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Barriers to access of quality renal replacement therapy in end-stage renal disease patients at the Kenyatta national hospital.

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Abstract:*Infrastructural, economic and man power factors dictate a conservative approach to renal replacement therapy (RRT) in majority of end-stage renal disease (ESRD) patients in Kenya. A quantitative and qualitative descriptive cross-sectional hospital based study was conducted on barriers to access of RRT at Kenyatta National Hospital (KNH) in ESRD patients. In the study (98%, n=106) of respondents did not get a minimum three hemodialysis sessions per week. Nephrology staff shortage was reported which affects service delivery. There was a strong statistical association between respondents' with no or low monthly income and missing of dialysis sessions. (Fishers' p = 0.008). No statistical significance association was noted between respondents missing hemodialysis session and reported major reason to be high cost of dialysis and those missing hemodialysis sessions and report inadequate number of hemodialysis machines as the major reason(chi square 1.78 p=0.18). Peritoneal dialysis was only acceptable to one respondent (0.93%) and (34%) of the respondents did not have sufficient knowledge on it. Respondents reported that high cost of kidney transplants (42.99%) and kidney donors (51%) as the two major barriers to this RRT procedure. Adequate resource allocation and cost containment measures are needed at KNH dialysis unit. Study done in December, 2012.*

Keywords: *Renal Replacement Therapy, End-Stage Renal Disease and Kenyatta National Hospital.*

I. Introduction And Literature Review

Good health is central to human happiness and well-being. It also makes an important contribution to economic progress, as healthy populations live longer, are more productive, and save more. Good health is essential to human welfare and to sustained economic and social development[1]. Chapter four, bill of rights section 43 (1a) of the Kenya constitution states that every person had the right to the highest attainable standard of health, which includes the right to health care services, including reproductive health care[2].

Data from many of the low-income countries on ESRD are largely not available, but given the prevalence of poor socioeconomic factors, the incidence of ESRD is likely to be greater than in high-income countries. In sub-Saharan Africa, economic and man power factors dictate a conservative approach to therapy in most instances, but the majority of those with ESRD "perish" because of lack of funds; Very few patients can afford regular maintenance dialysis and renal transplantation is often not available. [3]

Limitations to regular maintenance dialysis include the paucity of dialysis units, restriction of those units to urban centers, and absence of government funding or subsidy and health insurance to cover high costs of dialysis. The few available units are plagued with multiple problems: old machines frequently break down, and there is an absence of adequate maintenance, technical support, and spare parts, as well as lack of consumables and frequent power outages[4].

Access to renal replacement therapy is Kenya is limited because of lack of facilities[5]. The Kenyatta National Hospital mainly offers the following three modalities of renal replacement therapy (RRT) namely hemodialysis, peritoneal dialysis (pediatric patients) and kidney transplants for management of end-stage renal disease (ESRD) [6].

Access to healthcare in general is defined in four dimensions which are availability, accessibility, acceptability and appropriateness/quality. Access to healthcare services can however be affected by two main factors which are demand and supply. On supply side good quality and effective healthcare services may not be offered thus affecting access to quality healthcare. Individuals may not utilize services from which they could benefit if they do not have financial capability or knowledge thus demand is affected[7].

TABLE1.Various values of Hemodialysis product (HDP) as well as the corresponding expected clinical findings[8].

Hrs/Dialysis sessions	Dialysis sessions per week	HDP	Clinical results
3	3	27	Totally inadequate and patient at risk of protein energy malnutrition.
4	3	36	Inadequate
5	3	45	Borderline, some malnutrition
8	3	72	Proven adequate
5	4	80	Not data available
6	2	36	Not data available
8	6	288	Best so far

HDP = (hours/dialysis sessions) X $(\text{Sessions/week})^2$. HDP for patients should be at least above 60 for adequate dialysis.

1.1 Problem statement

A large number of ESRD patients at Kenyatta National Hospital (KNH) are having only one dialysis session per week which is not adequate. There are many patients who have been on maintenance hemodialysis for several years and thus have not had access to a kidney transplant.

the total level of dialysis adequacy in end-stage renal disease (ESRD) patients in Kenya is still very low compared to other hemodialysis centers in the world. Therefore there is an urgent need to address the issue of inadequacy of hemodialysis. Adequate dialysis maximizes well-being, minimizes morbidity and helps a patient retain social independence [9].

