritional status
   Quality of life
   Blood pressure
   Fluid status.
2. Monitoring of biochemical and haematological parameters
3. Measurement of clearance of solutes

The minimum dose of dialysis should be a urea reduction ratio (URR) of 65% or Kt/V of 1.2. To ensure adequate dialysis, a target URR $\geq$ 70% or Kt/V $\geq$1.4 (determined by single pool urea kinetic modelling) is required if this dose is to be achieved consistently [1,3].

An adequately dialysed patient is a healthy patient, in good frame of mind, without admissions for intercurrent illnesses [8].

Frequency of monitoring should be once a month for all adult and paediatric dialysis patients on regular thrice weekly dialysis [1,8]. The frequency of measurement of delivered dose should be increased when patients are non-compliant with their haemodialysis prescriptions (missed treatments, early sign - off) frequent problems noted in delivery of the prescribed dose e.g. variably poor blood flows, or treatment interruptions or when the haemodialysis prescription is modified.

In this environment where patients dialyse infrequently, weekly Kt/V should be determined (Opinion) [11,13]**.**

If Kt/V fails to meet target, options are:

- Improve vascular access if flow is poor
- Increase blood flow rate
- Increase dialysate flow rate
- Increase dialyser size
- Increase dialysis time and frequency [1].

Care of vascular access

In haemodialysis patients, poor personal hygiene is a risk factor for vascular access site infections. Therefore patients with poor personal hygiene should be taught how to improve and maintain personal hygiene. Education of dialysis staff is also crucial to minimise infection risks. All dialysis staff should be trained in infection control procedures. Handwashing, skin preparation techniques for permanent access and catheter care. Cleanse skin with 70% alcohol or 10% povidone iodine using a circular rubbing motion.

- The catheter exit site should be examined at each haemodialysis session for signs of infection
- Catheter exit site dressing should be changed at each haemodialysis treatment.
- Use of dry gauze dressing combined with skin disinfection, using either chlorhexidine or povidone iodine solution followed by povidone iodine ointment or mupirocin ointment (bactroban) at the catheter exit site are recommended after catheter placement and at the end of dialsysis session.
- ***Catheters should be locked with heparin 1ml = 1000IU and antibiotic solution (opinion)***.
- During catheter connect and disconnect procedures, nurses and patients should wear a surgical mask.

Cost containment measures

Dialysers can be reused to save cost except in HBV, HCV, HIV patients. When haemodialyzers are reused, they should be processed following the Association for the Advancement of Medical Instrumentation (AAMI) Standards and recommended practices for reuse of haemodialyzers during reprocessing it is important to check the total cell volume. Dialyzers having a total cell volume < 80% of the original measured value should not be reused. Where this would not add to cost of treatment, re-use is recommended [14,15].

Infection control

Infection control is of paramount importance within the dialysis unit. Nursing staff must take adequate precautions to prevent the spread of infection within the dialysis unit. This is achieved through the use of universal precautions and isolation of patients and machines, if required. Each dialysis unit must have infection control policies.

HBsAg positive patients require treatment in isolation and with designated machines. This is also desirable for patients that are HCV or HIV positive.

All staff working in the dialysis should be vaccinated against hepatitis B and should be screened annually

Dialysis in the elderly:

There are specific problems in dialysing the elderly. Vascular access problems cause increase use of central catheters with the attendant increased risk of sepsis and hypotension. Some elderly patients are frail with multiple medical and social problems. Pre-existing morbidity affects quality of life and outcomes. Consider conservative management for ESRD and this should be discussed with the patient and relatives. For those who agree to dialysis, PD might be a better option in view of vascular access problems.

Dialysis in pregnancy:

Intensive daily dialysis in the pregnant HD patient has been associated with better outcome although no RCTs have been conducted in this subset of patients. A target Kt/V of 2.5 has been suggested.

Target for HD patients

- Kt/V ≥ 1.2 or URR > 65%
- Hb 10 – 12g/dL
- Serum albumin > 3.5g/dL
- Phosphate < 1.80mmol/L
- Calcium within normal range for local laboratory and adjusted for serum albumin
- Bicarbonate 20 -26mmol/L
- Pre dialysis Potassium < 6.5mmol/L
- Pre-dialysis BP < 140/90mmHg
- Dietary protein of at least 1g/kg ideal body weight
- PTH target between 2-9 times normal

Routine laboratory tests

Forthnightly

- Haemoglobin

Monthly

- Standard kt/v
- Serum albumin
- Calcium, phosphate
- Nutritional assessment

Every 3 months

- Iron studies
- Serum PTH
- Viral screening

Peculiarity of haemodialysis in children [3]:

Outlined treatment targets for adults apply to children older than 5 or more than 15 kg. Haemodialysis is not generally preferred for younger children. Renal transplantation remains the most preferred modality of treatment for paediatric patients with ESRD.

Research areas identified:

1. Maintenance HD dosing that would provide good QOL in Nigerians with advanced CKD.
2. Maintenance HD dosing that would provide good QOL in Nigerian Children with advanced CKD.
3. Management of complications in maintenance HD.
4. Quality of water used in dialysis centres in Nigeria: recommendation based on patients electrolyte needs.

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SECTION IV

PERITONEAL DIALYSIS

INTRODUCTION

Peritoneal dialysis (PD) is an established, effective mode of renal replacement therapy that is particularly relevant in Nigeria and other developing countries because of its rural adaptability.

It has been used in the management of acute kidney injury in adults and children for more than 4 decades but major constraints have limited its continuous use in the management of end stage renal disease (ESRD), hence local experience in this area is limited [1-6].

PD should be provided as part of integrated renal replacement therapy care such that patients would have access to other modalities of care should the need arise [7-9].

Unfortunately, major limiting factors for sustainability of acute or chronic PD treatment in Nigeria have been unavailability of necessary consumables and exhorbitant cost when available. Others include the very high infection (peritonitis) rate and lack of and progressive attrition of well trained and skilled nursing personnel [10].

Contraindications to use of PD [9]: is unsuitable for some patient populations. These include severe obesity, hernias, those with recentabdominal surgery, active or past history of peritonitis, abdominal aortic aneurysm, absent anterior abdominal wall, inflammatory bowel disease, abdominal masses etc.

The use of peritoneal dialysis is also contraindicated in patients with physical or mental incapacitation or those with uncorrectable mechanical defects in the abdomen (eg, Prune Belly syndrome, surgically irreparable hernia, omphalocele, gastroschisis, diaphragmatic hernia, and bladder extrophy), as well as those with extensive abdominal adhesions.

It is also not encouraged in patients with intolerance to increased intra-abdominal pressures_eg in patients with concomitant obstructive airway disease.

Other limitations to use of PD include presence of abdominal infections like tuberculosis, inflammatory or ischemic bowel disease, abdominal wall or skin infection and severe malnutrition.

Choice of PD modality

The various modalities in practice are:

- *Continuous Ambulatory Peritoneal Dialysis*

(CAPD) Continuous Ambulatory peritoneal dialysis (CAPD) is used in the management of patients with established ESRD. It is the commonest modality of peritoneal dialysis in use worldwide. It should be presented to our ESRD patients as a viable choice of renal replacement therapy when the necessaryequipment(s) are available and affordable.

It could serve our rural population that may have to travel long distances to get to renal care centres.

- *Automated Peritoneal Dialysis*

Automated peritoneal dialysis is used in the management of acute exacerbation of chronic kidney disease (CKD) and in established ESRD. Its use in the first scenario is usually hospital based while that for ESRD is home based. It has various subtypes namely continuous cyclic peritoneal dialysis (CCPD) and Nightly intermittent peritoneal dialysis (NIPD). This is the preferred modality for children under 5 years and/or less than 15kg.

- *Acute Peritoneal Dialysis*

It should not be prescribed for patients with established ESRD except during special circumstances such as inability to secure vascular access, cerebrovascular disease, cardiovascular instability / severe arrhythmias and other intercurrent illnesses.

EQUIPMENT AND RESOURCES

The equipment necessary for a successful peritoneal dialysis program includes:

- **Peritoneal Dialysis Catheters:**

There are 2 major types –

- Rigid PVC catheters equipped with trocar and blade for bedside insertion. This is used for acute PD and for very short periods usu ally less than 1 week but may be retained with special precautions for up to 2 weeks.
- Soft silastic rubber catheter which is inserted laparoscopically or through open surgery. It has various modifications ie straight, coiled, cuffed (single or double), non-cuffed etc. It is used for automated PD and CAPD and could be used for prolonged periods particu larly if the procedure is uncomplicated.

- **Connectology**
  Connectology refers to the tubing used to link the PD catheter to the fluid source. There are different systems developed to address particular complications, the commonest being

PD peritonitis

- Y system
- Baxter 2 system
- Fresenius Safe-lock mechanism
- Twin bag system
- Direct connection between PD fluid and catheter using adaptable infusion sets though not encouraged because of propensity for peritonitis, could be lifesaving in rural communities in developing countries. If it is expedient to institute acute PD using such sets, transfusion set could be used but must be discarded after every exchange.
- PD connectology has undergone various modifications hence the latest varieties are now produced with the PD fluids which is not manufactured locally.

- **PD Fluids**

The fluids are manufactured in different concentrations ie hypotonic, isotonic or hypertonic and their use depends largely on the patient's clinical state and needs. The PD fluid could be glucose, glycerol, amino acid or icodextrin based, while the buffer used could be lactate or bicarbonate. The commonly available fluids are glucose based with lactate buffer. The availability of these fluids is the major limiting factor of peritoneal dialysis in Nigeria, hence efforts to develop indigenous production must be encouraged and sustained. This would reduce the cost of PD in Nigeria by 50-75%.

- *Standard Theatre*
  A standard theatre is vital for PD catheter insertion particularly for CAPD.

- *PD training room (s) & Private treatment room (s) :*
  The patient that would utilize CAPD would need to be trained on catheter care, fluid exchange and need for maintenance of sterility of the procedure and personal cleanliness. A private room with its conveniences would serve this purpose.

- *Personnel*
  Specialist PD nurses are vital to a success ful PD program hence units desiring to commence this treatment modality should engage in capacity development of their staff.

Clinical evaluation and preparation for PD

Patients with chronic kidney disease (CKD) who have reached stage 4 (Page 3) should be counseled about ESRD and renal replacement therapy options, including peritoneal dialysis (PD), haemodialysis (HD) and kidney transplantation as well as conservative management.

- **Placement of PD catheter**

There are different insertion methods for different catheter types.

- Laparoscopic insertion
- Open surgery
- Other special bedside techniques eg Y-Tech insertion method by Ash *et al*.
  - In all these instances the catheter must be tunneled.
  - Other insertion methods are used for various modifications of CAPD catheters.
  - Timing of PD catheter insertion should be well before commencement of CAPD procedure. An allowance for 4-6 weeks would allow correction of any early catheter-related problems. Early break in can be allowed when the need arises.
  - The blind method is usually used to insert Rigid PVC catheters equipped with trocar and blade at the bedside. This is used for acute PD and for very short periods.

Viral screening

This is desirable at initiation of therapy so as to ensure total care for the patient and protect the health personnel. Screening for anti HCV, HBsAg and anti HIV antibodies could be performed but all necessary pre and post test counseling must be ensured. It is particularly important as the patient could consider transplant in future.

Immunization

Immunization for Hepatitis B virus is desirable for similar reasons and influenza and pneumococcal vaccination could be offered to CAPD patients as well when available.

Peritoneal dialysis procedure

- Peritoneal dialysis prescription [7-9] Peritoneal dialysis should be prescribed for willing patients after careful evaluation. To optimize middle-molecule clearance in patients who have minimal residual renal function (RRF), the CAPD prescription should preferentially include dwells for the majority of the 24-hour day.

A minimum prescription should be Four 2L PD fluid exchanges during the day with or without night dwells depending on the peculiar needs of the patient. Indwelling time of 3-4 hours should be observed between exchanges. If there is need to augment clearance, the instilled volume per exchange should be progressively increased before increasing the number of exchanges per day.

For patients on automated PD, the exchanges are carried out at nights, 4-5 exchanges with or without a day dwell.

To achieve volume control, the lowest possible dialysate dextrose concentration should be used while dietary sodium and fluid restriction as well as the use of diuretics can be undertaken to control hypertension.

A combined urinary and peritoneal Kt/V[urea] of ≥ 1.7/week or a creatinine clearance of 50L/week/1.73m^2 considered as minimal treatment doses by other guidelines should be adopted. This should however be increased in symptomatic uraemic patients [7-9].

In addition strategies that retard progression of CKD or preserve residual renal function should be encouraged. These include control of anaemia, blood pressure (using ACEI and ARBs), calcium-phosphate homeostasis, dyslipidaemia, avoidance of nephrotoxins (including NSAIDs), hydration and malnutrition.

- Peritoneal equilibration test (PET) Peritoneal membrane function should be monitored at least 6 weeks after commencing CAPD or automated PD and annually thereafter except when clinically indicated. Peritoneal equilibration test should be used.

- Assessment of PD adequacy Both residual endogenous creatinine and peritoneal dialysis clearances are important in CAPD and should should be monitored every 6 months except otherwise clinically indicated. The minimal treatment doses mentioned above should be maintained.

