ADHERENCE TO POST KIDNEY TRANSPLANT TREATMENT AND LIFESTYLE CHANGES AMONG KIDNEY RECIPIENTS AT KENYATTA NATIONAL HOSPITAL, NAIROBI CITY COUNTY, KENYA

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

I dedicate this work to my sons Collins and Nicholas

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I wish to express my most sincere gratitude to the Almighty God for giving me perseverance and wisdom to carry out this thesis.

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LIST OF ABBREVIATIONS

BMI: Body Mass Index

BScN: Bachelor of Science in Nursing

BUN: Blood urea Nitrogen

DM: Diabetes mellitus

DSA: Donor specific antibodies

ESKD: End stage kidney disease

FDA: Food and drugs administration

HTN: Hypertension

KDIGO: Kidney disease improving global outcome

KDOQI: Kidney disease outcome quality initiative

KNH: Kenyatta national hospital

KSH: Kenya shillings

KU: Kenyatta University

MOH: Ministry of health

MTRH: Moi teaching and referral hospital

NACOSTI: National commission for science, technology and innovation

NHIF: National hospital insurance fund

RRT: Renal replacement therapy

SPSS: Statistical package for social sciences

WHO: World health organization

OPERATIONAL DEFINITIONS

Adherence: This is the extent to which the patient upholds the agreed recommendations from a health care provider.

Allograft: This is the transplant of an organ or tissue from one individual to another of the same species with a different genotype. They account for many human transplants, including those from cadaveric, living related and living un-related donors.

Alloimmunity: This is an immune response to non-self-antigens from members of the same species.

Antigen: This is a toxin or other foreign substance which induces an immune response in the body.

Body mass index: It is the measure of body fat based on height and weight to determine a healthy weight for the height It is calculated as weight in kilograms divided by height in meters squared ($BMI=KG/M^2$)

Blood Urea Nitrogen: A test that measures the amount of urea in the blood. Urea is the main nitrogenous final product of metabolic protein breakdown.

Creatinine: It is a product of creatine phosphate breakdown from muscle and protein metabolism.

Drug trough levels: It's the lowest drug concentration in the patient's blood. The test is done to monitor therapeutic drug dose and it's also important in adjusting drug dosages.

End stage kidney disease: It is the final, permanent stage of chronic kidney disease, where the kidney function has declined to the point that they can no longer function on their own and thus necessitates for a renal replacement therapy in order for the patient to survive.

Health care provider: This is an individual or institution which provides preventive, curative, promotional or rehabilitative health care services in a systematic way to individuals, families or communities.

Immune response: This is the way the body recognizes and defends itself against bacteria, viruses and other toxic or harmful substances.

Immunosuppressive therapy: This is a combination of immunosuppressant drugs which are meant to reduce the body's immunity in order to reduce the chances of the body to reject the transplanted organ. They are also called anti-rejection drugs.

Kidney transplantation: This is a surgical procedure of placing a healthy kidney procured from a live or a deceased donor into a person whose kidneys are no longer functional.

Kidney transplant recipient: This is an individual in who a donated kidney has been transplanted.

National hospital insurance fund: It is a Kenya government state corporation with a mandate to provide health insurance to all citizens.

Nursing theory: It is a systematic approach that guides nursing practice.

Post kidney transplant regimen: This is a prescribed course of medical treatment, diet, exercise and lifestyle adjustment for the promotion or restoration of health after kidney transplantation.

Serum Creatinine Level: It is the measure of the amount of creatinine in blood. It is the main indicator of Kidney function test.