Dialysis prescription should be individualized, monitored and reassessed regularly [10]. A chronic renal failure patient requires around three hemodialysis sessions per week. This effectively removes urea, uremic toxins and accumulated fluid in the patients' body [11].

1.2 Justification

In a study carried out in Egypt once or twice weekly dialysis schedule is usually inadequate unless there is a reasonable amount of residual kidney function. In El-Said's study survival rate of patients having thrice weekly dialysis sessions was more than double that of patients having twice weekly dialysis sessions [12].

Peritoneal dialysis is an efficient mode of RRT with positive outcomes but very underutilized in Kenya. It requires less technology and is cheaper than hemodialysis and transplants. This research will also seek to find out why peritoneal dialysis is under-utilized at KNH yet it could help increase access to RRT [6] .

The results of this research will increase the body of knowledge on barriers ESRD patients go through to access renal replacement therapy. The findings will be important for policy formulation and planning purpose for the Kenyatta National Hospital as well as the ministry of health Kenya.

II. Material And Methods

A descriptive cross-sectional hospital based survey that utilized both quantitative and qualitative research methods was utilized for the study at KNH Renal Unit for the study. Kenyatta National Hospital is the biggest referral hospital in East and Central Africa

Those included in the study met the following criteria: Diagnosis of end-stage renal disease (ESRD), patients on dialysis for more than six months, written consent to participate in the study, nurses who have undergone nephrology training and with at least three years clinical experience in KNH renal unit and nephrology consultant doctors who have worked for more two years at KNH renal unit. Patients who were critically ill with End-Stage Renal disease (ESRD), doctors and nurses were undergoing nephrology training were excluded.

Sample size for End-Stage Renal Disease (ESRD) patient respondents was estimated using the formula recommended by Cochran (1963) [13]. Local prevalence rates of end-stage renal disease (ESRD) are unavailable and thus an estimate of 50% based on anecdotal evidence was used. $\mathbf{n= z^2 pq/ d^2}$

A total of 108 respondents with ESRD and 6 key informants were included in the study. Key informants were selected by the researcher, they comprised of four nurses and two doctors at the renal unit.

Data collected was done using administration of questionnaires to respondents. A key informants' guide was used to obtain the renal unit's doctors' and nurses' opinion on barriers at access of RRT at KNH.

Pre-testing of the study tool on ESRD patients on hemodialysis was done at the Moi Teaching and Referral Hospital. This is because the Moi Teaching and Referral hospital

Data was collected from questionnaires administered to respondents, medical files and key informants

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0 computer software. Chi squires, Fishers' exact and p-values will be used to calculate the statistical significance of results

obtained. Statistical significance was set at $p<0.05$ so that the results will have universally accepted levels of accuracy.

Ethical clearance was sought from the Nairobi University and Kenyatta National Hospital joint ethics and research committee and the Moi Teaching and Referral Hospital ethics and research committee. Respondents who met the inclusion criteria all signed a written informed consent that stipulated their rights and purpose of the study to which they agreed.

III. Findings

3.1 Quantitative data

A hundred and eight (108) respondents who met the inclusion criteria were selected for the study and filled in study questionnaires. Demographic results of the respondents are a shown in table 1.

TABLE 2: Demographic characteristics of respondents

Respondents	**n (%)**
Male	**67(62.04%)**
Female	**41(37.96%)**
Total	**108(100%)**
Respondents' Age	
10-19 years	**n (%)**
20-29 years	**4(3.7%)**
30-39 years	**13(12.04%)**
40-49 years	**25(23.15%)**
50-59 years	**32(29.63%)**
60-69 years	**25(23.15%)**
70-79 years	**5(4.63%)**
Above 70 years	**4(3.7%)**
Total	**108(100%)**
Residence by province	**n(%)**
Central province	**45(41.67%)**
Nairobi	**37(34.26%)**
Rift Valley	**10(9.26%)**
Eastern	**9(8.33%)**
Nyanza	**5(4.63%)**
Coast	**2(1.85%)**
Total	**108(100%)**

Majority of respondents (57.41%, n=62) have been on hemodialysis for less than two years, (24.07% n =26) have been on hemodialysis for 2 to 3 years, (11.11% n=12) have been on hemodialysis for4 to 5 year, and (7.41%, n=8) of the patients having been on maintenance hemodialysis for more than five years as seen in figure 1.

