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Preparedness for Renal Replacement Therapy Among Ambulant Adult Patients on Chronic Intermittent Haemodialysis in a Referral Hospital in Kenya: Kenyatta National Hospital Experience

Dr. Samuel K. Kabinga[1], Dr. John N. Ndungu[2], Prof. Seth O. McLigeyo[1], Prof. Joshua K. Kayima[1]

[1](East African Kidney Institute, College of Health Sciences, University of Nairobi, Kenya)
[2](Renal Department, Kenyatta National Hospital, Nairobi, Kenya)
Corresponding Author: Dr. Samuel K. Kabinga

Abstract: *The prevalence of chronic kidney disease is on the rise locally and globally. The care for patients with chronic kidney disease is multifaceted and multidisciplinary. The study aimed to explore the state of preparedness for renal replacement therapy for patients on chronic intermittent haemodialysis at the Kenyatta National Hospital Nairobi, Kenya. This cross-sectional descriptive study was to document the level of preparedness for renal replacement therapy by the time the patients were initiated on haemodialysis. Despite this contact with health provider before development of end stage kidney disease, 74.4% of the patients were initiated on haemodialysis as emergency (p value 0.001) and 29.3% knew of dialysis as the only modality of renal replacement therapy (p value <0.001). Acute catheters were used by about 85.30% of the patients as the vascular access for initiation of haemodialysis with tunneled catheters use in 13.40% and arteriovenous fistulae use in 1.2% (p value <0.001). Counseling and other supportive services such as health education and nutritional counseling were not optimal was at least 20% of patients gave responses indicating deficiency of information or knowledge in these domains. More than 40% of the patients had not been counseled about kidney transplantation*

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I. Introduction

Chronic kidney disease (CKD) is a global public health problem [1] with rising prevalence especially in-income and middle-income countries [2, 3]. The leading risk factors for CKD are diabetes mellitus and hypertension. According to KDIGO, there are 6 categories of CKD based on glomerular filtration rate (GFR) [4] with higher stage depicting advanced disease. Chronic kidney disease is often a sentinel disease, heralding increased risk for hospitalizations, cardiovascular events, and all-cause mortality [5]. The KDIGO guidelines recommend that people with progressive CKD be managed in a multidisciplinary care setting. The multidisciplinary team should include or have access to dietary counseling, education and counseling about different RRT modalities, kidney transplantation options, vascular access surgery, ethical, psychological, and social care [6].Progression to end-stage renal disease (ESRD) is varied, and at ESRD, renal replacement therapy (RRT) is necessary for sustenance of life. Modalities of RRT include haemodialysis, peritoneal dialysis and kidney transplantation. The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines recommend referral to specialist kidney care services for people with CKD in the acute kidney injury (AKI) or abrupt sustained fall in GFR; GFR <30 ml/min/1.73 m^2. The referred patients also include those with persistent abnormalities of serum potassium, recurrent or extensive nephrolithiasis, and hereditary kidney disease among other conditions. Timely referral for planning RRT in people with progressive CKD in whom the risk of kidney failure within 1 year is 10–20% or higher, as determined by validated risk prediction tools is recommended [6]. Patients should be initiated on RRT when one or more of the following are present: symptoms or signs attributable to kidney failure (serositis, acid-base or electrolytes abnormalities, pruritus). Inability to control volume status or blood pressure and a progressive deterioration in nutritional status refractory to dietary intervention are indications for initiation of RRT. Cognitive impairment warrants RRT too. This often but not invariably occurs in the GFR range between 5 and 10 ml/min/1.73 m^2. We set out to document the level of preparedness for renal replacement therapy by patient on maintenance haemodialysis by the time they were initiated on haemodialysis at Kenyatta National Hospital, tertiary referral hospital in Kenya, East Africa.