ABSTRACT

End stage kidney disease (ESKD) prevalence has become a global public health burden. Kidney transplantation is the best remedy for cases suffering from ESKD. Adherence to post kidney transplant treatment and lifestyle changes is critical in maintaining graft function. However, non-adherence leads to graft loss necessitating the patients to revert to dialysis or re-transplantation. This descriptive cross-sectional study aimed at describing adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at Kenyatta National Hospital. Census sampling method was used to recruit 106 study participants attending transplant clinic. Data collection was done using interviewer and self-administered questionnaire. Descriptive statistics were used to describe patients' characteristics. Chi square test of significance was used to determine the relationship between the independent and dependent variable. A *p* value of less than 0.05 was considered statistically significant. Logistic regression was used to determine the predictors of adherence. The study findings revealed that most of the respondents 63(60%) were non adherent to clinic attendance while 49(46%) were non-adherent to medication. Forgetfulness and cost of medication were reported to be the major contributing factors to non-adherence to medication. Frequency of medication dosing was a statistically significant factor influencing non-adherence to medication (x^2 (1) = 6.61, p = .019, p= <.005) while distance to the hospital statistically significance influence of non-adherence to clinic attendance, (x^2 (2) = 12.63, p = .002, p<.005). The study concluded that non adherence is a major concern in post kidney transplant recipients occasioned by drug cost and distance to the hospital. The study recommends that the government and non-governmental organizations should offer financial support for medicines. Also decentralization of post kidney transplant services to the county referral hospitals and use of daily dose drugs should be embraced.

CHAPTER ONE: INTRODUCTION

1.1 Background information

End stage kidney disease (ESKD) has continued to increase in the last decades and has become a global public health burden (Mathes et al.,2017). Kidney transplantation is one of the most effective modalities of renal replacement therapy for patients with end stage kidney disease (Sanders-pinheiro et al., 2018). It is aimed at restoring the initial kidney function, extend patient's survival and above all improve the quality of their life (Moreso & Torres, 2015).

However, to sustain and elongate the kidney allograft function, it is of paramount importance for the recipient to take lifelong immunosuppressant medications and uphold recommended lifestyle adjustments in order to prevent appearance of donor specific antibodies which induce acute graft rejection with eventual graft loss (Moreso & Torres, 2015). Over 96% adherence to this therapeutic regimen is vital for the success of pharmacological interventions and reduction of preventable complications (Adhikari et al., 2018).

Post kidney transplant treatment regimen begins from three days pre operatively, and continues until graft failure or death of the recipient. This regimen involves a variety of life style changes which include but not limited to optimal exercises, abstinence from smoking and alcohol use, skin protection, lifelong immunosuppressive medication therapy, regular medical clinic attendance and clinical laboratory tests (Hedayati et al.,2017).

Transplanted patients are considered as chronic patients since treatment is for life; they

are therefore expected to be followed up in the transplant clinic with the aim of monitoring their health progress (Adhikari et al., 2018). Moreover, the patients are expected to adapt to the "new life" in order to reorganize their health behaviors to improve positive outcomes of kidney transplantation (Sanders-pinheiro et al.,2018).

Non adherence brings about unsatisfactory clinical benefit of kidney transplant and it is ranked as the second main cause of graft loss accounting for over 65% of graft failure globally. This has led to eventual return to dialysis, re-transplantation, increased morbidity, increased hospitalization, increased financial burden and premature death among this special population (Hucker et al.,2017).

A study carried out in the USA to assess the level of adherence to medicine and lifestyle adjustments among kidney recipients reported a non-adherence rate of over 40%. This accounted for over 30% loss of transplanted kidneys. This was linked to skipped and self-adjusted doses as those patients reported working away from their homes where they found themselves with no medicines (Cukor et al., 2017).

In UK, non-adherence is estimated to be 50% and has seen to kidney recipients lose their graft and revert to dialysis modalities as they await a second transplant. In this population, missing of clinic appointment and failure of monitoring the drug trough levels was the main predisposing factor. Majority of those patients were found to be taking the same dosage of medicine as they were discharged with, as the drug dosages remained unadjusted (Hucker et al., 2017).

In a study conducted in South Africa, resumption of dialysis following graft failure was highly linked to poor adherence to immunosuppressive medications. In addition, cardiovascular diseases were more prevalent in kidney recipients who were smoking and those who did not keep their clinic appointments as compared to those who were adherent since they lacked proper follow up for early detection of comorbidity (Ndemera & Bhengu, 2017).