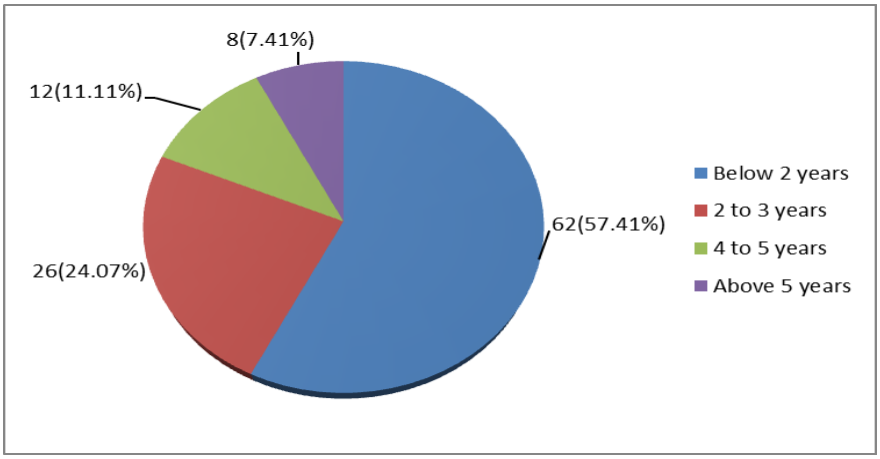


Fig. 1: Number of years respondents have been on maintenance hemodialysis

Most respondents undergo one (47.72%, n=51) or two (50.93%, n=55) hemodialysis dialysis sessions per week with only (1.85%, n=2) having the ideal number of three sessions per week occasionally. See figure 2.

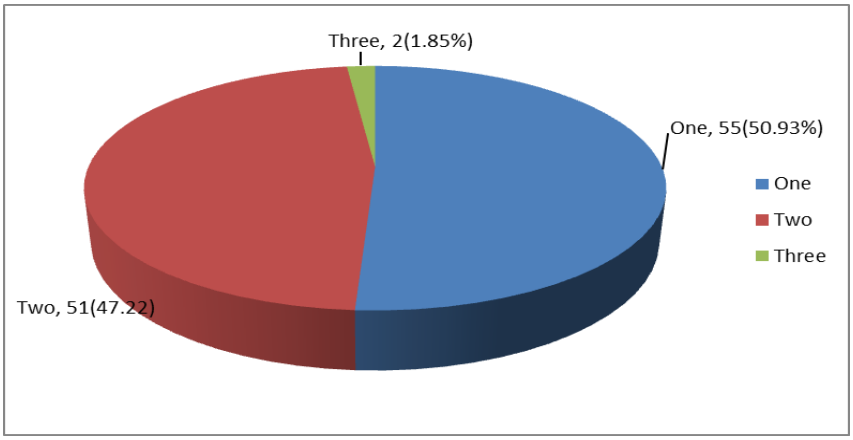


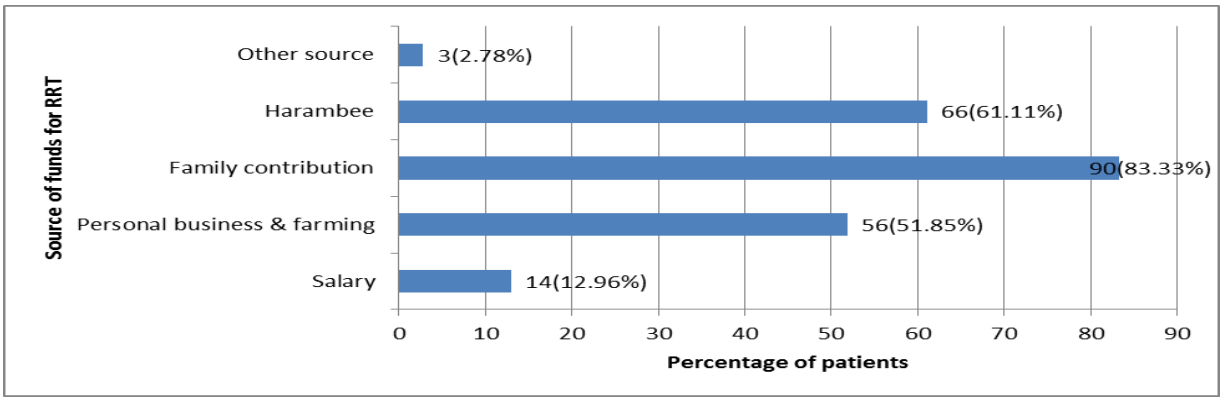
Fig. 2: Number of weekly hemodialysis sessions for respondents interviewed