Medical management of PD patient

- *Hypertension :* Hypertension should be managed according to recommendations on Section 2 subsection D. In CAPD patients with residual renal function who is hypertensive, preference should be given to the use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs). While in those without hypertension but still has residual renal function, ACE inhibitors or ARBs should be considered further preserve the residual function.
- *Malnutrition* (Refer to Section 2 subsection H.) Nutritional status of CAPD patients should be assessed at least once in 6 months.

Dietary protein allowance is generally >1.2g/kgbody weight /day to cater for losses through the PD fluid. It should not be lower than 0.8g/kg/day [15]. (Refer Section 2 subsection H.)

- Anaemia (Refer Section 2 subsection E.)
- Bone Disease (Refer Section 2 subsection F.)
- Dyslipidaemia (Refer Section 2 subsection G.)

Achievement of treatment targets

Local experience is very limited on achievability of treatment targets in CAPD. To improve ultrafiltration, clearance and quality of life it may be desirable to increase dwell volume, frequency of exchange, number of night dwells, etc [7-9, 16].

PD Peritonitis and care of PD catheter/exit site

- PD Peritonitis can be diagnosed if the patient presents with two of the following criteria

- Cloudy effluent or abdominal pain

- Elevated WBC count (>100 cells/cu mm)or Neutrophil count (>50 cells/cu mm)

- Positive culture of PD effluent

o Prevention Strategies.

PD units should observe universal precautions on sterility and cleanliness.

Hand washing with antiseptic soap must be ensured before and after performing procedures both by the patients and the hospital personnel.

It is important that units should undertake regular audit of their infection rates, and identify causative organism(s) and treatment outcomes. Local treatment and prevention protocols need to be developed.

Flush-before-fill dialysis delivery systems is encouraged and patients should undergo regular revision of their technique and receive regular intensified training.

Antibiotic prophylaxis is encouraged after initial catheter insertion. Clavulanate potentiated Amoxicillin, quinolones, ceftriazone or ceftazidime have been used in various units in Nigeria with success.

Topical antibiotic administration could be used to reduce the frequency of exit-site infection and peritonitis

o Treatment

Exit site infections usually present with pain, swelling, serous and / or purulent discharge. Swabs should be taken for culture and initial em piric therapy should be commenced with oral antibiotics that will cover *S. aureus, Klebsiela spp, Escheri chia coli and P. aeruginosa.*

Dose adjustments as recommended in ISPD guidelines could be employed [8].

Initial treatment regimens for peritonitis should cover for both Gram positive and Gram negative bacteria pending microbiology results [9].

Intraperitoneal antibiotic treatment is instituted after confirmation of peritonitis. Antibiotic combinations should include quinolones, ceftriazone or ceftazidime clavulanate potentiated Amoxicillin pending the availability of culture results. Catheter should be removed if there is relapsing peritonitis, refractory peritonitis, refractory tunnel infection and fungal peritonitis.

Systemic antibiotic therapy should be given in cases of sepsis but particular attention must be paid to dose adjustments in ESRD patients on CAPD [8].

Research areas identified:

1. Wider multicentre prospective study on applicability and usefulness of CAPD in Nigeria.
2. Peritoneal membrane characteristics and its impact on mortality in Nigerians.
3. Cost containment measures in CAPD management.
4. Pattern of peritonitis and modalities of controlling and reducing it.
5. Health related QOL in CAPD patients in Nigeria.

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SECTION V

KIDNEY TRANSPLANTATION

INTRODUCTION

Kidney transplantation remains the best option for management in established ESRD conferring survival benefits in the short and long-term, significant cost saving benefits and the best possible 'Quality of Life'[1,2,3].

The shorter the time spent on dialysis prior to the transplant, the better the outcome of graft survival [4].

Sources of kidneys:
Cadaveric
Living-related
Living emotionally related

As of now, only Living-related and Living emotionally related transplantations are the available modalities in Nigeria.

Indication: Established ESRD with GFR less than 15mls/min (Stage 5 CKD) for at least 3 months.

Absolute contraindications [5]
These include unresolved malignancy, active chronic infections, life expectancy of recipient less than 10 years and other end stage organ disease. Others include severe cardiovascular disease and insufficient finances for post transplant medications.

Relative contraindications [6]
These include a history of non-compliance, obesity/malnutrition, extremes of ages less than10 years or more than 65 years and emotional instability/psychosis. Others include decreased mental capacity/dementia, poorly controlled diabetes, possibility of recurrence of primary disease and substance abuse.

Assessment of recipient for appropriateness for transplantation.

(1) Patients must be confirmed to be in established End Stage kidney failure (ESRD), stage 5 CKD. These should include (but not limited to)
   (a) eGFR by MDRD
   (b) 24hr Creatinine Clearance
   (c) USS examination of the Kidneys
   (d) Exclusion of potentially reversible causes of renal dysfunction.

(2) Exclusion of any contraindications to renal transplantation above.

Suitable live donors should include [7**];**

- Aged between 18yrs and 65yrs
- Genetically related individuals
  - Parents
  - Siblings
  - Offsprings
  - Cousins (up to 3rd Cousins).
- Emotionally related individuals (including but not limited to)
  - Spouses
  - Friends

Altruism in these cases would need to determined by both a legal affidavit and the opinion of a separate ethics committee (consisting of at the least a legal practitioner, a physician unrelated to the program, a religious leader) meeting the donor and recipient together and separately and must give a written attestation of the altruism involved. Every effort must be made to discourage organ trafficking and transplant commercialism as enshrined in the Declaration of Instanbul [8].

(d) Must have two physiologically and anatomically normal kidneys with no medically discernable risk of shortened life span as a consequence of kidney donation.

(e) Must have no chronic infection or malignant condition that may be transferred to the recipient during the process of the transplant.

(f) Must be in a position to give a fully informed and signed consent and must be under no Psychological, Emotional, Physical or Commercial compulsion of any sort.

(g) Must be assured of long term follow-up geared towards identifying any potential complications of kidney donation.

(h) Should be assured of an accelerated consideration in any deceased donor renal transplant Program in the event that he/she in the future develops renal failure and the need for a kidney transplant.

(i) Should share compatible blood group and have good HLA match.

Recipient Pre- Transplant Investigations

- Blood Group
- Genotype
- HIV, HBsAg, HCV, VDRL, EBV, CMV Screening
- Chest X-Ray (CXR)
- Electrocardiography (ECG)
- Echocardiogram.
- Coronary angiography if evidence of coronary artery disease or in diabetics older than 50 years.
- Venous/ Arterial Doppler studies of femoral vessels if long term femoral cannulations or evident bruits.
- Electrolytes, Urea, Creatinine, Calcium, PO4, serum protein (total and albumin)
- LFTS and lipids screen
- FBC + ESR.
- Urinalysis + MSU M/C/S
- Renal USS + Abd USS.
- PsA definitive if male and > 40yrs.
- FBS + OGTT if necessary HbA1C
- Full Breast Examination if female
- + (plus)Mammogram if older than 40 years.
- Pap smear in Females.
- Dental Examination
- HLA typing and Cross Match.
- + PRA'S, DSA'S

Donor Pre-Transplant Investigations

- Blood Group
- Genotype
- Weight – Height BMI
- HIV, HBsAg, HCV, CMV, VDRL, EBV Screening.
- E/U/Cr, eGFR (MDRD) or Cockcroft)
- LFTS
- FBC ESR + CRP
- FBS + OGTT if abnormal. HbA1C
- Lipid profile
- 24hr Creatinine Clearance
- Urinalysis + M/C/S
- Renal USS
- CXR.
- ECG.

- Echocardiogram if > 50yrs
- HLA Typing and Cross match
- Renal Angiogram after review of all above and decision taken to go ahead with the transplant.
- Group and X match 2 unit's blood

Other Considerations for immediate preop

- **o** Dialyze patient effectively thrice weekly for at least 2 weeks prior to the date of the transplant.
- **o** Patient must be dialyzed not earlier than 24hr before the intended transplant to obviate the need for dialysis within 48hr post transplant in the event of delayed graft function or accelerated acute rejection.
- **o** Avoid transfusion once the HLA typing and Cross match have been done and crossmatch negative. In case of any transfusion, wait at least 2 weeks and repeat crossmatch before transplantation.
- **o** Insert a central venous catheter prior to the transplant for CVP monitoring post operatively
- **o** Review by Urologist or Transplant surgeon
- **o** Review by anesthetist experienced with peculiarities of anesthesia in transplant recipient
- **o** Adequate control of BP and Blood Glucose (if Diabetes)
- **o** Adequate correction of anemia preferably by EPO and Iron Infusion.
- **o** Exclusion of any ongoing acute and chronic infections.

PROPHYLAXIS IN RECIPIENTS

- Prophylactic antibiotic; I.V. Rocephin 1G stat at induction and repeat daily for 3days.or Vancomycin 1G Stat + Genticin 80mg Stat. (If pt is allergic to penicillin and cephalosporin)

- Prophylactic antifungal; Oral Nystatin 200,000 units as part of premed and repeat 200,000unit 8 hourly till 4 Weeks post transplant or till discharged, whichever is later [9].

- Prophylaxis for Pneumocystis carinii; Co-trimoxazole 1 Tablet daily for six months [10].
- Ulcer Prophylaxis; Omeprazole 20mg daily for 6 month or until prednisolone dosage is 7.5 mg dly or less whichever occurs earlier [11].

- Thrombosis prophylaxis;

- **o** Aspirin 75mg stat with premed and daily thereafter or Heparin 5000units 12hourly post surgery (stop only if frank bleeding, not routinely for biopsy) [12].

- Osteoporosis prophylaxis [13];

- **o** 1 alpha calcidol O.25mcg daily

- Protection From Ischemia [14]

- **o** Nifedipine SR 10mg or Amlodipine 10mg

- Tuberculosis prophylaxis [15];

- **o** Isoniazid 150mg daily + Pyridoxine 50mg daily.

- CMV prophylaxis for high risk groups;

- **o** Acyclovir 200mg thrice daily or ValGancyclovir 450mg daily till six months with dose adjusted to renal function [16].

- Malaria Prophylaxis

- **o** Proguanil 100mg daily

- Till six months post transplant. Start only after serum creatinine is less than 2 mg/dl [17]

IMMUNOSUPPRESIVE DRUGS, INDUCTION AND MAINTENANCE

(A) Induction therapy[18]

This is a major cost and has been demonstrated to reduce acute rejection rates without major impact on long term graft survival. Another major consideration is the risk of opportunistic infections due to the greater degree of immunosuppression.

Induction should thus be considered only in high risk patients

(j) Previous transplant
(ii) Previous multiple Blood transfusions
(iii) Previous multiple Pregnancies
(iv) Children
(v) Haplotype Mismatches
(vi) Presence of HLA antibodies or Donor specific antibodies
(vii) Deceased donor kidney transplantation.

Options include

a. Thymoglobulin (ATG) 5mg/kg daily x [2/7] then 3.5mg/kg daily x [5/7]
b. Basiliximab (Simulect) 20mg days O and 4 use 10mg if <35kg

Standard Triple regimen induction for low risk patients:

(i) Cyclosporine (Neoral) 5mg/kg bd started 24hrs preop.
In children do "priming induction" and start 72 – 96 hrs preop.
Give with a little water on the morning of the transplant.
(ii) a. I.V. Azathioprine 3mg /kg as part of premed on Morning of the transplant.
(iii) (a.) I.V. Methylprednisolone 500mg as part of premed (slowly) on the morning of the transplant.
(b.) I.V. Methylprednisolone. 500mg stat at release of clamps.

(B) Maintenance immunosuppressive

Even though the use of the anti proliferative agent Azathioprine has declined in developed countries with the introduction of Mycophenolate, the Myss study convincingly demonstrated that long term efficacy of Azathioprine and MMF are comparable even though MMF costs 15 times more [19].

The Calcineurin inhibitors are however indispensable and there is an increased risk of graft loss and increased incidence of acute rejection if avoided or withdrawn.

Cyclosporine and Tacrolimus are both accepted although Tacrolimus has lower acute rejection rates and Nephrotoxicity but higher incidence of post transplant diabetes.

Combination of Cyclosporine (CsA) with ketoconazole 100mg daily reduces the dose requirements of CsA by 50- 70% whilst Diltiazem reduces the dose of CsA by 30-50%.

Combination with Rifamipicin however increases the dose requirements by 100%.

Standard Triple Regimen;

(1) Corticosteroids
Methylpred O.5g I.V. with Pre med
Methylpred O.5g I.V. with release of clamps
Oral prednisolone 20mgfrom day 1 after 2 weeks reduce 2.5mg every fortnight to 7.5mg daily till 1yr Reduce to 5mg daily after 1yr.

(2) Azathioprine
3mg / kg I.V. with Premed
2mg / kg I.V. when clamps released
1mg / kg orally daily from day 1 stop if WBC $<3.5x10^9$/L.
Reintroduce when WBC > 5.0×10^9/L

(3) Cyclosporine (Neoral)
Start at 5mg/ kg twice daily orally
Give first dose with premed.
Avoid I.V. Cyclosporine but if necessary give as [1/3] dose of oral.

Adjust dose depending on C^o or C^2 levels.
If dose of CsA is changed do not measure blood levels till 36hrs after.Aim for 3mg /kg bd by 6 months post transplant.