According to Mathes et al. (2017) intercessions to promote adherence in kidney recipients are required in order to increase adherence, prolong the kidney allograft function and generate more health benefits in kidney recipients. In addition, with prolonged graft function and improved quality of life in this special population, the number of kidney transplants may increase and thus reduce the burden in dialysis centers.

1.2 Problem statement

Failure to adhere to immunosuppressive medications and health promoting practices has been ranked as the second leading cause of kidney allograft loss after kidney transplant (Ndemera & Bhengu, 2017). It is linked to a seven-fold increase in numbers of graft failure following kidney transplant. Kidney graft failure brings about graft loss necessitating the need for the kidney recipient return to dialysis, seek a re-transplant, increase in hospital readmissions, increase in financial burden to the patient and country at large (Paterson et al., 2018).

As reported by Ndemera and Bhengu (2017) adherence to medication among kidney transplant recipients is a challenge owing to the pill burden, pill size and taste, frequency of doses per day, cost of the drugs, medicine side effects and availability of the drug.

They also noted that those patients who poorly adhered to immunosuppressive medications had a 70% risk of graft failure as compared to those who took medicine as prescribed.

Taber et al. (2017) pointed out that missed clinic appointments doubled the risk of graft loss following transplant. They stated that with missed appointments, there is poor monitoring of health progress and at the same time complications are not identified on time. The missed appointments were linked to regular travels on job appointments, distance to the health facility and inadequate knowledge on the need for follow up and lack of motivation to keep appointments.

Additionally, a Nigerian study revealed negative post kidney transplant outcomes related to non-adherence. The non-adherence was linked to poverty, poor health facility infrastructures, lack of trained personnel to give quality care to patients before and after kidney transplantation and poor follow up after kidney transplantation (Okafor et al., 2016). Poor post kidney transplant outcomes have led to graft failure, increased rates of morbidity and hospitalization, increased economic burden and premature deaths (Okafor et al., 2016).

In Kenya, kidney transplants are done in the two main referral hospitals (Kenyatta National Hospital and Moi Teaching and Referral Hospital) and in a few selected private hospitals (Nairobi Hospital, Aga Khan University Hospital, Mater Hospital and M.P. Shah Hospital). In Kenyatta National Hospital, medical records revealed 50% failure rate in patients who had undergone kidney transplantation. Of these patients, 27.5% were on management of acute graft rejection, 3.75% had been re-transplanted, 15% had reverted

to dialysis, and 50% had succumbed to complications related to non-adherence while 2.5% were lost to follow up (KNH Renal unit health records 2019).

It was not known whether these patients adhered to treatment and lifestyle changes or not. The study therefore aimed at describing the level of adherence to post kidney transplant treatment regimen and lifestyle changes, among kidney recipients at Kenyatta National Hospital.

1.3 Research questions

The study sought to answer the following questions:

i. What is the level of adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at Kenyatta National Hospital, Kenya?

ii. What patient factors influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at Kenyatta National Hospital, Kenya?

iii. What treatment related factors influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at Kenyatta National Hospital, Kenya?

iv. What institutional related factors influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at Kenyatta National Hospital, Kenya?

1.4 Objectives

1.4.1 Broad objective

To describe the level of adherence to post kidney transplant treatment regimen and lifestyle changes among kidney recipients at the Kenyatta National Hospital, Kenya.

1.4.2 Specific objectives

i. To determine the level of adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at the Kenyatta National Hospital, Kenya.
ii. To describe patient factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at the Kenyatta National Hospital, Kenya.
iii. To establish the treatment related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at the Kenyatta National Hospital, Kenya.
iv. To identify the institutional related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients at the Kenyatta national hospital, Kenya.