In response to the question on the adequacy of resources at KNH, majority of respondents (97.3%, n=105) indicated that hemodialysis machines were not adequate, (88.9% n=96) indicated that number of nephrologists was not adequate, (76% n=82) indicated number of nurses not adequate and finally (69.5% n=75) reported that dialysis surgical materials were not always available at the hospital as indicated in Table 3.

TABLE 3: Availability of selected RRT service providers and dialysis items

	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Item	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Number of Hemodialysis machines adequate	0(0.0)	3(2.8)	0(0.0)	10(9.3)	95(88.0)
Number of Nephrology doctors adequate	1(0.9)	8(7.4)	3(2.8)	40(37.0)	56(51.9)
Number of Nurses adequate	3(2.8)	15(13.9)	8(7.4)	68(63.0)	14(13.0)
Dialysis surgical materials are always available in pharmacy	1(0.9)	29(26.9)	3(2.8)	18(16.7)	57(52.8)

Respondents on maintenance hemodialysis at KNH, raise funds for their weekly dialysis sessions mainly from family contributions (83.33%, n=90) and (12.96%, n=14) from monthly salaries as indicated in figure 3.



There was a strong statistical association between respondents' monthly income and missing of dialysis sessions. The respondents who had lower monthly income were more likely to miss hemodialysis sessions (Fishers 0.008)as seen in Table 4. This could be so mainly because they lacked sufficient funds to pay for services.

There was a significant statistical association between respondents missing hemodialysis sessions and had low monthly income thus dependent on family contributions for hemodialysis funds. Respondents who had very little or no income thus depend on family contributions to raise funds for hemodialysis were more likely to miss hemodialysis sessions(Fishers' p=0.011) as indicated in table4 below.

There was no statistical significance association between respondents missing hemodialysis session and reported major reason to be high cost of dialysis and those missing hemodialysis sessions and report inadequate

number of hemodialysis machines as the major reason(chi square 1.78 p=0.18) as indicated in Table 4. This shows that cost of hemodialysis sessions and inadequate number of hemodialysis machines are equally major barriers to dialysis at KNH. Thus to increase access to dialysis in KNH patients both this two issues have to be addressed.

TABLE 4: Relationship between respondents missing dialysis sessions and their economic/resource factors

Item	**Missed sessions**		**Chi square**	**P value**
	Yes	No		
Family contribution				
No	7(38.9)	11(61.1)	Fisher's	0.011
Yes	66(73.3)	24(26.7)		
NHIF cover				
Yes	70(68.0)	33(32.0)	Fisher's	0.658
No	3(60.0)	2(40.0)		
Reported barriers				
High cost of dialysis	29(61.7)	18(38.3)	1.798	0.18
Number of machines	43(71.7)	17(28.3)		
Monthly income				
Below Kshs 1,000	15(57.7)	11(42.3)	Fisher's	0.008
Ksh 1,000-10,000	37(86.0)	6(14.0)		
Ksh 10,001-20,000	10(58.8)	7(41.2)		
Ksh 20,001-30,000	9(56.3)	7(43.8)		
Ksh 30,001-50,000	2(33.3)	4(66.7)		

There is a statistical significance association between respondents missing hemodialysis sessions and availability of dialysis surgical materials at the hospital. Respondents who reported that dialysis surgical materials were not always available in the hospital pharmacy thus have to buy them at a more expensive price elsewhere, were more likely to miss hemodialysis sessions (Fisher p<0.001). Refer to Table 5 below.

TABLE 5: Relationship between respondents missing dialysis sessions and availability of dialysis surgical materials for RRT

Dialysis surgical materials are always available at KNH pharmacy	**Missed dialysis Yes**	**Missed dialysis No**	**Fisher's exact p value**
Agree	28(93.3)	2(6.7)	<0.001
Neutral	2(66.7)	1(33.3)	
Disagree	43(57.3)	32(42.7)	

There was no statistical significance difference between knowledge of ideal number of hemodialysis sessions and the number sessions the respondents had weekly (Fisher's p=0.094) as indicated in table 10 below. Respondents who knew the minimum number of dialysis sessions required for an ESRD patient per week did not necessarily get more or adequate number of hemodialysis session. Refer to table 6.