Co Levels for CyA [20]
1-3 months 250 – 350 ng/ ml
4-6 months 150 – 250ng/ ml
6 -12 months 100 – 200ng/ml
> 12 months 100 – 200ng/ml

C_2 Levels for CyA [21]
1st Month 1,700ng /ml
2nd Month 1,500ng/ml
3rd Month 1,300ng/ml
4 – 6 month 1,100ng/ml
6 – 12 month 900ng/ml > 12 month 800ng/ml

(4) Mycophenolate may also be given if the patient is high risk or there are any episodes of acute rejection.

The EARLY Postoperative Period

1. Observations
   a. Half hourly BP, Pulse and respiration
   b. Hourly CVP
   c. Hourly urine output
   d. Hourly temperature
   e. Hourly Glucometer Checks
   f. Daily weight
2. Routine investigations
   a. FBC 12hourly
   b. E/U/Cr 12hourly
   c. Urinalysis daily
   d. Check WBC before each dose of Azathioprine and omit if WBC < 3.5 x 10^9/L
3. I.V. Fluids;
   Titrate fluid administration to keep CVP >10cm
   Alternate Ringers Lactate with Normal Saline with 5% Dextrose
4. Urinary Catheter usually left for 3 – 5 days but check with surgeon.
5. Drains;
   Wound drains usually removed after 48 -72 hrs Check urea and electrolytes if any suspicion that it contains urine.
6. Doppler USS assessment by 72 hrs or earlier if any suspicion of vascular complications.
7. Diet;
   Normal diet when bowel sounds heard and food is tolerated.
8. Mobilize patient early
   Give LMW Heparin if bed bound for > 48 hours
9. Indicate boldly on notes if ureteric JJ stent in place.
   Remove at 6 weeks.
10. Avoid dialysis for 24- 48 hrs post op if possible.

SPECIAL SITUATIONS

Acute Rejection

(a.) Hyperacute Rejection occurs only with preformed antibodies. Remove the graft.

(b.) Accelerated acute rejection occurs within 24 hrs – 4 days. Due to sensitization from previous transplant, transfusions and pregnancies.

(c.) Acute Rejection
Occurs days to weeks post op. Systemic disorder with multiple cyctokine (TNF)induced constitutional symptoms. Multiple acute episodes, late episode >1yr, more severe episodes all increase risk of chronic rejection. Severe acute rejections include vascular rejection and those resistant to steroids.

Treatment

1. Pulse Methylpred 125 mg – 1 kg (3-5mg /kg) daily for 3 – 5 days. (Successful reversal in 75% of cases).
2. ATG 3mg/kg daily for 8- 10/7.
3. OKT3 5mg bolus dly for 7 – 14/7
   Reserve 2 & 3 only for severe acute rejection or biopsy proven antibody-mediated rejection . If on Azathioprine, switch to Mycophenolate formulations [22]

Follow-up;

Discharge recipient usually by 10 days to 2weeks.
Outpatient follow-up, twice weekly for first month.
Weekly, second month.
Two weekly third month
Monthly thereafter

Cyclosporin / Tacrolimus Assay

Day 3 post op by which time you should expect to achieve therapeutic levels.

Weekly for 1st 4 weeks or 36hours after any dose changes.

Repeat if any unexpected rise in Urea or Creatinine

Renal Graft Biopsy

Graft biopsy should be done if clinically indicated.

Indications include:

a. Delayed Graft Function
b. Acute Rejection
c. Rising Urea or Creatinine Values.

Pregnancy and Contraception Post-Transplant
Approximately 1 in 50 women of child bearing age with a functional transplant becomes pregnant. Although the incidence of spontaneous abortions may be higher than normal, there is no increase in the incidence of congenital abnormalities in pregnancies carried to term. There is a definite risk of rejection in pregnancy (about 9%) and permanent impairment of graft function in 15% [23] .

. Pregnancy is best achieved 2-5 years post transplant when graft function is relatively normal and stable. A successful outcome is more likely if creatinine less than 1.5mg/dl.

Contraception
This should be addressed prior to discharge after transplantation.

The risks to the graft of pregnancy and the need to wait till at least 2 years post-transplant must be clearly explained to the patient. Oral contraceptive pills have a potential for drug interaction with cyclosporine and if used would necessitate frequent drug level monitoring, The intrauterine contraceptive devices may increase the risk of infection but this risk is worse close to the time of insertion and as such use the longer acting alternatives and cover with prophylactic antibiotics at the time of insertion. Barrier methods are safest, show least risk of side effects and offer the added advantage of reduction in risk of transmission of STD's.

Kidney transplant in HIV seropositive patients
HIV infection is not a contraindication to a successful kidney transplant. Life expectancy of at least five years is considered appropriate to go ahead with a renal transplant [24].

Criteria

- CD4 > 200cells/microlitre for at least 6 months.
- Undetectable HIV viraemia (<50 copies/ml) for 6 months.
- Adherence to HAART for >6 months.
- Absence of AIDS defining illnesses following immune reconstitution after HAART.
- Available HAART options in the future.
- Absence of chronic infections that may reactivate with immunosuppression.
- Absence of any malignancies e.g. Kaposi Sarcoma.

Immunosuppression is as with other patients but drug/drug interactions between antiretrovirals is a consideration that would necessitate more frequent assessment of drug levels.

Paediatric patients: renal transplantation is the preferred modality of treatment of terminal CKD and pre-emptive transplantation is encouraged. The need for potent immunosuppression is greater in children. Rapid steroid tapering is advised because of stunting of growth. Human growth hormone may be added if increased growth is desired [25].

Major action point: Providing legal framework for transplantation in Nigeria

Research areas identified:

1. Assessing cost effectiveness and survival post renal transplantation in Nigeria.
2. Determining the appropriate immunosuppressive dosing regime in renal transplant recipients in Nigeria.
3. Assessment of infectious complications of renal transplantation.
4. Assessment of malignancies complicating renal transplantation in Nigeria.
5. Assessment of morbidity and adequate follow-up of kidney donors.

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RELATIONSHIP BETWEEN OBESITY INDICATORS AND REDUCED RENAL FUNCTION AMONG ADULTS IN A RURAL COMMUNITY

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Background: Obesity is defined as a body mass index (BMI) ³30kg/m² or body fat percentage (BF) ³ 25% for males and 32% for females. It is a growing global epidemic and a risk factor for numerous disease conditions including, insulin resistance, glucose intolerance, diabetes mellitus, hypertension, dyslipidemia, chronic kidney disease, sleep apnoea, arthritis, hyperuricemia, gall bladder disease, and certain types of cancer. Indicators of obesity include, waist circumference (WC), waist-hip ratio (WHR), BMI and BF. Though obesity has been associated with chronic kidney disease, there is no consensus on the relationship between obesity indicators, CKD and other metabolic risks.

Aim and objectives: To determine the prevalence of obesity among study population using the various obesity indicators; and the relationship between obesity indicators and reduced renal function.

Methods: This is a community-based cross-sectional study. Five hundred and twenty adults residing in the community were recruited by cluster sampling. Data on their socio-demographic characteristics and health status were obtained and recorded in a structured questionnaire. Body fat percentage was calculated using the Deurenberg's equation. Blood samples were collected on site for determination of serum creatinine and glomerular filtration rate was then estimated using the Cockcroft-Gault (CG) equation. Early- morning urine was also tested for proteinuria.

Results: The sex ratio of participants was 1:1.9 (M:F). Age range was 18-90 year while the mean age was 46.7±17.8 year. The mean WC was 86.2 ± 11.1cm, WHR 0.9 ± 0.1, BMI 25.0 ±4.7kg/m² and mean BF was 38.6 ± 8.6%. BF increased with increasing age. The overall prevalence of Obesity defined by abnormal BMI, BF and WC was 14.1%, 57.4% and 30% respectively. The mean BF and WC were significantly lower in participants with reduced renal function compared to normal. The mean BMI did not differ significantly between the two groups. A reduced BMI was significantly associated with, and predicted reduced renal function.

Conclusion: The prevalence of obesity is high among the population studied. It was much higher when defined using abnormal BF. Mean BF and WC is significantly lower among patients with reduced renal function however there is no significant association between BF, WC and reduced renal function. Finally reduced BMI significantly predicts reduced renal function.

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PATTERN OF SERUM URIC ACID CONCENTRATION AND ITS CORRELATES IN YOUNG ADULT NIGERIANS

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Background: The prevalence of chronic kidney disease (CKD) is on the increase globally with attendant heavy disease burden and high morbidity and mortality particularly in developing countries. Due to the magnitude of CKD burden, poor infrastructure and the high cost of care, especially for ESRD, preventive measures are recommended. Early detection of modifiable risk factors of CKD in population groups and early intervention is the most plausible strategy to possibly prevent CKD and thereby reduce its prevalence. Hyperuricaemia and high-normal serum uric acid levels have been linked to CVD, hypertension, renal disease and metabolic syndrome and recent study showed that treatment with allopurinol slowed the progression of renal disease and reduced the risk of cardiovascular events in patients with CKD. This study was therefore undertaken to determine the pattern of serum uric acid levels and its correlates in young healthy adult Nigerians.

Methods: The demographics of 300 undergraduates of the University of Port Harcourt were obtained using a structured questionnaire designed for the study. Body mass index was calculated from their weights and heights and blood pressures measured following standard protocols. Serum uric acid levels and other laboratory parameters were determined. Data were analyzed using SPSS version 17.0 and results presented as mean±SD and percentages. Comparisons were done using independent variable t-test and Pearson's Chi square test as appropriate. Pearson's correlation test was used to determine the correlates of serum uric acid. P-values < 0.05 were considered statistically significant.

Results: Age of subjects ranged from 17 to 35 years with a mean of 22.53±2.67 years. Males comprised 218 (72.7%) while 82 (27.3%) were females. The mean BMI of the study population was 23.28±2.95kg/m^2 and serum uric acid concentration was 222.43±73.34µmol/L, while the means for systolic blood pressure, diastolic blood pressure and serum sodium concentration were 117.96±9.80mmHg, 74.29±8.24mmHg and 132.25±9.21mmol/L respectively. A total of 248 (82.7%) of the subjects admitted to soft drinks consumption, 85(28.3%) to alcohol consumption while only 18 (6.0%) were current cigarette smokers. Dietary salt intake was reported to be low by 33(11.0%) of subjects, high 10(3.3%) and moderate 257(85.7%). It was difficult to determine dietary salt consumption, what is reported here are subjects' self assessments of their salt intake. Prevalence of hyperuricaemia (serum uric acid > 420µmol/L in males and >360µmol/L in females) was 2.3% in the study population and the prevalence of high normal serum uric acid (310-330µmol/L) was 3%. Systolic blood pressure 140mmHg was recorded in 11(3.67%), systolic blood pressure in the pre-hypertension range of 120-139mmHg 73(24.33%), while diastolic blood pressure 90mmHg was seen in 21(7.00%) and diastolic blood pressure of 80 to 89mmHg was reported in 25(8.33%). The prevalence of obesity BMI 30kg/m^2 was 9(3.00%), while overweight had a prevalence of 57(19.00%). Females in the study population were significantly younger [21.43±2.34 vs 22.95±2.71 years, P=0.00] and also had lower

blood pressures [SBP 113.41±7.90 vs 119.67±9.91 mmHg, P=0.000; DBP 71.06±8.08 vs 75.50±7.99 mmHg, P=0.000]; their serum uric acid concentration was lower [210.12±78.58 vs 227.06±70.90 μmol/L], but only had a tendency towards significance (P=0.07). Serum sodium concentration and BMI were not significantly different [P=0.132 and 0.769 respectively].

Of the variables tested, only body weight [r=0.145, P=0.012] and BMI [r=0.139, P=0.016] had significant positive correlation with serum uric acid. Systolic blood pressure [r=0.053, P=0.358], diastolic blood pressure [r=0.033, P=0.567] and age [r=0.005, P=0.927] had direct but not significant relationship with serum uric acid, while serum sodium concentration [r=-0.088, P=0.129] had an inverse, but also not statistically significant relationship with serum uric acid concentration.

Conclusion: The prevalence of hyperuricaemia and high normal serum uric acid level are relatively low in this young adult population and body weight and BMI significantly correlated with serum uric acid level.

Keywords: serum uric acid, hyperuricaemia, young adults, Nigeria

ABS/2011-PR03
KNOWLEDGE OF KIDNEY DISEASES AMONG UNIVERSITY OF BENIN NON- MEDICAL STUDENTS

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Background: End-stage renal disease (ESRD) is on the increase globally. Renal replacement therapy and management of the ESRD patient is very expensive. Patients with ESRD in Nigeria and their relatives have to bear the cost of treatment. Prevention is thus the best option. Knowledge of kidney disease in the population will aid its prevention. The aim of this study was to determine the knowledge of kidney diseases among university undergraduates.

Methods: A 13- item self administered questionnaire was offered to 3rd and 4th year students of the University of Benin studying Linguistics, Electrical Engineering and Accounting. The data obtained was analysed using SPSS version 16

Results: Out of 350 questionnaires administered, 295 were returned, 183(62%) males and 112 females (38%) with a male - female ratio of 1.6:1. The mean age of respondents was 27.8±3.2years with a range of 18-37years. Students of Linguistics, Electrical engineering and Accounting made up 34.2%, 38.3% and 27.5% of respondents respectively. 5% of the respondents did not know the number of kidneys in the body. 28% did not know the location of the kidneys in the body. 68%, 61% and 49% of respondents believed that inability to pass urine; body swelling and weakness respectively were the symptoms of kidney disease. Their knowledge of the causes of kidney disease was poor; 44% were aware that diabetes mellitus could cause kidney disease but only 25% knew of the association between kidney disease and hypertension. 48% of respondents believed in alternative medicine for the treatment of kidney disease such as spiritual healing, herbal therapy and urine therapy. Their knowledge of haemodialysis was poor (37%) but 89% were aware of kidney transplantation as an option for renal replacement therapy.