1.5 Justification

Adherence to the prescribed post kidney transplant treatment and lifestyle changes is the key component to obtaining the desired outcomes in kidney recipients. It prevents appearance of donor specific antibodies which are responsible for acute graft rejection and eventual chronic graft rejection (Moreso et al., 2015)

Transplantation is limited due to lack of willing donors and lack of gazette rules for the approval of cadaveric and non-related organ donation. In addition, the cost of maintenance drugs is high posing monetary load to the patients and their care givers. Therefore, it is critical to ensure longevity of the graft function in the already transplanted patients by promoting adherence to the treatment regimen and lifestyle changes. The success in graft function may promote kidney transplantation and motivate more people to donate kidneys to their ailing relatives; it may also attract donor funding for future kidney transplants.

By adhering to post kidney transplant treatment and lifestyle changes, the kidney transplant recipients participate actively in their own care. Successful kidney transplantation promotes well-being of the patient thus improving their mental and physical functionality hence promoting productivity. In addition, a functioning graft provides the patient with freedom away from the hospital with an eventual resumption to their pre morbid state.

Kenyatta National Hospital was purposively selected since it is a teaching hospital and a research center. It is the first hospital to carry out kidney transplantation in Kenya and has the largest population of transplanted patients in Kenya. KNH serves as the largest referral hospital in East and Central Africa so it has diverse patient population making it the ideal study area for this study. In addition, no published or unpublished studies on adherence to treatment and lifestyle changes among kidney transplant recipients at KNH and Kenya at large was found. This necessitated the need for the study in this study area.

It is therefore crucial to understand how kidney transplant recipients at KNH take their medication; how they adhere to the recommended lifestyle changes following kidney transplantation. In addition, it is vital to identify the contributing factors to non-adherence and interventions capable of improving adherence among kidney recipients at Kenyatta National Hospital, Kenya.

1.6 Significance of the study

The findings from this study will provide the government, KNH management, health care providers and patients with useful data on factors that influence adherence among kidney transplant recipients. The findings will inform the KNH policy makers on strategies to promote adherence in order to reduce the number of allograft losses and the number of patients reverting to dialysis. This will guide in resource and fund allocation in order to curb this menace. In addition, the findings will guide nurse researchers, transplant coordinators and nephrologists to come up with a set of individualized lifestyle amendments to be an integral component in the pre transplant training in order to promote adherence. Furthermore, the findings will form a valuable guide in re-designing post kidney transplant treatment protocol on patient management and follow up thus promoting nursing practice. The findings will provide useful data in curriculum development in Nephrology Nursing. In addition, it will identify gaps for future research in kidney recipient population. Finally, the results will increase awareness to the current knowledge on medication and lifestyle adherence in post kidney population.

1.7 Conceptual framework

Kidney transplant comes along with physical, emotional and lifestyle changes. The kidney recipients have experienced a major change in life hence they are expected to adapt to this “new” life of lifelong medicine, an altogether changed lifestyle and regular clinic visits in order to minimize the risks of lifelong immunosuppressant therapy (Sodhi, 2016).

Long term post kidney transplant recipient care needs an ongoing cognitive adaptation and reorganization of behavior in order to accept the changes as part of daily life and maintain highest levels of adherence (Costa et al., 2015).This study therefore will be guided by Roy Adaptation Model where the main focus is adaptation. The person (patient) is seen as a bio-psycho-social adaptive system who is in constant interaction with the changing environment (Naga & AL-Khasib, 2014).

In the opinion of Roy, the founder of this model, environment is the stimulus which the person responds to. Roy classified the environment into three categories namely; focal, contextual and residual stimuli. Focal stimuli are those external and internal stimuli that confront the human system (Naga & AL-Khasib, 2014). In this study, focal stimuli will be the level of adherence and patient related factors that influence adherence to treatment and lifestyle changes.

Contextual stimuli are other stimuli present that can affect the focal stimuli (Naga & AL-Khasib, 2014). In this study, contextual stimuli will be treatment related factors and institutional related factors that influence adherence to treatment and lifestyle changes post kidney transplant.