TABLE6: Relationship between knowledge of dialysis adequacy and Number of Respondents' weekly hemodialysis sessions

	Number of sessions			
Knowledge of number of sessions in ESRD	One	Two	Three	Others
Inadequate	34(56.7)	25(41.7)	0	1(1.6)
Adequate	20(41.7)	26(54.2)	2(4.2)	0
	Fisher's	**exact**	**=**	**0.094**

The study findings indicate that respondents have barriers to kidney transplantation. Majority of respondents (42.99%, n=46) reported that the high cost of kidney transplants, (28.97% n=31) stated finding a kidney donor as the major barrier to the kidney transplantation, (5.61%) stated uncertainty of the outcome of kidney transplant and (22.43% n=24) stated various other reasons

Approximately sixty four percent (n=68) of respondents would be comfortable having a kidney transplant procedure done at KNH. The remaining (36.45% n=39) respondents would not wish to have a kidney transplant at KNH but would be comfortable having it done in other countries

Respondents who would not mind having kidney transplant procedures done at KNH cited the following reasons for their choice. Thirty nine point eight nine percent (n=43) stated cheaper cost of kidney transplant at KNH compared to other countries in the world, (25% n=27) stated confidence in KNH doctors ability to perform successful kidney transplants, (8.33% n=9) reported KNH is close to their home and (1.85%, n=2) were of the opinion that easier follow-up. However respondents who had reservations on having their kidney transplant operation done at KNH reported perceived high failure rates (28.9%, n=31), slow systems at the hospital (5.56%, n=6) and (10.85% n=11)various other reasons as their reasons

The principal researcher reviewed respondents' medical and dialysis files with their consent so as to assess their management and follow up. Periodic medical reviews, follow-up and investigations were either not documented or not done in a large number of respondents hospital medical files. Hemodialysis session observations done by nurses were however documented in the files for the weekly number of dialysis sessions patients got. Thirty six point eleven percent (n=39) of the files were updated several times in 2012 and (16.67% n=18) of the respondent files were last updated in 2011 as indicated in Table 7.

TABLE 7: Documentation on patient review and investigation done

Year file last updated	**Files**	**%**
Files last updated in 2010 or before	30	27.78%
Files last updated in 2011	18	16.67%
Files last updated several times in 2012	39	36.11%
File not traceable in records department	21	19.44%
Totals	**108**	**100%**

3.2 Qualitative data

Key informants interviews were carried out on 2 doctors and 4 nurses from the renal unit on barriers to RRT in ESRD patients at KNH. There was broad consensus that KNH has resource barriers to access of quality RRT for ESRD patients.

Respondents cited in-order of priority: large number of patients at the renal unit, small renal unit that needed expansion, few dialysis machines with several spoilt; inadequate staff and inadequate kidney transplant resources. These were reasons affecting quality of RRT services offered to the big number of ESRD patients who require RRT at the hospitals' Renal Unit.

All of the respondents were of the opinion that RRT services are very expensive and the ESRD patients can barely afford them. The National Hospital Insurance Fund (NHIF) helps cover close to half of the cost of hemodialysis at KNH. This is KNH admits these patients and this makes the cost of hemodialysis cheaper as compared to other dialysis centers in the country where it does not do the same. KNH thus has high number of patients from nearly all provinces as dialysis cost is cheaper. It was reported by all respondents that dialysis surgical materials are not always available at KNH and it costs more if patients have to buy them from outside the hospital.

Respondents overwhelmingly supported the opinion that patients do not readily accept some modes of RRT services because of cultural factors. These are like peritoneal dialysis or blood/organ donations and this affects their access to quality RRT services, since the patients' options are limited. Peritoneal dialysis is unpopular because it is seen as cumbersome (3session every 8 hours per day), it is associated with high infection rate, it lowers self-esteem and is said to affect "manhood" in some patients. Some religions do not accept blood transfusions and organ transplants and this affect the patient's access to RRT.