Conclusion: The knowledge of the respondents on kidney diseases was poor. There is a need for a better education of Nigerians on kidney disease.

ABS/2011-PR04

SCREENING FOR RISK FACTORS OF KIDNEY DISEASES IN AN OIL PRODUCING COMMUNITY IN RIVERS STATE

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Background: Chronic Kidney Disease is associated with many traditional and nontraditional risk factors. Petroleum products have been associated with kidney diseases. Screening for these risk factors is associated with prompt interventions and preventive measures in kidney disease.

Aims and Objective: The aims and objective of this study is to determine the frequency of risk factors of kidney diseases in an oil producing community in Rivers State.

Subjects and method: This is a cross sectional study. The study location was Ido in Asari Toru Local Government Area of Rivers State. All subjects aged 18 years and above who gave consent were recruited for the study. Their biodata, relevant medical history, clinical and laboratory parameters were documented. The obtained data was analysed with SPSS Vs 15.0

Results: A total of 105 persons participated in the study. The age range was 18 to 86 years, 50.0% were above 50 years. Females were 75.0%, 33.3% had post primary education, 14.3% were retired and 37.2% were traders. 10.5% and 27.8% had history of significant intake of tobacco and alcohol respectively. 13.3% were known hypertensive, 4.8% were known diabetic and non with past history of kidney disease. 22.9% had regular at least thrice weekly exercise however 25.7% were obessed. 39.4% had elevated blood pressure, 4.8% had random blood sugar 200mg/dl and above. Total serum cholesterol was higher than 200mg/dl in 28.6%, LDL was higher 150mg/dl in 24.8%, and 38.4% had proteinuria.

Conclusion: The prevalence of risk factors for kidney diseases is high in this oil producing community. What is the role of oil or its exploration?

ABS/2011-PR05

PREVALENCE OF CHRONIC KIDNEY DISEASE AND RISK FACTORS OF CHRONIC KIDNEY DISEASE IN A RURAL ADULT POPULATION IN NIGER DELTA, NIGERIA

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Background: The prevalence of chronic kidney disease is increasing globally as a result of increasing burden of non-communicable diseases and other risk factors in both urban and rural populations.

Aim: To determine the prevalence of CKD and its risk factors in Odufor-Etche, a rural community in Rivers State, Nigeria.

Ethical consideration: The study was approved by the ethics committee of the college of health sciences of the University and only consenting subjects were included in the study.

Methods: Socio-demographic, anthropometric, clinical and laboratory parameters of consecutive subjects were determined following standard protocols. Estimated GFR was calculated using MDRD formula.

Results: 300 subjects were studied; 140 (46.7%) males and 160 (53.3%) females. The mean age was 40.55±17.30 years. Mean BMI, systolic and diastolic blood pressures were 21.30±4.06Kg/m^2, 120.02±15.99 mmHg and 71.74±11.19 mmHg respectively. Mean FBG was 4.85±0.93mmol/L, total cholesterol 4.28±0.68mmol/l, triglyceride 1.33±0.28mmol/L, HDL 0.92±0.18mmol/L and LDL 2.78±0.62mmol/L. Being from a farming community level of physical activity was high with 52.7% engaging in moderate intensity, 30.0% very intense and 17.3% mild physical activity. Current cigarette smokers accounted for 34(11.3%) of the population and those who snuffed tobacco 40(13.3%); there were no female smokers. The prevalence of CKD[eGFR<60ml/min/1.73m^2] was, 6(2.0%), mostly females 5(83.3%) with mean age and eGFR of 50.67±23.30 years and 44.97±16.01 ml/min/1.73m^2. Prevalence of diabetes mellitus [12(4.0%)], obesity 15(5.0%) and metabolic syndrome [19(6.3%)], while the prevalence of hyperfiltration [60(20.0%)] and hypertension [50(16.7%)] were relatively high. Dyslipidaemia showed a variable prevalence, high LDL 5(1.7%), hypercholestrolaemia 19(6.3%), hypertriglyceridaemia 34(11.3%) and low HDL dyslipidaemia alarmingly high 257(85.7%).

Conclusion: The prevalence of CKD is low in this rural community. Prevalence rates of risk factors are relatively low except for hypertension and hyperfiltration. There is however, need for health promotion activities.

ABS/2011-PR06

PREVALENCE OF CHRONIC KIDNEY DISEASE AND ITS FACTORS AMONGST ADULTS IN A RURAL POPULATION IN EDO STATE, NIGERIA

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Background: Chronic kidney disease (CKD) in recent times has become a global public health concern, increasing worldwide at an annual growth rate of 8% with both high costs and poor outcomes of treatment. The adverse outcomes of CKD such as end stage renal disease (ESRD), cardiovascular morbidity and mortality and premature death are enormous in our part of the world due to paucity of facilities for renal replacement therapy and high cost of services for management of ESRD. Prevention at all levels is the most effective way of retarding this fast growing problem.

Aims and Objective: The aim of the study was to determine the prevalence of CKD and its risk factors amongst adults in a rural community in Edo State.

Methodology: This is a community-based cross-sectional study. Five hundred and twenty adults residing in the community were recruited by cluster sampling. Data on their socio-demographic characteristics and

health status were obtained and recorded in a structured questionnaire. Early morning urine was examined for urinary abnormalities such as proteinuria and haematuria, using the 10 parameter dipstix (Medi-Test Combi 10®). Blood samples were collected on site for determination of serum creatinine, random blood sugar (RBS) and packed cell volume (PCV). Glomerular filtration rate was then estimated using the Cockcroft-Gault (CG) equation. All Individuals who had urinary abnormalities as detected by dipstix were re-visited after a period of three months to confirm persistence of these abnormalities.

Results: A total of 476 participants completed the study giving a response rate of 91.5%. Male to Female ratio was 1:1.9. The mean age of participants was 46.7±17.8 yr. The mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) were 127± 20mmHg and 78±12mmHg respectively. Significant Proteinuria was detected in 21 participants (4.4% of the study population), out of which 18 (3.6% of the population) had persistent proteinuria. Prevalence of hypertension was 34.2% and diabetes 2.1%. The prevalence of CKD according to NKF K/DOQI definition was 27.2%. Risk factors significantly associated with CKD were increasing age, systolic and diastolic hypertension, proteinuria, use of NSAIDS, use of skin lightening agents and use of herbal remedies. Increasing age and systolic hypertension were the strongest independent risk factors of CKD. Prevalence of obesity was significantly lower among individuals with CKD, and a BMI< 30kg/m^2 was predictive of CKD.

Conclusion: Chronic kidney disease is common in Ogbona and the prevalence increases with increasing age. The risk factors of CKD are prevalent in the community. Screening for the early detection of CKD and its risk factors is strongly recommended to retard the growth of the problem

ABS/2011-PR07
RESULTS OF ROUTINE SCREENING FOR MARKERS OF CHRONIC KIDNEY DISEASE IN ADULTS AND SECONDARY SCHOOL STUDENTS IN A SEMI-URBAN COMMUNITY DURING WORLD KIDNEY DAY (WKD) 2010.

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Background: The prevalence of chronic kidney disease (CKD) has assumed epidemic proportion globally and data from Nigeria suggest a rising trend. Unfortunately majority of affected patients present late and die early from uraemia and cardiovascular disease. Renal replacement therapy options are unaffordable and therefore unsustainable b y those with advanced disease hence our only hope is in mounting preventive nephrology programs. This has led to the clarion call for commemoration of WKD annually on the first Thursday in the month of March. As part of the program for 2010 the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC) WKD team conducted screening for markers of CKD in a secondary school as well as in volunteers after public enlightenment and sensitization programs with the aim of detecting (if any) the presence of proteinuria, hypertension and obesity.

Methodology: Our entire team conducted free medical screening for students of a secondary school and interested members of the public. The screening included blood pressure check, weight and height assessments as well as urinalysis using medi-test Combi 2 (Macherey Nagel, Germany) test strips. The summary of the results of the screening is outlined below.

Results: A total of 1014 participants were screened, 777(76.6.%) were students aged less than 20 years, 76 (7.5%) participants were in the 20-39 year age range, 91(9.1%) were in 40-59 years age range, 62 (6.1%)

were in the 60-79 year age range while only 30 (3%) were older than 70 years. Of the participants, 513 (50.5%) were females while 501(49.5%) were males. Hypertension was detected in 15 (1.9%) of participants aged less than 20 years, while the prevalence increased exponentially after 4th decade. 44% of participants aged 40 and above were found to be hypertensive ($p<0.0001$). On dipstick testing, 535 (52.8%) had no proteinuria while the remaining 479 (47.2%) had varying degrees of proteinuria which worsened with increasing age ($p<0.0001$). Hypertension demonstrated weak positive correlation with the degree of proteinuria ($r=0.157$, $p<0.0001$). BMI was less than 20kg/m^2 in 43.9% while 38.3% had BMI between 20kg/m^2 -25kg/m^2 range. It was higher than 25kg/m^2 in 17.8%.

Conclusion: Routine screening for proteinuria should be encouraged in all individuals ie adults and children alike while that for hypertension should be mandatory from fourth decade of life Lifestyle modification should be encouraged to reduce incidence of obesity.

ABS/2011-D01
UNCOMMON COMPLICATIONS OF HAEMODIALYSIS VASCULAR ACCESS – 2 CASE REPORTS

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Background: Haemodialysis vascular access plays significant role in determination of the adequacy and efficiency of haemodialysis. Haemodialysis vascular access can be temporal, semi-permanent or permanent depending on the durability of the access. Complications arising from the vascular access constitute limitations. And also contribute to morbidity and mortality associated with haemodialysis. Though complications are common with temporal access, occasional with the semipermanent access, they are not absent with the permanent type of vascular access. These complications can be early or late, mild or severe, frequent or rare. We report 2 uncommon but severe complications resulting from haemodialysis vascular access in end-stage kidney disease patients.

Case 1 is a 58 years old businessman on maintenance haemodialysis from diabetic nephropathy. He was initially on internal jugular for 6 weeks but later radio-cephalic AVF created as vascular access for haemodialysis. He was on regular thrice weekly haemodialysis for 3 years. He presented with septicaemia resulting from infected aneurysm of the AVF. The AVF was subsequently closed surgically and other medications were given.

Case 2 is a 65 years old man, a retiree that had end stage kidney disease resulting from chronic glomerulonephritis. He was on maintenance haemodialysis for 11 months, initially (9 months) using femoral vein and later internal jugular vein as vascular access. He had a live related kidney transplant 2 weeks earlier but presented with acute loss of the transplanted kidney following thrombosis of the femoral vein on same site with the transplanted kidney. He had vascular intervention and the transplanted kidney regained function.

Conclusion: Complications resulting from vascular access can be life threatening, thus the need for optimum use and care of the vascular access.

ABS/2011-D02

SPECTRUM OF RENAL DISEASE IN PATIENTS UNDERGOING HAEMODIALYSIS IN A PRIVATE KIDNEY CARE CENTRE IN RIVERS STATE

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Background: Nigeria is not exempted from the global increase in prevalence of kidney disease. The spectrum of kidney disease varies from mild/transient acute renal injury to end stage renal disease requiring renal replacement therapy. Septicaemia and chronic glomerulonephritis has been variously reported as the commonest cause of acute and chronic kidney disease respectively.

Aim of this study: The aim of this study is to highlight the spectrum of kidney disease in patients presenting for haemodialysis in a private kidney care centre in Port Harcourt Rivers State.

Subjects and method: This is a retrospective study. The biodata, clinical and laboratory parameters of patients presenting for haemodialysis from 1st August 2008 to 31st July 2010 were obtained and entered in a spreadsheet. The data obtained was analysed using SPSS VS 15.0

Results: A total of one hundred and one patients had haemodialysis during the period studied, 54 (53.5%) males and 47 (46.5%) females. The age range was 15 to 85 years, 81.4% were less than 60 years. Fifty nine (57.4%) patients were in end stage kidney disease and 40(39.6%) had acute renal failure. 14.8% were HIV seropositive. Hypertensive nephrosclerosis was the commonest cause of chronic renal failure occurring in 24.6% of patients. Septicaemia was the commonest cause of acute kidney injury occurring in 40.0% of the patients. Other causes were chronic glomerulonephritis, diabetes nephropathy, obstructive uropathy, adult polycystic kidney disease, toxic nephropathy for chronic kidney disease and gastroenteritis, haemorhage, acute glomerulonephritis for acute renal failure.

Conclusion: Hypertensive nephrosclerosis and septicaemia were the commonest cause of chronic and acute renal failure respectively.

ABS/2011-D03
PATTERN OF PATIENT PRESENTATION IN A NEW DIALYSIS FACILITY AT NAUTH, NNEWI (NOV 2009- NOV 2010)

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Objective: To give a one year review on haemodialysis as seen in the dialysis centre of the Nnamdi Azikiwe University Teaching Hospital Nnewi (NAUTH)- the experience of the first year of the centre (Nov. 2009- Nov. 2010).