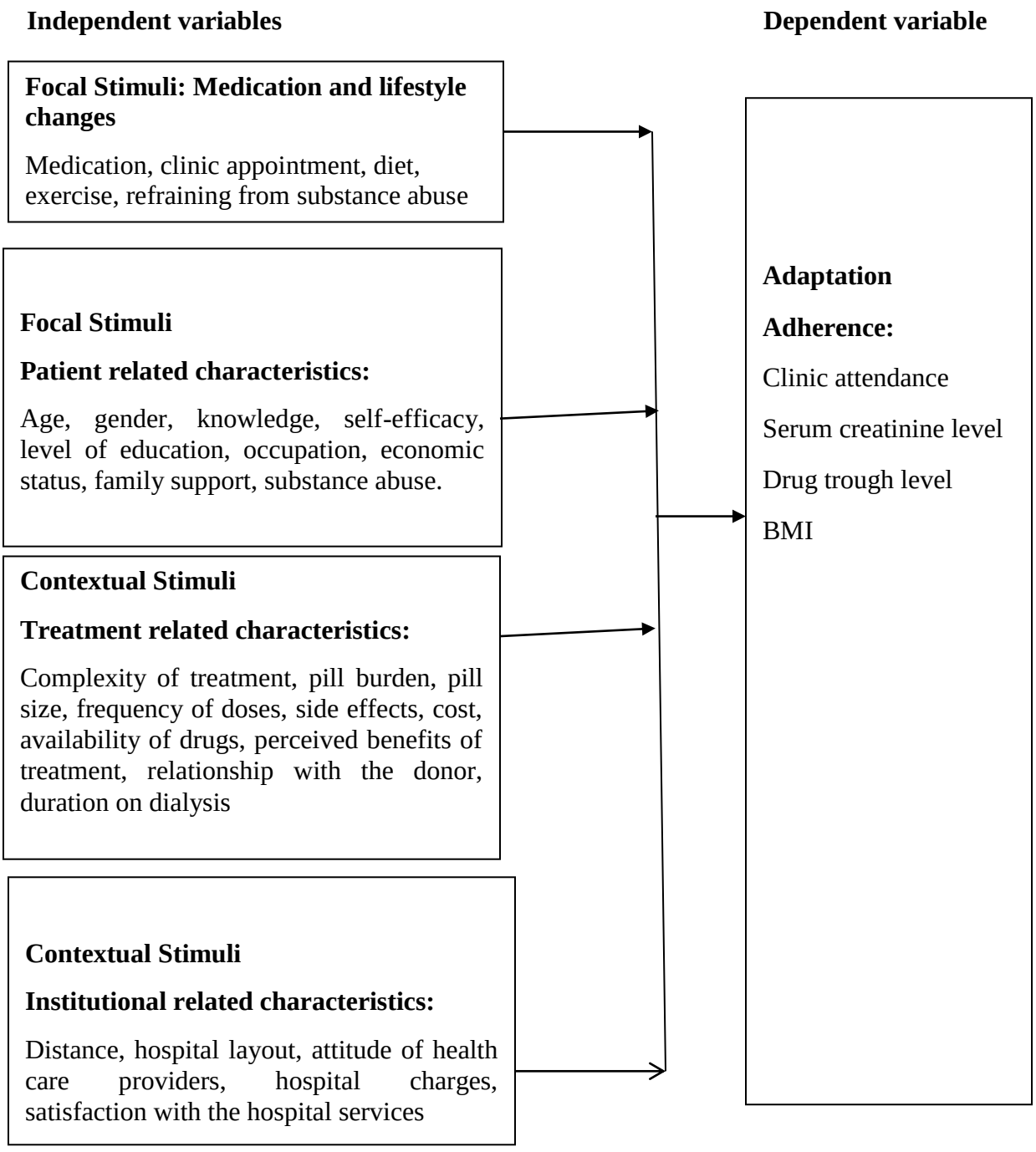

*Figure 1.1: Conceptual Framework: Source (Nyambura, Githemo &Wala 2019***)**

The conceptual framework shows that adherence to post kidney transplant medication and lifestyle change is determined by patient factors, treatment factors and institutional factors.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter involved a global, regional and local review of literature related to the study. The chapter is organized in some sub-topics to include; background of kidney transplantation, levels of adherence to post kidney treatment and lifestyle changes, patient related factors that influence adherence to post kidney transplant and lifestyle changes, treatment related factors that influence adherence to post kidney treatment and lifestyle changes, institution related factors that influence adherence to post kidney transplant and lifestyle changes, an over view of Roy's adaptation model and finally research gaps identified.

2.2 Background of kidney transplantation and adherence

ESRD has become a global burden owing to the increased prevalence of lifestyle related morbidities particularly Diabetes and Hypertension which are the top leading causes; it causes approximately 60 million deaths globally (Hedayati et al., 2017). Kidney transplant is considered the best treatment for patients with this condition as it allows for a better quality of life and prolonged life as compared to dialysis therapies; it also has a lifelong less financial burden to the patients (Williams et al., 2014).

However, to optimize graft survival, the recipient is expected to strictly adhere to lifelong immunosuppressive medicines to prevent formation of donor specific antibodies which are responsible for graft rejection as well as medicines to prevent and treat other comorbidities (Moreso & Torres, 2015). In addition the patients should adopt healthy lifestyles to include but not limited to abstinence from smoking and substance use, dietary adjustments and self-directed exercises with the aim of preventing cardiovascular

diseases and other comorbidities (Vankova et al., 2018).

Adherence to post kidney transplant treatment and lifestyle changes involves taking medicines at the right dosages, timings and duration, keeping clinic appointments and laboratory monitoring, making recommended adjustments to the diet, abstinence from substance use, engaging in self-governed exercises thrice a week, prevention of infections and skin protection (Adhikari et al., 2018).