II. Material And Methods

This retrospective cross sectional descriptive study was carried out on ambulant adult patients chronic maintenance haemodialysis in the Renal Department at the Kenyatta National Hospital in Nairobi, Kenya in June and July 2018. A total 82 ambulatory adult patienents of aged ≥ 18, years, who had been on heamodialysis for at least three months were recruited in this study.

Study Design: Retrospective cross sectional descriptive study.

Study Location: The study was carried out in the Kenyatta National Hospital, Nairobi-Kenya, Renal Department. This is a tertiary care teaching and referral hospital, the largest hospital in Eastern and Central Africa

Study Duration: June to July 2018.

Sample size: Population study of 91 patients.

Sample size calculation: The minimum number of patients required to be enrolled into the study was derived from formula with finite population correction [7].

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)}$$

where n' = Sample size with finite population correction,
N = Population size,
Z = Z statistic for a level of confidence,
P = Expected proportion (If the prevalence is 20%, $P = 0.2$), and
d = Precision (If the precision is 5%, then $d = 0.05$)

With, N =91, Z = 1.96, and P = 50%, at least 74 (n') patients on chronic haemodialysis, was the minimum number of the patients required for this population study.

Subjects & selection method: All consenting eligible patients were enrolled in the study.

Inclusion criteria

Ambulant consenting adult patients aged 18 years and above on chronic maintenance haemodialysis for at least three months prior to the study commencement.

Exclusion criteria

Very sick patients, non-consenting patients and those aged under 18 years were excluded from the study.

Procedure methodology

Medical records for the ambulant patients on chronic maintenance haemodialysis were retrieved from health records and information office. Sociodemographic, medical history, duration of followup and state of preparedness parameters were obtained through interview and entered into the questionnaire.

Statistical analysis

Data analyses were performed using the Statistical Package for Social Science (SPSS) version 20.0. For continuous variables eg age, mean, mode, median, range, and standard deviations were calculated. Frequencies of categorical variables e.g. sex were calculated. Significance testings were performed with chisquare testing and student t-test.

III. Result

During the period between June and July 2018, the Kenyatta National Hospital had about 91 patients who had been on chronic maintenance haemodialysis for at least 3 months. Three of the patients were aged below 18 years, thus not eligible for enrolment into the study. There were therefore 88 eligible patients. Six of the patients were not included. Eighty two (93.2%) of the eligible patients were enrolled into the study. Among the recruited patients, the males and females were equal in number. About two in every three (65.9%) of the patients were aged 50 years and below. Almost half (47.60%) of the patients on haemodialysis were enrolled from the hypertension clinic. About 1 in every 5 patients (19.50%) was from diabetes clinic. More than 3 in every 10 patients (31.70%) were enrolled from the renal clinic while almost 15% of the patients had no regular clinic prior to enrollment into haemodialysis programme.

Preparedness for kidney replacement therapy

The follow up duration before initiation of haemodialysis ranged from zero (0) months to 552 months (46 years). Almost 55% of the studied patients had duration of follow up of one year or less before initiation of haemodilaysis . The duration of follow up mean, mode and median were 41, 0 and 0 months respectively. The duration which the patients were on haemodialysis ranged from 3 months to 138 months (11.5 years). Almost 3 in every 4 patients (74.4%) were initiated on haemodialysis as emergency (p value <0.001). Almost 80% were initiated haemodialysis via acute vascular access placed in the jugular and subclavian veins. At least 3 months later, 40% still had acute catheters on the same veins. In-dwelling acute venous catheters on the femoral veins were in 9.2% at initiation and 6.6% of the patients at least 3 months later. Less than 2% of the patients had arteriovenous fistulae at the incident haemodilaysis, which rose to 14.5% at least three months later. Tunneled catheter were placed at 11.8% of incident haemodialysis and at least 3 months, were almost 40%. (Figure 1).

By the time of the study, 70.7% of the patients on haemodialysis knew two modalities of kidney replacement therapy. Thirty percent (30.5%) of the patients on haemodialysis did not know about kidney transplantation as a modality of kidney replacement therapy. In the chronic maintenance haemodialysis patients in the renal unit, 52.4% had been counseled about kidney transplantation (Table 1).