Method: All cases of renal disease requiring haemodialysis whether acutely or chronically, managed by the dialysis centre at NAUTH Nnewi between November 2009 to November 2010 were included in the study.

Data was obtained from the renal register of the centre. This included the biodata, type and cause of renal disease, the clinical and laboratory data, frequency of haemodialysis and patient outcome. These were recorded and analyzed using SPSS version 13.0.

Result: A total of 63 patients received haemodialysis during the period under review. Thirty-eight (60.3%) were males while 25 (39.7%) were females with a male: female ratio of 1.5: 1. Their mean age was 46 ± 15 years. The most common diagnosis was hypertensive nephropathy 27(42.2%) followed by CGN 16 (25%) and Diabetic nephropathy in 13 (20.3%). Three patients (4.7%) had obstructive uropathy, two had acute renal failure, one patient had severe renal artery stenosis and the remaining one had ADPKD. The most common indication for dialysis was uremic encephalopathy. The mean systolic and diastolic blood pressures were 157± 23 and 94 ±14 mmHg respectively. Majority of the patients were hypertensive 59 (993.6%) while 62 (98.450 were anemic. The most common complication during dialysis was hypotension occurring in 4 (6.3%0 f the patients. Only 1.6% had renal transplant, 46.9% are still dialyzing and being followed up while 42.25 were lost to follow up. Only 7.8% were recorded dead.

Conclusion: Kidney disease is prevalent in our environment. Patients present late and in poor clinical condition. Poverty and ignorance were the major setbacks as patients were not able to get adequate dialysis due to financial constraint. Most of the patients that needed dialysis did not get it from the centre because they were seropositive for hepatitis B, C and HIV virus.

ABS/2011-D04
CLINICAL PROFILE, INTERVENTION AND OUTCOME OF PATIENTS DIALYSED AT LAGOS STATE UNIVERSITY TEACHING HOSPITAL (LASUTH), IKEJA.

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Introduction: Hemodialysis at the critical care unit (CCU) of the Lagos State University Teaching Hospital(LASUTH), Ikeja commenced in November 2009.This study presents a review of the clinical profile, intervention and outcome of patients dialysed at the Unit between November 2009 to November 2010.

Methods: A retrospective study of all patients dialysed at the CCU of LASUTH, Ikeja between November 2009 and November 2010 was done. Data from the dialysis charts and available case notes were retrieved from the medical records department. Data relating to age, gender, type and aetiology of renal function impairment, number and duration of hemodialysis, vascular access route and outcome were obtained. A descriptive analysis of data was done using the statistical software SPSS version 15.

Results: Twenty two (22) patients were dialysed during the study period. The mean age was 45.6years ± 18.2 (range 15 to 80). There were 16 males and 6 females. Male:female ratio was 8:3. The clinical diagnoses were acute kidney injury (AKI) in 7(32%) patients and End Stage Renal Disease(ESRD) in 15(68%) patients. The most common cause of AKI was obstetric related complication occurring in 2 (9.1%) patients. Hypertension was the commonest cause of ESRD occurring in 6 (27%) patients while diabetes and chronic glomerulonephritis occurred in 4(18%) each. The most common access route was internal jugular 13(59%) while nine (41%) patients had repeated femoral cannulation. Most patients had infrequent dialysis. Of the 15 ESRD patients, only 4(18%) could afford more than 10 hemodialysis sessions while 8(32%) had less than 10 dialysis sessions. Four (18%) AKI recovered renal function. Three (14%) ESRD were referred for renal transplantation, 3(14%) were lost to follow up, 2(9%) are still on maintenance hemodialysis while 10(45.5%) died.

Conclusion: Young adult males constituted majority of the patients dialysed. The most common cause of ESRD was hypertensive nephrosclerosis. Internal jugular cannulation was the most frequently used access route.

ABS/2011-D05
A ONE YEAR REVIEW OF PATIENTS UNDERGOING TREATMENT IN A NEW DIALYSIS CENTER OFFERING SUBSIDISED TREATMENT

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Background: Management of end-stage renal disease poses a great economic and social burden on patients, their families and the community. Increase in hospital prevalence rates of chronic kidney disease (CKD) has resulted in the emergence of new haemodialysis units in the country. Majority of patients with CKD could not afford the cost of renal replacement therapy. This has prompted the Bauchi State government to subsidise the treatment for all Nigerians affected with this disease. Dialysis session cost only 5000 naira with no reuse, in its newly commissioned haemodialysis center.

Methods: A retrospective review of patients treated over one year period to study their clinical and demographic characteristics and compare with previous reports from other parts of the country.

Results: Seventy patients were referred to the center during the study period, seven were transferred to other centers on request. There were 27 patients on regular haemodialysis for mean duration 8.2± 4.2 months. Among those on regular dialysis 17 were males and had a mean age 41.9±14.2. Their mean systolic and diastolic blood pressures were 159±26 and 78± 16. The mean Haematocrit was 27± 5.4 with only 30% on erythropoietin regularly.

Conclusion: This study has shown that with subsidy on the cost of dialysis many Nigerian CKD patients can be sustained on maintenance haemodialysis with fair blood pressure and haematocrit levels. Unlike previous reports were majority of the patients could not afford dialysis for one month majority of our patients were on dialysis for one year. We therefore call on the government subsidise the cost of this treatment to our patients.

ABS/2011-D06
CLINICAL OUTCOMES OF DIALYSIS TREATED ACUTE KIDNEY INJURY PATIENTS

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Background: Acute kidney injury is a common cause of adult medical admission in Nigeria and significant proportion of our patients receive renal replacement therapy as part of their management but data on outcomes of these patients are sparse.

Study objective: To determine the clinical outcomes of dialysis treated AKI patients in our hospital.

Methods: The clinical data of 62 Intermitent haemodialysis (IHD) treated AKI patients treated at the University of Port Harcourt teaching hospital during an interrupted six year period were analyzed.

Results: They comprised 34 males and 28 females (M/F=1.2:1), with a mean age of 41.3 $\pm$ 18.5(15-83) years. Over 70% of the patients were under fifty years of age. The leading medical aetio-pathologies causing AKI were, sepsis (22.7%), acute glomerulonephritis (20.5%), acute gastroenteritis (15.9%) and toxic nephropathies (11.4%). The mean e-GFR of the patients at presentation was quite low 14.7 $\pm$ 5.8(6.7-34) mls/min/1.73m^2. 93.5% of patients were in the **F**ailure category of RIFLE. Mean dialysis period was 2.3 $\pm$ 1.3 weeks and mean number of dialysis sessions received was 2.3 $\pm$ 1.7. Of the 62 patients 29(46.8%) survived and were discharged from the hospital, 27(43.5%) died in hospital while 6(9.7%) absconded from treatment. Comparison of the demographic, clinical and RIFLE status of the dead and the surviving patients showed that the survivors had better RIFLE Grade than those who died ($p<0.001$)

Conclusions: Hospital mortality rate of dialysis treated AKI patients is high and the severity of renal damage at presentation may be an important factor

ABS/2011-D07
PRURITUS IN PATIENTS ON MAINTENANCE HAEMODIALYSIS IN BENIN CITY

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Background: Pruritus is an unpleasant cutaneous sensation prompting a desire to scratch. It can be very disturbing and is common in patients on maintenance HD. Its pathogenesis is not very clear but has been attributed to diverse factors including uremia and iron deficiency anemia.

Aims/Objectives: The aims and objectives of this study were, to determine the frequency of pruritus in hemodialysis patients at the University of Benin Teaching Hospital, Benin city; to evaluate the relationship of pruritus in these patients with age, sex, BMI, skin changes, peripheral neuropathy, duration of dialysis, and laboratory findings (including PCV, serum creatinine, urea, calcium, and phosphate) and to determine the percentage of patients with increasing pruritus during and after dialysis.

Method: Consenting patients on maintenance hemodialysis were recruited for the study. Some relevant clinical and laboratory parameters (age, sex, BMI, skin changes, neuropathy, presence of pruritus, severity and intensity of pruritus, serum urea, creatinine, calcium and phosphate) were collated and data generated were analysed using the SPSS version 17 package.

Results: A total of 50 patients participated in the study. Twenty four (48%) of these patients had pruritus. Of the 24 patients with pruritus, 14 (58.3%) were males while 10 (41.7%) were females. The mean age, BMI and duration of hemodialysis of the patients with pruritus were 51.0±13.61yrs, 23.3±1.77kg/m^2 and 7.4±9.31months respectively. Also, the mean serum urea, calcium and PCV of the patients were 252.1±65.10mg/dl, 7.0±1.04mg/dl and 25.5±4.38% respectively. Eight (33.3%) had an increasing intensity of pruritus during and after hemodialysis. Twelve (50%) of the patients had mild pruritus while another 12 (50%) had moderate pruritus. There was no case of severe pruritus. Anemia, serum urea, duration of hemodialysis and increasing age of patients were found to be significantly related to pruritus. (Using Pearson's correlation)

Conclusion: Pruritus is relatively prevalent amongst our patients on maintenance HD and factors significantly associated with this condition include anemia, serum urea, and age of patient as well as duration on HD.

ABS/2011-D08
PROVIDING MAINTENANCE HAEMODIALYSIS IN A RESOURCE POOR COUNTRY: THE LAGOS UNIVERSITY TEACHING HOSPITAL EXPERIENCE

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Background to study: Providing maintenance haemodialysis for patients with end-stage renal disease (ESRD) is associated with high costs and poor outcomes. In addition to cost of the dialysis procedure, there is the additional cost of creating and maintaining vascular access and erythropoiesis stimulating agent. In Nigeria, patients with ESRD pay out-of-pocket for maintenance haemodialysis and other aspects of therapy. We reviewed the experience of our hospital-based haemodialysis unit.

Methods: We reviewed the records of all patients who entered into the maintenance haemodialysis program of our dialysis unit between 1st January 2009 and 31st September 2010.

Results: One hundred and twenty patients entered into the maintenance dialysis program of our unit during the period of review. 72(60%) of the patients were male while 48(40%) were female. The mean age of the study population was 47yrs $\pm$ 14yrs with 51.6% of the patients being younger than 50yrs of age. The aetiology of chronic kidney disease was hypertension in 45% of cases, chronic glomeruonephritis in 13.5%, diabetic nephropathy in 12.5% and obstructive uropathy in 12.5% of the cases. The mean haemoglobin concentration at commencement of dialysis was 7.3g/dL $\pm$ 1.6g/dL. The initial vascular access was femoral vein cannulation in all the patients. The vascular access was changed to a non-tunneled internal jugular catheter in 12.5% of the patient after a mean of 6.6 $\pm$ 3.9 dialysis sessions. 25% of the patients received parenteral iron therapy while while 24.2% received erythropoietin. 73.5% of the patients require blood transfusion at some point with 33% receiving 5 or more pints of blood. 3.3% of the patients of the patients were having thrice weekly dialysis, 21.7% twice weekly, 23.3% once weekly, 16.7% once in two weeks, 2.5% once in three week and 11.7% once monthly. At the time of review, 8.3% were of the patients were known to be dead, 38.3% were lost to follow-up and 53.3% remained on maintenance dialysis.

Conclusion: Majority of patients with ESRD on maintenance haemodialysis in our unit are under-dialysed, have inadequate anaemia treatment and are over-transfused with blood with resultant high mortality rates.

ABS/2011-GN01

NEWER VS OLDER ANTIHYPERTENSIVE AGENTS IN AFRICAN HYPERTENSIVE PATIENTS (NOAAH) TRIAL: STUDY DESIGN AND FIRST BASELINE RESULTS (NCT01030458)

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Background: Sub-Saharan Africa experiences an epidemic surge in hypertension. Studies in African Americans led to the recommendation to initiate treatment with a diuretic or a low-dose fixed combination

including a diuretic. We mounted the Newer versus Older Antihypertensive agents in African Hypertensive Patients (NOAAH) trial (NCT01030458) to compare in native African patients a fixed combination of newer drugs, not involving a diuretic, with a combination of older drugs including a diuretic.

Methods: Previously treated (<2 drugs) or untreated patients (30–69 years) are eligible, if they have uncomplicated grade 1 or 2 hypertension (140–179/90–109 mm Hg). Patients with e”3 risk factors, target organ damage or diabetes are excluded. After a 4 week treatment free run-in period, 180 patients will be randomized to once daily bisoprolol/hydrochlorothiazide 5/6.25 mg or amlodipine/valsartan 5/160 mg. To attain the target (<140/<90 mm Hg) during the 6 month follow-up, the doses of bisoprolol and amlodipine in the combination tablets will be increased to 10 mg/day. Subsequently ?-methyldopa (up to 2 gram/day) or hydralazine (up to 200 mg/day) can be added to the randomized medication. NOAAH is powered to demonstrate a 5 mm Hg between-group difference in the sitting systolic blood pressure, the primary endpoint, with a 2-sided *P*-value of 0.01 and 90% power. NOAAH is an investigator-led clinical trial and fully complies with the Helsinki declaration.

Results: Six centers in 4 sub-Saharan countries started patient recruitment on September 1, 2010. On December 1, 190 patients had been screened, 161 had been enrolled, and 42 were randomized and in follow-up. The trial will be completed in the third quarter of 2011.