The success of kidney transplant depends solely on adherence to immunosuppressive therapy in order to prevent formation of donor specific antibodies which leads to graft failure. In addition, dietary and lifestyle adjustments are also crucial with the aim of preventing recurrence of the primary kidney disease and/or development of new comorbidities which may affect the graft. Moreover clinic follow and laboratory blood works monitor the effectiveness of therapy as well as early detection of complications (Ruppar & Russell, 2011).

Successful kidney transplant recipients have been shown to return to higher level of physical functioning as compared to those patients on dialysis but, regardless of a return to the pre morbid state, the graft should not at any single time be considered stable. Therefore, medication and recommended lifestyle changes should be strictly adhered to (Djamali et al., 2015).

Globally, kidney transplantation face a challenge due to the high initial cost of pre transplant preparation and surgery and lack of donors; therefore there is need to ensure prolonged graft function in the already transplanted patients by promoting adherence in

this unique population (Garcia et al., 2012).

2.3 Level of adherence to post kidney transplant treatment and lifestyle changes

As stated by the World Health Organization (2003), non-adherence is a global public health burden occurring in over 65% of patients with chronic illnesses, kidney recipients not spared. Williams et al. (2014) reported that kidney allograft failure is seven folds higher in non-adherent patients than adherent patients.

In addition, Ruppar and Russell (2011) reported that high level of adherence of over 95% to post kidney transplant medicine and lifestyle changes is an important factor in achieving optimal outcomes of kidney transplant. Furthermore, Ruppar and Russell (2011) reported that adherence to medication determines the effectiveness of the therapeutic agents thus minimizing drug adverse effects; it also prevents development of lifestyle related comorbidities and controls the progression of the existing illnesses.

However, non-adherence to medication of only 3% was found to cause an increase in acute graft failure which eventually progressed to graft loss. This was reported particularly in the group of patients who went on “drug holiday” and self-adjusted the medications in spite of keeping clinic appointments and engaging in health promoting behaviors (Ruppar & Russell, 2011).