It was also noted from the renal unit nurses that patients get some information on RRT services offered at KNH from their fellow patient friends or relatives that may not be correct but affects their choices of RRT services. The medical care givers also do not give the patients all the information about choices of RRT especially peritoneal dialysis to make informed choices.

The two doctors agreed that documentation of patient management is not well done because of staff shortages. ESRD patient are reviewed when they need medical review, laboratory investigations are ordered and prescriptions done but documentation of these is not well done because of the large number of patients the doctors have to review daily.

Majority of key interview respondents (5) were of the opinion that peritoneal dialysis is an efficient mode of RRT and can increase access to RRT at KNH. Peritoneal dialysis compared to hemodialysis is however more expensive and prone to infections, making it less utilized as a mode of RRT at KNH.
High cost, inadequate number staff, and facilities for kidney transplants were cited as major barriers to kidney transplantation at KNH by the unit doctors.

IV. Discussion

One hundred and six respondents (98.15%) did not have the required minimum of three dialysis sessions per week (Figure 3). Sixty nine respondents (63.88%) earn between ksh 0 to ksh 10,000 (Figure 4), yet they require ksh 13,000 for the required minimum three hemodialysis session per week. The respondents who earn higher monthly income missed less dialysis session in relation to those who earned less monthly. Respondents who depended on family contributions tend to miss more dialysis sessions than those who had their own income to fund hemodialysis session (Table 4).

Income is a significant factor in the utilization of health services generally. In developing countries, the poor have less access to health services. Most patients come to KNH because of the subsidy on admission by NHIF which is one factor increasing the number of hemodialysis patients at KNH. Utilization of health services is higher for insured patients in developing countries where health insurance exists [14].

Respondents who stated that hemodialysis surgical materials were not available most of the time at KNH (57.3% n=85) were shown to miss more dialysis session in comparison to those who said dialysis session are available most of the time at KNH (93.3% n=30). These hemodialysis surgical materials are available in shops outside KNH but at more expensive prices compared to KNH, thus patient cannot afford to buy them in those shops (table 5). Governments of developing countries should foster market forces that could drive the cost of dialysis down and in coordination with suppliers; they can implement programs of cost containment [15] .

Some respondents did not have adequate information about peritoneal dialysis. This mode of RRT is good and efficient if patient follow instructions. The focused group discussion respondents agree that peritoneal dialysis is an effective method of RRT if well utilized and can increase access of RRT. They also agree that peritoneal dialysis is more expensive as compared to hemodialysis at KNH. Peritoneal dialysis is less accepted according to the study findings is a more expensive method of RRT compared to hemodialysis at KNH. This is in contrast to the findings, that it requires less technology and it is cheaper than both hemodialysis and kidney transplants in developed countries [6].

Barriers to kidney transplantation are difficulty in finding donors, high costs, uncertainty of outcome and other factors . It costs over ksh 1,000,000 to have a kidney transplant [16].

V. Conclusion And Recommendation

5.1 Conclusion

ESRD patients at KNH have resource, economic, cultural and knowledge barriers to access of quality RRT services. Dialysis adequacy is still very low and kidney transplants are not accessible to many patients at Kenyatta National Hospital. Poor access to RRT is not so much a KNH problem but a country problem. The "large" number of ESRD patients from nearly all provinces in Kenya coming to the hospital's renal unit access to quality RRT as they have to share the limited resources. Stakeholders should petition the government increase funding to health to 15% according to the Abuja declaration and decentralize RRT services to increase access to required RRT in KNH and the whole country.

5.2 Recommendations

Dialysis pool at KNH should be decreased through proper treatment of Renal Failure so that it does not progress to ESRD, pre-emptive kidney transplants and kidney transplants should be advocated for as main treatment of renal failure patients.

The hospital management needs to increase the number of nephrology staff to effectively serve the large and growing number of nephrology patient in Nairobi.
KNH management should ensure that it repairs/replaces the dialysis machines that have broken down and reduce cost of dialysis sessions to increase access.

Stakeholders should increase funding for RRT services and fast track decentralization of the RRT services in the country to ease patient congestion at KNH renal unit.

The KNH and the Kenya government should put in place cost containment measures like identify good suppliers to ensure dialysis surgical materials are always available and at affordable prices to ESRD patients.

Stakeholders should petition the NHIF to cover costs on RRT to same percentage as KNH in other hospitals which would relieve congestion of patients at KNH.

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