Table 1: *Knowledge about the modalities of renal replacement and kidney transplantation*

	Number (%)	P-Value (Chi-square)
Number of modalities of renal replacement		
Dialysis only	24(29.3)	**<0.001**
Dialysis and kidney transplant	58(70.7)	
Know about kidney transplantation		
Yes	57 (69.5)	**<0.001**
No	25(30.5)	
Counseled about kidney transplantation		
Yes	43 (52.4)	**0.659**
No	39(47.6)	

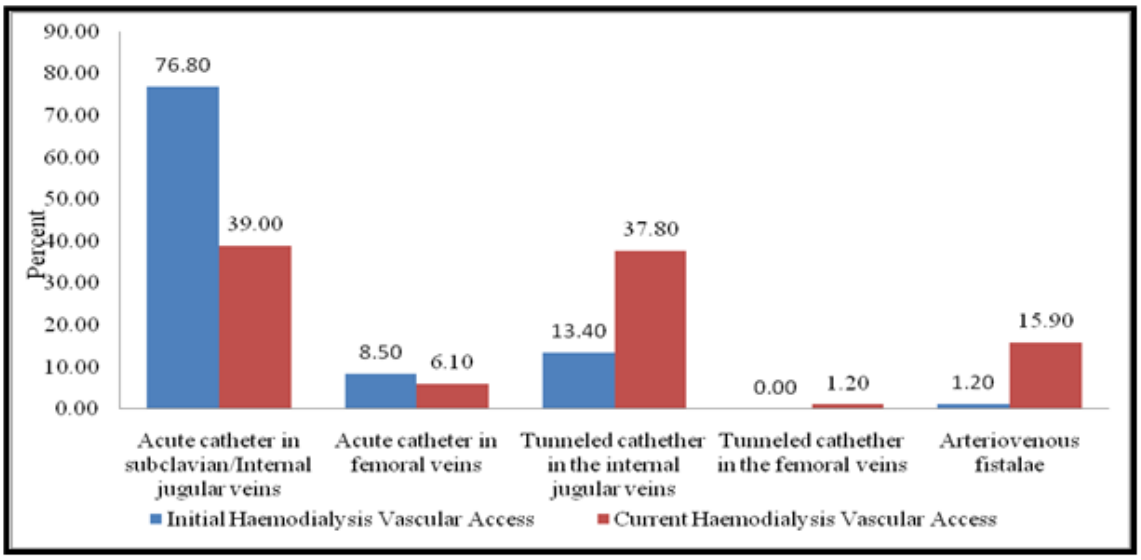

Figure 1. *Initial and current haemodialysis vascular access*

Eighty eight percent of patients on chronic maintenance haemodialysis were twice weekly intermittent haemodialysis, while 6% were on weekly and 6% on thrice weekly intermittent haemodialysis for at least 3 months preceding the study. By the time of the study, 70.7% of the patients on haemodialysis knew two modalities of kidney replacement therapy. Thirty percent (30.5%) of the patients on haemodialysis did not know about kidney transplantation as a modality of kidney replacement therapy. In the chronic maintenance haemodialysis patients in the renal unit, 52.4% had been counseled about kidney transplantation (Table 1).

Subjectively, about 19.5 % to 30.5% of the patients felt that they were never informed about the deterioration of the kidney disease; the results of the tests performed in the clinics and never had health education during the course of their follow up in the out-patient clinics. (Table 2). In a Likert scale with never, sometimes, most of the times and every time, 13 .2% of the patients felt strongly that they were not well informed about their health, with only 44.7% reporting to have been well informed about their health condition by the time they were initiated on haemodialysis. In another Likert scale spanning from strongly disagree, disagree, somehow agree and strongly agree, 42% f the patients reported that they were not informed about the risks of kidney failure due to the underlying medical condition. More than 1 in every five (22.4%) had no counseling sessions by the time they were initiated on haemodialysis (Table 3).