Conclusions: NOAAH is the first randomized multicenter trial of antihypertensive medications in native African patients in sub-Saharan Africa and will inform future guidelines.

Keywords: Antihypertensive therapy, health policy and outcome research, randomized clinical trial, special populations

ABS/2011-GN02

FREQUENCY OF CONTRAST-INDUCED NEPHROPATHY AMONG PATIENTS UNDERGOING CONTRAST PROCEDURES IN UBTH

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Background: Contrast-induced nephropathy (CIN) is a significant yet underestimated problem in clinical practice. The increasing use of contrast media in diagnostic and interventional procedures over the last 30years has resulted in CIN becoming the third leading cause of hospital acquired acute renal failure (ARF) in developed countries. There is currently a paucity of data on the incidence of CIN in our environment.

Objectives: To determine the frequency and risk factors of CIN amongst patients receiving intravenous contrast in University of Benin Teaching Hospital (UBTH) and to validate the CIN predictive risk score in the study population.

Methodology: This is a hospital-based prospective observational study. One hundred and eighty (180) patients undergoing either contrast CT or Intravenous Urography were recruited consecutively over a 6 month period. Data on their sociodemographic characteristics and health status were obtained and recorded in a questionnaire. Venous blood and urine were collected for biochemical estimations before contrast exposure and up to 72 hours post-exposure.

Results: The frequency of CIN was 35.9% (51 out of 142). One patient required haemodialysis. Baseline renal insufficiency, anaemia and age >55 years were significant risk factors of CIN. Baseline renal insufficiency, anaemia and age >55yrs were predictive of CIN in univariate but not multivariate analysis. A higher proportion of patients who developed CIN (11.8%) had high risk scores compared to those who did not develop CIN(8.8%); this difference was however not statistically significant (p = 0.600).

Conclusion: The frequency of CIN is high among patients having contrast enhancing CT and IVU in UBTH. Baseline renal insufficiency, anaemia and increasing age are the most significant risk factor and predictors of CIN among the patients. The CIN predictive risk score does not sufficiently identify patients at risk of CIN in UBTH.

ABS/2011-GN03

CLINICAL AND LABORATORY FINDINGS OF NEPHROTIC SYNDROME SEEN IN LAGOS STATE UNIVERSITY TEACHING HOSPITAL (LASUTH), IKEJA, LAGOS

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Introduction: Nephrotic syndrome has diverse clinical presentation likewise causes. Primary or idiopathic glomerulonephritis is seen in 75% of nephrotic syndrome patients. Prevalence of the various histological patterns varies with age and race and underlying aetiology. For example, it is known that minimal change disease (MCD) is commonly seen in children, especially in temperate regions, while focal segmental glomerulosclerosis (FSGS) is associated with human immune-deficiency virus associated nephropathy (HIVAN).This study reviews the clinical, biochemical and histological patterns of nephrotic syndrome patients seen at LASUTH within June 2006 and November 2010.

Methods: The study is a retrospective review of patients seen between June 2006 and November 2010 at the Medical Out Patient Department of LASUTH. Each patient case note was studied for documented clinical, laboratory biochemical, haematological and histological findings. A descriptive analysis of the data was done using SPSS 15.

Results: Forty six cases were reviewed, there were 16 males and 30 females with male : female ratio of 1:1.7, while the modal age was 20 – 39 years in both sexes. The most frequent clinical presentation were leg swelling (95.7%), frothy urine 91.3%, followed by facial swelling (88.9%) respectively. The mean hypercholesterolaemia and hypertriglyceridaemia was 252.5mg/dl and 152.4mg/dl respectively. The mean 24 hour urinary protein was 2.96g/24hrs ± of 2.8 and serum albumin of 2.90 ± 0.967. 14 patients had renal biopsy; (9) 64.3% had Focal Segmental Glomerulosclerosis (FSGS), while (3) 21.4% had minimal change disease (MCD) and 1 patient had Membranoglomerulonephritis (MGN) 7.1%, and (1) , 7.1% inconclusive.

Conclusion: The most common mode of presentation in the studied patients was pedal oedema and FSGS is the major cause of nephritic syndrome in the biopsied patients.

ABS/2011-GN04

A SINGLE CENTER 7 -YEAR EXPERIENCE WITH ESRD CARE IN NGERIA- A SURROGATE FOR POOR STATE OF ESRD CARE IN NIGERIA AND OTHER SUB-SAHARAN AFRICAN COUNTRIES: ADVOCACY FOR A GLOBAL FUND FOR ESRD CARE PROGRAM IN SUB-SAHARAN AFRICA

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Background: With the advent of Maintenance dialysis and kidney transplantation some 50 years ago, End stage renal disease (ESRD) is no longer a fatal disease. The benefit of this significant achievement is however not universal. There is a prevailing wide gap in the access to modern ESRD care between the developed and the developing countries, especially the sub-Saharan African (SSA) countries. With perhaps the singular exception of South Africa, ESRD care in most SSA countries is characterized by very poor access, poor dialysis adequacy, minimal access to kidney transplantation and consequently very high mortality rates within 90 days of diagnosis. Prevalent poverty and the absence of any Government intervention in ESRD care are responsible for the gross deficit in ESRD care in SSA countries.

Aims: A Single center ESRD –care experience in a Nigerian teaching hospital is presented as a surrogate case to demonstrate the prevailing ESRD care situation in Nigeria and most SSA-countries, over 50 years after the advent of modern ESRD care.

Methods: Retrospective evaluation of ESRD care experience, during a seven year period in a Nigerian teaching hospital.

Results: The data for 320 consecutive ESRD (200males, and 120 females, M/F=1.6:1) patients treated during a seven year period, were retrospectively analysed. They had a mean age of 46.2±17.6 years, with 40.8 percent of them in socio-economic classes V and VI. Over 80% funded dialysis treatment from direct and extended family sources .There was no government based support. Chronic glomerulopathy(45.6%), hypertensive nephropathy(29.7%) and diabetic nephropathy(17.5%) were the three leading causes of ESRD in the patients. Their mean e-GFR was 6.2±5.8 mls/min/1.73m^2. By JNC-7 criteria, 88.5 percent of the patients were hypertensive with 70.3% presenting with grade II hypertension. At presentation, 85% of the patients were in an unstable clinical state. The mean duration on dialysis before loss to the program was 5.2± 7.6 weeks, range 1-37 weeks. 314(98.1%) of the patients could sustain dialysis for only 1-12 weeks. Total dialysis sessions during the 7- year period were 1476, giving an average weekly dialysis session of 0.013± 0.05 hour per patient per week. All patients achieved an aggregate mean urea reduction ratio (URR) of 48.7±22.0 %, range 8-88% and an aggregate mean Kt/V of 0.94± 0.4, range 0.5-1.9 respectively. Within 90 days of entry into the ESRD care, 128(40%) were confirmed dead, 134(41.8%) had absconded and presumed dead while 8(2.5%) patients had opportunity for kidney transplant outside Nigeria.

Conclusions: The results confirm that ESRD care in this single centre was characterized by very poor access, gross dialysis inadequacy, over 90 percent case fatality within three month of diagnosis and very low opportunities for kidney transplantation. Poverty and the absence of Government support for ESRD care are responsible for the poor outcomes. This situation is not different from other parts of Nigeria and most other SSA countries, after over fifty years of modern ESRD care. Global focus on ESRD care in SSA has become imperative for sustainability and diversity.

Keywords: *ESRD care, Nigeria, Sub-Saharan Africa, Poor outcomes, Global intervention*

ABS/2011-GN05

BURDEN AND OUTCOME OF CHRONIC KIDNEY DISEASE AT THE UNIVERSITY OF CALABAR TEACHING HOSPITAL: A THREE YEAR RETROSPECTIVE STUDY

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Introduction: The lack of data on CKD is more evident in the former south eastern region comprising Cross River and Akwa Ibom states which until recently lacked specialist nephrology services. This study was designed to provide much needed baseline information on the burden, pattern and outcome of CKD in the region.

Methods: This was a retrospective study of patients with chronic kidney disease at the University of Calabar Teaching Hospital over a three year period from January 2007 to December 2009. Data was extracted from medical records using a structured form and was analyzed using STATA statistical package version 10.

Results: A total of 2041 patients were admitted in the period. Of these, 59 (2.9%) had CKD with a male to female ratio of 1:1.2 and the following mean variables: age 42.1±13.6 years, SBP 161.5±34.9 and DBP 99.2±21.9 mmHg, haemoatocrit 23.9±7.6 and creatinine 434.1±236µmol/l. About 19(32%) had CGN, 18(30%) had Hypertension while 8(13%) had diabetes. The remainder had sickle cell nephropathy, HIV related renal disease, APKD and obstructive uropathy. In terms of outcome, 33 patients were discharged for follow up, 20 were referred for dialysis outside the centre, 5 died while one left the hospital against medical advice.

Conclusion: The epidemiology of CKD is similar with other regions. However, renal replacement facilities are needed to obviate the problem of referral with the attendant increase in mortality and overall cost.

ABS/2011-GN06

RENAL HISTOPATHOLOGICAL STUDY OF HIV POSITIVE PATIENTS WITH CLINICAL EVIDENCE OF RENAL DISEASE IN BENIN CITY, NIGERIA

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Background: Human immunodeficiency virus (HIV) infection now constitutes a global disease burden. Currently about 33 million people are HIV positive worldwide. Renal involvement has been found to be associated with a number of cases, as evidenced by presence of proteinuria and reduced estimated glomerular filtration rate (eGFR). It is important to biopsy HIV patients with proteinuria, normal or increased kidney size, and/or deranged renal function, provided there are no contraindications.

Aims/Objectives: To determine the histopathological findings (on light microscopy) in HIV positive patients with renal disease seen in Benin City.

Methods: HIV positive patients with evidence of renal disease and consenting to renal biopsy were recruited for the study. All of these patients were naïve to antiretroviral drug usage. Those with contraindications for renal biopsy were not recruited. A statistical spreadsheet with age, sex, CD4 count, PCV, renal scan sizes and histological findings was made and analyzed via SPSS 17 package.

Results: A total of 17 patients, 10(58.8%) females and 7(41.2%) males participated in the study. The mean age, PCV, CD4 count and eGFR were 38.1±8.53years, 20.5±5.12%, 154.4±65.26cells/ul and 39.7±19.99ml/min. Twelve patients (70.5%) had proteinuria of 3+ and above. Twelve (70.6%) of the 17 patients had focal segmental glomerulosclerosis of the collapsing variant on light microscopy while 2(11.8%) had chronic pyelonephritis and another 2 (11.8%) had membranous glomerulonephritis and 1(5.9%) had minimal change disease.

Conclusion: From our limited renal histopathological study of HIV patients with renal disease, the predominant histological type encountered is the collapsing variant of FSGS, a pattern which is in keeping with reports from previous studies globally.

ABS/2011-GN07

THE DETERMINANTS OF AUTONOMIC DYSFUNCTION AMONG PRE DIALYSIS CHRONIC KIDNEY DISEASE (CKD) PATIENTS IN SOUTH-EAST NIGERIA

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Background: Autonomic dysfunction in CKD has been shown to occur more in certain clinical disease conditions. Our study objective is to determine demographic or disease-related factors that may influence the development and/or severity of autonomic dysfunction among pre dialysis CKD patients in South East Nigeria.

Methods: Eighty pre dialysis CKD patients were age and sex matched against healthy randomly selected volunteers. A questionnaire was administered to assess the symptoms and signs of autonomic dysfunction in the patients and control subjects. Autonomic dysfunction was determined using a battery of 5 non invasive cardiac autonomic function tests: Heart rate response (HRR) to standing, HRR to breathing, HRR to vasalva maneuver, resting tachycardia and blood pressure response to standing. In addition, some demographic factors (e. g. age, gender,) and disease- related factors (e. g. disease duration, blood pressure control, level of azotaemia, serum calcium phosphate index, glomerular filtration rate) were recorded. Data from this cross-sectional survey were analyzed by a multiple regression model to determine independent predictors of autonomic dysfunction and statistical significance set at á = 0.05 for all tests. All analysis was done with SPSS version 11.5. Approval for this study was obtained from University of Nigeria ethics committee.

Results: CKD patients showed significantly higher autonomic dysfunction than controls, in all the age groups. Disease duration showed significant correlations with autonomic dysfunction. Calcium phosphorous product and GFR showed linear correlations with autonomic dysfunction; however these were not statistically significant. Multiple regression analysis to determine the predictive symptoms of autonomic dysfunction among CKD patients showed that impotence ($p = 0.03$, OR = 0.02), postural dizziness ($p = 0.04$, OR = 8.39) and nocturnal diarrhea ($p = 0.02$, OR = 29.09) were the symptoms that most predicted the development of autonomic dysfunction in these patients.

Conclusion: In this study, autonomic dysfunction in pre dialysis CKD patients was not significantly affected by demographic factors. It was more in patients with longer disease duration, and more severe diseases. Pre dialysis CKD patients with impotence, postural dizziness and nocturnal diarrhea are more likely to have

positive autonomic dysfunction testsWe recommend that all patients with these symptoms be further assessed for autonomic dysfunction and adequate treatment instituted.

ABS/2011-GN08

PREVALENCE AND PATTERN OF AUTONOMIC DYSFUNCTION AMONG PRE DIALYSIS CHRONIC KIDNEY DISEASE (CKD) PATIENTS IN SOUTH EAST NIGERIA

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Background: Autonomic dysfunction has been shown as a significant independent risk factor for mortality among CKD patients. Little is known about autonomic dysfunction among CKD patients in sub-Saharan Africa. This study aims to determine the prevalence and pattern of autonomic dysfunction among CKD patients in the South East, Nigeria

Method: A cross sectional study conducted over a six month period (August 2005 – January 2006), was carried out at a tertiary university-affiliated teaching hospital in Nigeria, on pre dialysis CKD patients. Subjects without kidney failure were chosen randomly to serve as control. A questionnaire was administered to assess the symptoms and signs of autonomic dysfunction in the patients and control subjects. Autonomic dysfunction was determined using a battery of 5 non invasive cardiac autonomic function tests: Heart rate response (HRR) to standing, HRR to breathing, HRR to vasalva maneuver, resting tachycardia and blood pressure response to standing. Descriptive statistical analysis was performed using SPSS 11.5 software and statistical significance set at á = 0.05 for all tests. Approval for this study was obtained from University of Nigeria ethics committee

Results: Eighty patients were included in the study; 39 (48.75%) males and 41 (51.25%) females with a mean age of 42.1 years**.** Forty subjects were chosen: 21 (52.5%) males and 19 (47.5%) females with a mean age of 37.8 years Autonomic dysfunction was seen in 51.25% of the patients compared to 7.50% in the control group. Both sympathetic and parasympathetic dysfunctions were recorded in these patients.

Conclusion: Our study documented a high prevalence of autonomic dysfunction among pre dialysis CKD patients. Autonomic dysfunction in these patients presented in both sympathetic and parasympathetic patterns. Our recommendation is that autonomic function test should be carried out in CKD patients presenting for the first time in the outpatient clinic and appropriate management modalities instituted.

ABS/2011-GN09

PATTERN OF ACUTE KIDNEY INJURY IN LAGOS

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Background to Study: Acute Kidney Injury (AKI) is a serious disorder of kidney function associated with prolonged hospital stay and significant morbidity and mortality. The aetiologic spectrum of AKI differs significantly between developed and developing countries and is thought to closely mirror the socioeconomic

status of the community. Most cases AKI in developed countries are hospital-acquired and usually follow major surgical procedures or trauma. Whereas, in developing countries, most cases are community acquired with community acquired infections and obstetric complications being responsible for the majority of cases. In the last few years there has been improvement in level of education, awareness, economic status and access to healthcare in the general population in Nigeria hence the need to assess its impact, if any, on the pattern of AKI.

Methods: We reviewed the hospital records of all patients with a diagnosis of Acute Kidney Injury and Acute Renal Failure admitted into the Lagos University Teaching Hospital between the 1st of January 2009 and the 30th of September 2010. The information retrieved included, biodata, aetiology of AKI, results of laboratory investigations done on admission, whether dialysis was carried out and outcomes.

Results: The records of 54 patients were available for review. 27(50%) were male and 27(50%) were female. The mean age of the study population was 39.7yrs with 68.5% of the patients being younger than 50yrs of age. Sepsis was the aetiology of AKI in 52.1% of cases, obstructive uropathy in 14.6%, gastroenteritis in 10.4% and pre-eclampsia/eclampsia in 6.3%. Other causes were; toxic nephropathy (7.4%), post-surgery (5.6%), acute myocardial infarction, haemolytic uraemic syndrome and antepartum haemorrhage (1.9% each). 16.9% of the patients were admitted to the intensive care unit (ICU) while the remaining patients were managed on the open wards. Dialysis was indicated in 88.9% of the patients; however, dialysis was not carried out in 25% of these patients because they could not afford to pay for the procedure. In-hospital mortality was 29.6%. Overall, patients who died had a shorter mean duration of hospital stay [9.2days vs 33.9days ($P < 0.01$)], lower mean serum bicarbonate [19.5mmol/L vs 22.9mmmol/L ($P= 0.02$)], were more likely to be admitted unconscious [62.5% vs 26.3% ($P= 0.01$)] and more likely to have been admitted into the ICU [37.5% vs 7.9% ($P= 0.01$)]. Also, among patients in which dialysis was indicated, not having dialysis was associated with higher mortality [46.7% vs 15.2% ($P= 0.02$)]

Conclusion: The aetiologic spectrum of AKI in the study is similar to that reported from other developing countries and differs significantly from that reported from developed countries. Though the period of the study is much shorter than that of a similar study by Bamgboye et al in the same institution about 18years ago, the findings suggest a changing pattern of AKI seen at the Lagos University Teaching Hospital. Sepsis remains the commonest cause of AKI however in this study obstructive uropathy has replaced obstetric complications as the next most common cause. The reduction in the contribution of obstetric complications to the burden of AKI in Lagos may be a reflection of better access to obstetric care in the general population.

Keywords: *Acute Kidney Injury; Aetiology; In-hospital Mortality*

ABS/2011-GN10

PATTERN OF RENAL DISEASES IN NEWLY DIAGNOSED PATIENTS WITH HUMAN IMMUNODEFICIENCY VIRUS INFECTION AT THE UNIVERSITY COLLEGE HOSPITAL, IBADAN

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Background: The burden of kidney disease among HIV-infected patients is expected to rise as more patients are able to access anti retroviral therapy and as such live longer. Careful screening at first diagnosis may reveal patients with renal disease and help in the planning of holistic care before institution of ARVs.

Methods: A cross sectional study to determine the pattern of renal disease among newly diagnosed HIV patients. A small subset of those without renal disease was also studied to ascertain the risk factors for renal disease among the subjects.

Results: Of 1270 subjects screened for renal disease, 368 were found to have renal disease with a prevalence of 28.9%. Of this, 316(85.9% had proteinuria), 164(44.5%) had at least one electrolyte disorder, 46(12.5%) had acute kidney injury while 158(42.9%) had chronic kidney disease. When compared with 371 HIV positive subjects without kidney disease, logistic regression analysis showed that short duration of illness ($p<0.001$), use of herbal remedies ($p<0.001$), hypertension ($p=0.034$), low BMI (p0.032), low PCV ($p=0.003$) and low CD4 counts ($p<0.001$) were significantly associated with development of kidney disease.

Conclusion: Early screening and timely detection of renal disorders in ARV naïve patients is a clinical imperative for holistic care.

ABS/2011-GN11

KIDNEY FUNCTION AND TOTAL SERUM CHOLESTEROL LEVELS IN THE GENERAL POPULATION OF ADULT NIGERIANS: A COMMUNITY BASED STUDY

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Background: Chronic kidney disease (CKD) is associated with an increased risk of cardiovascular disease. Lipid abnormalities have been linked to the initiation and progression of CKD. In this cross sectional study, the relationship between the estimated glomerular filtration (eGFR) and total cholesterol was investigated.

Method: This community based health survey of adults 18 years and above in Maiduguri, investigated the residents of 3 randomly selected clusters of government owned housing estates. It is part of an ongoing ISN endorsed kidney disease early detection programme. Consenting individuals had an overnight fast before the collection of their blood samples. The glomerular filtration rate was estimated using the 4 variable MDRD equation while cholesterol levels were determined with Hitachi-Roche auto analyser.

Results: Data from six hundred and ninety-six individuals (m: f=1:1) with an average age of 36.8 years was analysed. The mean total cholesterol was 5.18mmol/L while 304 (43.6%) of the study population had total cholesterol levels of 5.2mmol/L or greater. The mean eGFR was 105.2mls/min/1.73m2 for the study population. The eGFR correlated inversely with the total cholesterol ($r = -0.369$) for the whole group. The mean eGFR of the subgroup with total cholesterol < 5.2mmol/L was 114.8 mls/min/1.73m2 in comparison to 93.1 mls/min/1.73m2 for those with total cholesterol =/> 5.2 mmol/L.

Conclusion: Risky levels of total serum cholesterol are common in the general population of Nigerians and therefore cholesterol tests should be routinely done in adults. Elevated serum cholesterol levels are associated with lower estimated GFRs in non institutionalized adult

ABS/2011-PN01

CHALLENGES IN THE MANAGEMENT OF A CHILD WITH END STAGE RENAL DISEASE: THE STORY OF A POOR NIGERIAN GIRL

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Background: End stage renal disease (ESRD) is on the rise among children in Nigeria. The cost of its management with renal replacement therapy is quite enormous for the average Nigerian family in view of the absence of NHIS support.

Objectives: To highlight the challenges encountered in the management of a Nigerian child with ESRD.

Methods: The case record of a 13year old girl with ESRD managed in our unit was reviewed with a view to bringing out the various odds encountered in the management.

Results: The social challenges encountered included inadequate fund for renal replacement therapy resulting in outsourcing of funds, abandonment/isolation of the child and irregular administration of renal replacement therapy.

Conclusion: The management of ESRD remains a challenge with the diagnosis almost like a death sentence.

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AMINOPHYLLINE IMPROVES URINE FLOW BUT NOT SURVIVAL IN CHILDHOOD OLIGOANURIC ACUTE KIDNEY INJURY.

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Conflicts of interest: *None to declare.*

Introduction and aims: In the injured kidney, adenosine is released endogenously causing vasoconstriction of the renal afferent arteriole via the adenosine A1 receptor as well as vasodilatation of the renal efferent arteriole via the adenosine A2 receptor thereby reducing the renal blood flow and glomerular perfusion pressure leading to ischaemic renal injury. Aminophylline is one agent that has been tried with the objective of achieving better acute kidney injury (AKI) outcome with variable results; it vasodilates the renal afferent arterioles through competitive inhibition of adenosine on the adenosine A1 receptor thereby improving renal blood flow, glomerular perfusion pressure and filtration. In this study, we determined the outcome of aminophylline treatment in childhood AKI.

Methods: This was a retrospective study of AKI patients treated with aminophylline and controls. The outcome indices that were determined comprised urine flow rate, oligoanuria duration (days), number progressing from one to the next severe AKI stage, number requiring dialysis, number dialyzed and mortality in the aminophylline arm and compared with non_aminophylline arm.

Results: The control (n=8) and aminophylline (n=9) arms mean ages were 4.56±2.68 and 4.882.14 years (p=0.726), respectively. All patients had Stage 3 AKI. Baseline median urine flows in the aminophylline 0.13 (0.000.45) and control arms 0.04 (0.000.43) mL/kg/h were similar, p=0.463. The median urine flow rates (mL/kg/h) increased significantly from days 5 (0.820 Vs 0.095; p=0.025), 6 (1.030 Vs 0.165; p=0.017), and 7 (1.23 Vs 0.215; p=0.025) in the aminophylline than in the control arm. Oligoanuria duration was 6 days in 7 aminophylline-treated patients compared to 2 in controls (77.8% Vs 25.0%; odds ratio 0.09; 95% CI: 0.010.89; p=0.035). Four of 5 controls were dialyzed compared to only one of 8 aminophylline-treated patients (odds ratio 0.16; 95% CI: 0.040.71; p=0.031). The aminophylline arm maintained a relatively constant serum creatinine level compared to controls who showed progressive and statistically significant increases in Scr. Mortalities were similar in both aminophylline-treated and control patients (3 Vs 2; hazard ratio 0.77; 95% CI: 0.115.45; p=0.791).

Conclusions: Aminophylline therapy was significantly associated with improved urine flow rate and reduced number of dialyzed patients but had no positive impact on childhood AKI survival.

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ACUTE CHILDHOOD CARDIORENAL SYNDROME AND IMPACT OF CARDIOVASCULAR MORBIDITY ON SURVIVAL

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Conflicts of interest: *None to declare.*

Background and aims: Cardiorenal syndrome (CRS) is a recognized morbidity and mortality multiplier in critically ill children. While a lot of data have been published on chronic kidney disease as risk factor for cardiovascular morbidity and mortality in both children and adults there is paucity of specific data on acute cardiac dysfunction (ACD) leading to acute kidney injury and vice versa in children especially; in this study, an attempt was made to determine the prevalence, aetiology, clinical types of CRS and impact of acute cardiovascular morbidity on childhood acute kidney dysfunction (AKD) outcome.

Methods: This was a retrospective case–control study of childhood AKD and ACD .

Results: Forty seven of 101 (46.53%) patients with AKD had CRS. Median age was 4.0 (0.3–14.5) years. Majority were <6 years old (70.21%). Types 3 and 5 CRS were found in 10 and 37 patients, respectively. Type 3 CRS was due to acute glomerulonephritis (AG N; n=7), captopril (n=1), frusemide (n=1), and hypovolaemia (n=1). Malaria–associated haemoglobinuria (n= 20), septicaemia (n= 11), lupus nephritis (n= 3), tumour lysis syndrome (n= 2) and acute lymphoblastic leukaemia (n= 1) caused Type 5 CRS. The cumulative mortality in hypertensive CRS was similar to non–hypertensive CRS (51.4% Vs 40.9%; p = 0.119). Mortality in CRS and non–CRS was similar (45.7% Vs 24.5%; p= 0.053). Type 5 survived better than Type 3 CRS (66.7% Vs 12.5%; p= 0.001). Risk factors for mortality were Type 3 CRS (p=0.001), AGN–associated CRS (p=0.023), dialysis requiring CRS (p=0.008) and heart failure not associated with anaemia (p=0.003). All–cause–mortality was 34.2%.