Table 2: *Knowledge and information about disease progression during predialysis clinic visits*

	Before I was initiated on dialysis, the clinicians informed me about my illness and progression every time I attended the clinic (%)	The clinicians informed me about the test results every time I brought the results during the clinic visits (%)	The clinicians referred me for health education during my clinic visits (%)
Never	30.5	19.5	28.0
Sometimes	28.0	18.3	37.8
Most of the times	17.1	22.0	9.8
Every time	24.4	40.2	24.4

Table 3: *State of preparedness for haemodialysis*

	I felt well informed about my health condition by the time I was initiated on haemodialysis (**%**)	I felt adequately informed to cope with complications of the kidney disease by the time I was initiated on dialysis **(%)**	I had been informed about the risks of kidney failure due to the primary illness during the clinic visits (**%**)	I had adequate nutritional counseling in respect to the kidney disease **(%)**	I had sessions with the renal counsellor before initiation of dialysis **(%)**
Strongly disagree	13.2	13.2	17.1	5.3	22.4
Disagree	14.5	25.0	25.0	19.7	21.1
Somehow agree	27.6	28.9	13.2	17.1	13.2
Strongly agree	44.7	32.9	44.7	57.9	43.4
P-value Chi-square	**<0.001**	**<0.001**	**0.007**	**<0.001**	**0.001**

IV. Discussion

Among the 82 patients who were on chronic maintenance haemodialysis in Kenyatta National Hospital renal unit in June-July 2018 the number of males and females were equal but females were younger than males. The average age was 45.39 years for both males and females. They were relatively young with almost two-thirds of the patients aged 50 years and below. This compares with haemodialysis populations reported elsewhere in Africa in Nigeria [8], Côte d'Ivoire [9] and Cameroon [10] [11] and India [12], but differs from the ones from Iran [13], Japan [14] and Spain [15] Brazil [16] and Sweden [73] where the populations near or more than 60 years of age.

Despite follow up in the outpatient clinics prior to initiation of haemodialysis, 74.4% (p value <0.001) of the patients were initiated haemodialysis as emergency. Vascular access planning was poor, 77.6% (p value <0.001) were initiated haemodialysis via acute indwelling venous catheters, with only 1.3% initiating haemodialysis using the recommended arteriovenous fistulae. This is different from reports from elsewhere in the world like Spain [17], where more than half of incident haemodialysis are elective with only 30% of patients using acute catheters and more than 50% arteriovenous fistulae at the start of haemodialysis [18]. However, similar low arteriovenous fistulae uptake and high prevalence of acute haemodialysis catheters use at incident haemodialysis has been reported in the annual United States Renal Data System [19] and among Hispanics in the USA where acute haemodialysis catheters use was as high as 85.5% as the first vascular access [20]. Majority of our patients (88%) were on twice weekly intermittent haemodialysis. The internationally minimum recommended is thrice weekly.

Patient education is important in management of chronic medical condition to win participation of the patients in delivery of their health care. Information to the patient about disease progression, laboratory tests results and referral for health education was low among clinic attendees. Subjectively, significant proportion of the patients felt inadequately informed about their health condition and inadequate to cope with complications of kidney disease. Information about the risks of kidney failure resulting from the primary disease was also inadequate. Nutritional management is necessary in CKD. More than 20% of the patients reported inadequate nutritional counseling. Dietary and fluid restrictions compliance have been shown to reduce symptoms and improvement of quality of life and increase in life expectancy [21] in patients who are on dialysis.

V. Conclusion

In conclusion, patients preparedness for renal replacement therapy in our setting is wanting. Even patients with long duration of follow up in outpatients clinics are not well prepared for renal replacement therapy. Majority initiates haemodialysis as emergency with acute vascular accesses. Counseling, nutrition education and transplantation uptake are low. Multidisciplinary approach to care of chronic kidney disease to optimize better the preparedness is necessary in our setting.

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