Conclusion: CRS was a very common event with high mortality rate in critically ill children. Preventive measures aimed at some of the preventable CRS aetiologies might be critical to reducing its prevalence.

CLINICAL PRESENTATION AND OUTCOME OF AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE: A PROSPECTIVE FOLLOW-UP STUDY

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Background: Autosomal dominant polycystic kidney disease (ADPKD) is the commonest form of genetically inherited kidney disease with sparse literature in our setting. The disease affects about one person per thousand. It is an important cause of renal failure, accounting for 10-15% patients who receive haemodialysis.

Aim & Objectives:

1. To determine the pattern of clinical presentation and outcome of Autosomal Dominant Polycystic Kidney Disease (ADPKD).
2. To determine the factors (if any) that portend worse outcome.

Patients and Methods: All patients that satisfied the inclusion criteria were prospectively followed up over a 15 year period (January 1996 - December 2010) at the Nephrology clinic, Obafemi Awolowo University Teaching Hospital, Ile-Ife. The clinical diagnostic criteria used included;

1. Ultrasonographic evidence of 2 or more cysts in both kidneys,
2. Family history of kidney disease,
3. Presence of hypertension, anaemia, cardiac or renal failure or cerebrovascular disease.
4. Patients must not have had haemodialysis.

Patients that satisfied criteria 1 and any of the other 2 were diagnosed to have ADPKD.

The patients were taken through thorough clinical and laboratory evaluation to assess presenting complaints, family history of ADPKD, any palpable mass on abdominal examination, cardiac examination for any abnormal finding and other complications. Laboratory parameters assessed included, serum chemistry and haematologic parameters while the imaging tests included abdominal and renal ultrasonography, echocardiography and cranial computerised tomography scan of magnetic resonance imaging. Data was analysed using SPSS statistical software version 13.

Results: A total of 41 patients fulfilled the diagnostic criteria. They included 23 (56.1%) males and 18 (43.9%) females with a male:female ratio of 1.3:1. The median (range) age at the time of diagnosis of ADPKD was 44.00 (18-80) years. Median (range) follow up period for all patients was 24 (0.25-84) months. Most common form of presentation was hypertension in 40 (97.6%), nocturia in 32(78%) and loin pain in 28(68.3%) patients. Kidneys were palpable in 34 (82.9%), liver in 4 (9.8%) and spleen in 1 patient (2.4%). Haematuria was present in 19 (46.3%) patients. Thirty five (85.4%) patients had left ventricular hypertrophy though only 10 had aortic regurgitation that was confirmed by transthoracic echocardiography. On MRI 2(4.9%) had intra-cerebral aneurysm while 6(14.6%) patients were discovered to have aneurysm and intra-cerebral bleeding at autopsy. The mean creatinine clearance at presentation was 34.2±23.6 (range 1-84) mls/min. Twenty-three (56.1%) patients received haemodialysis while 3(7.3%) had peritoneal dialysis. Five patients were dialysis dependent at the end of follow-up. Twenty-one patients (51.2%) died during the follow up period. Uraemia was the commonest cause of death and hence portend worse prognosis.

Conclusion: ADPKD is increasingly being recognised in our setting with improvement in diagnostic facilities. Hypertension remains the commonest form mode of presentation with majority of patients presenting between 30and 60yrs. ESRD was found to be the commonest cause of mortality followed by intracerebral haemorrhage.

HEALTH RELATED QUALITY OF LIFE IN MAINTENANCE HAEMODIALYSIS PATIENTS: COMPARISON OF PERFORMANCE OF KARNOFSKY PERFORMANCE STATUS SCALE (KPSS), 36-ITEM SHORT FORM HEALTH SURVEY (SF-36 HEALTH SURVEY) AND KIDNEY DISEASE QUESTIONNAIRE (KDQ)

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Background: Assessment of health related quality of life (HRQOL) has become a vital quality control tool in the monitoring of treatment outcomes in different disease states. With prolongation of the life of end stage renal disease (ESRD) patients, it has become imperative to assess the quality of life achieved. Several instruments are available for assessing HRQOL, while some are physician dependent, others are patient centred and while some are generic, others are disease specific. In this cross sectional study we set out to compare the performance of 3 different instruments used in the assessment of HRQOL namely Karnofsky performance status scale (KPSS), 36-Item Short Form Health Survey (SF-36 Health Survey) and Kidney disease questionnaire (KDQ) in our maintenance haemodialysis population.

Methodology: We recruited 41 patients with End Stage Renal Disease (ESRD) after an informed consent. The socio-demographic, clinical and laboratory data were assessed using a structured questionnaire while the HRQOL was assessed with the aid of 3 instruments namely Karnofsky performance status scale (KPSS), SF-36 Health Survey (SF-36) and Kidney disease questionnaire (KDQ). Dialysis adequacy was assessed using single pool kt/v derived from second generation logarithmic equation (Daugirdas et al) while standard kt/v was estimated using Leypoldt Fixed-volume equation. Data was analysed using SPSS package version 16.

Results: The mean (±SD) age was 49.6(±16.5) years with a slight male preponderance (58.5%). Thirty-one patients (75.6%) were on twice weekly HD sessions while the remaining 10 (24.4%) had thrice weekly sessions. The median duration on HD treatment was 12 (range; 4 -110) months. Fourteen (34.1%) patients had native arterio-venous fistula as dialysis access, while subclavian, jugular and femoral venous accesses were used in 3 (7.3%), 5 (12.2%) and 19 (46.3%) patients respectively. The median serum creatinine, urea, total protein, albumin, and packed cell volume were 742.6 (range; 203.3– 1980.2) umol/L, 43.9 (range; 9.9 – 96.4)mmol/L, 62.5 (range; 34 –84) g/L mmHg, 33.5 (range; 17 –43) g/L and 25 (range; 17 –42)% respectively. The median percentage reduction in urea (PRU), single-pool kt/v and standard kt/v were 57 (range; 22– 71)%,1.0 (range; 0.4 – 1.5) and 1.26 (range; 0.58 –2.27) respectively. The median scores for the 3 HRQOL instruments are as follows; KPSS 80 (range; 40-100), the eight SF-36 domains were Physical functioning 50 (range; 0– 95), Role – physical 25 (range; 0-100), Bodily Pain 62 (range; 0– 100), General Health 42 (range; 15– 87), vitality 50 (range; 15– 90), Social Functioning 37.5 (range; 0– 100), Role – Emotional 66.7 (range; 0– 100), and Mental Health 72 (range; 32– 100). The median scores for KDQ were SF-12 physical 35.7 (range;17.0-56.7) and SF-12 mental 49.0 (range; 29.4 - 60.7). There was a good correlation between the 3 HRQOL scales. KPSS correlated with the 7 out of 8 SF- 36 domains with r values ranging between 0.383 and 0.628 and corresponding p values of 0.013 to <0.0001. It also correlated positively with the with physical (r=0.440, p=0.004) and mental (r=0.491, p=0.001) domains of KDQ. The physical and mental health domains of KDQ also correlated with 8 SF 36 domains with the ranges of 'r' and 'p' values of 0.353- 0.717 and 0.024 - <0.0001 for physical health and 0.480- 0.756 and 0.003 - <0.0001 for mental health respectively. There was good correlations between frequency of HD per week, packed cell volume, total serum protein, albumin as well as standard kt/v and the different components of the 3 HRQOL scales. On ease of applicability and interpretation KPSS is the simplest while SF-36 is the most complex but assesses both physical and mental health domains.

Conclusion: KPSS, SF-36 Health Survey and KDQ are reliable instruments for assessing HRQOL with excellent agreement between them. KPSS though physician dependent, is simple to apply and correlated with the mental health domains of SF-36 and KDQ.

IS THERE ANY RELATIONSHIP BETWEEN CHRONIC KIDNEY DISEASE (CKD) AND TUBULAR DYSFUNCTION IN ADULT SICKLE CELL DISEASE (SCD) PATIENTS IN STEADY STATE.

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Background: Chronic kidney disease (CKD) is common in adults with Sickle Cell Disease (SCD) and contributes significantly to morbidity and mortality. Glomerular and tubular dysfunctions are major manifestations leading to CKD. While tubular abnormalities manifest in children and early adulthood, glomerular diseases occur later in adulthood and progresses inexorably to end stage renal disease (ESRD). In this cross sectional study we assessed prevalence of CKD and abnormalities in tubular function in adult SCD patients in steady state and determine whether any relationship(s) exist between them.

Methodology: Seventy-nine adult SCD patients in steady state were recruited after an informed consent. They were taken through socio-demographic, clinical and laboratory evaluation and derived data recorded. Microalbuminuria was assessed in urinary dipstick negative patients while 24-Hour urine protein excretion was determined positive ones. 24 Hour urine was also used to assess fractional excretion of sodium (FeNa), fractional excretion of potassium(FeK), specific gravity and pH. Glomerular filtration rate (GFR) was estimated using Cockroft & Gault equation. CKD was defined as the presence of one or more of the following: (i). Reduced GFR <60mls / min, (ii) proteinuria and (iii) microalbuminuria. Data was analysed using SPSS package version 16.

Results: The age of the patients ranged between 18 and 56 years (median; 25 years) with a female preponderance (58.2%). Duration of management for SCD ranged between 6 and 46 years (mean ± SD; 22.5± 8.3).The Hb genotype was SS in 65 (82.3%) and SC in 14 (17.7%) patients. Sixty-eight patients (86.1%) had d" 2 vaso-occlusive crises per year while the remaining had >2. The mean (±SD) for serum creatinine, urea, sodium, and potassium were 88.9 (±17.3) µmol/L, 3.8 (±1.3) mmol/L, 137.0 (±2.0) mmol/L and 4.3 (±0.42) mmol/L respectively while the mean (±SD) haemoglobin concentration, WBC and platelet counts were 8.1 (±1.8) g/L, 9648.1 (±3523.3) / mm^3 and 299251.9 (±142075.0) / mm^3 respectively. The estimated GFR ranged between 33.7 and 188.8 (median; 68.2) mls/min, 81% had GFR < 100mls /min but only 5.1% had GFR > 120mls/min. The median (range) FeNa and FeK were 6.12(0.54 – 11.8)% and 30.5(3.8 – 55.9)% respectively with 98.7% of studied patients having markedly elevated levels of both. The median (range) of pH and specific gravity were 5.5(5.0 – 7.5) and 1.020(1.000 – 1.030) respectively. There was no proteinuria in 59(74.7%) patients while microalbuminuria and overt proteinuria were found in 12(15.2%) and 8(10.1%) patients respectively, 36 (45.6%) of the patients had CKD. Those with CKD had significantly lower BMI ($p<0.0001$)) and Hb ($p=0.004$) while their SG, FeNa and FeK were significantly higher with corresponding p values of 0.005, 0.048 and 0.019 respectively.

Conclusion: There exist marked tubular dysfunction in most studied patients but it was exaggerated or worse in those with CKD. Tubular defects may contribute to the magnitude and progression of CKD in adult SCD patients.

PRECIPITANTS OF ACUTE DECOMPENSATION IN PATIENTS WITH CHRONIC RENAL FAILURE: A PROSPECTIVE STUDY

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Background: The prevalence of chronic kidney disease (CKD) has assumed epidemic proportions in both developing and developed countries. It often present acutely with attendant high morbidity and mortality particularly in sub- Saharan Africa. Management of the precipitants of acute decompensation would assist in reducing morbidity and mortality hence our decision to assess the causes of acute decompensation in our CKD patients.

Methodology: One hundred and sixty-three CKD patients that presented acutely with uraemic symptoms were recruited. They were taken through history, clinical examination and laboratory investigations which included complete blood count, serum chemistry as well as blood and urine culture where indicated. They also had imaging tests which included renal ultrasonography and two dimensional and doppler echocardiography. Data was analysed using SPSS package version 16.

Results: The age range was 15-85years (Mean ± SD; 41.9±16.7years) with male preponderance (125 males, 76.7%). The commonest aetiologic factors included chronic glomerulonephritis (52.8%), hypertension (28.2%) and diabetes mellitus(9.2%). The common causes of acute deterioration in renal function identified were congestive cardiac failure (41.7%), malignant phase hypertension (39.9%), infections (35.6%) and nephrotoxins (20.9%) out of which majority were herbal remedies. The prevalence of systolic heart failure was 16.4% while diastolic heart failure was 62.5%. The commonest foci of infection were urinary tract and chest while the common isolates were Escherichia coli (42.9%) and Staph aureus (21.4%). More than 50% of the patients had either grade 3 or 4 hypertensive retinopathy on fundoscopy. Renal replacement therapy offered was haemodialysis and 86 (52.7%) of the patients were discharged on conservative treatment after a mean (±SD) of 3.95 (±2.09) sessions of HD and remained stable for 1-12 (Mean ±SD; 3.19±2.32) months. Of the 61 deaths recorded 30(49.2%) occurred within first 2 weeks of presentation. Major causes of death were uraemia and acute pulmonary oedema.

Conclusion: The common causes of acute decompensation of CKD were congestive cardiac failure, malignant phase hypertension, infections and nephrotoxins. More than half of such patients could be sustained after initial salvage dialysis sessions hence aggressive management of these acute complications in CKD could be lifesaving.

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