In a study conducted in USA on the importance of clinic appointment among kidney recipients, it was found that appointment non adherence rate of over 14%, resulted to 71% greater possibility of graft loss and 31% higher risk of death (Taber et al.,2017). The same study reported that appointment non adherence highly correlated to medication non

adherence. These two factors though independent, when combined had three-fold greater possibility of acute rejection, graft loss and mortality (Taber et al., 2017).

Engaging in self-directed exercises three times a week for a period of more than 30minutes in post kidney transplant patients was reported to have better blood pressure, blood glucose and body weight control. In addition, an overall improved cardiac function was reported which in return improved graft perfusion thus prolonging its functionality as compared to a sedentary lifestyle (Romano et al., 2012).

The same study emphasized that those patients who lived a sedentary lifestyle had a tenfold risk of developing new onset diabetes mellitus after kidney transplant (NODAT), complications related to cardiovascular diseases, poor muscle tone which affected their mobility and psychosocial problems which are but not limited to depression, anxiety and social withdrawal (Romano et al., 2012).

A South African study pointed out that non adherence to health behaviors (recommended diet, regular exercises, smoking and alcohol use) posed a fourfold higher risk of developing cardiovascular diseases particularly hypertension which is an important factor in causing kidney damage. In addition cardiovascular diseases increase morbidity and mortality in this population which lead to loss of functioning graft (Ndemera & Bhengu, 2017a).

2.4 Patient related factors that influence adherence to post kidney transplant treatment and lifestyle changes

Various patient related factors have been identified to influence adherence to post kidney transplant treatment and lifestyle changes to include to age, gender, level of education, marital status, self-efficacy, beliefs and attitudes (Sanders-Pinheiro et al., 2018).

2.4.1 Age

Age is a known determinant of non-adherence. Patients over 65 years of age often exhibit low adherence level associated to comorbidities, poly-pharmacy and difficulty in swallowing medication. They also have cognitive impairments which negatively affect their concentration, memory and decision making of their daily lives leading to non-adherence (Paterson et al., 2018). As reported by Tong et al. (2011), sick persons above 65 years of age were found to have exaggerated drug adverse effects due to physiological changes affecting the pharmacokinetics and pharmacodynamics of many drugs. Additionally, this group of patients was found to poorly adhere to diet due to resistant in altering their customary accustomed eating habits (Tong et al., 2011).

On the other hand, teenagers are also reported to have lowest levels of adherence to medication related to denial of chronic illness, the need to take lifelong medications and worries about social stigma (Russell & Dellen 2016). According to Russell and Dellen (2016) teenagers were found to make assumptions that when symptoms improve they may discontinue the therapy. In addition, this group of patients was also reported to have poor adherence to dietary adjustments related to beige eating behaviors, reduced adult supervision and busy schedules that make them eat out of the house (Foster & Pai, 2014).

A study done in Canada on adherence among adolescents and teenagers reported that this group of patients observed a drug "holiday" due to the drug adverse effects particularly excessive hair growth. This population is mostly concerned about their self-image thus opting out of treatment. In addition, this group perceived clinic follow up as an "intruder" to their daily lives thus they opted to skip (Foster & Pai, 2014).

However, teenagers were reported to have high level of adherence to self-directed exercises. At this stage in life, they are actively involved with social activities and at the same time they are conscious of their body image. This is also a school going age where exercises are advocated for at school level (Foster & Pai, 2014).

2.4.2 Gender

Gender is an important factor in determining adherence. In a study done in India to assess the level of adherence to post kidney recipients, female patients were found to have higher levels of adherence to medication as compared to male patients (Adhikari et al., 2017). In addition, female patients were found to have a higher level of adherent to lifestyle changes (diet, exercises), keeping of clinic appointments than male patients as they showed more concern on their health progress (Hedayati et al., 2017; Russell & Dellen 2016).

2.4.3 Marital status

Family cohesion offers emotional bonding to family members. Patients who were married and lived with their spouses were found to greatly adhere in comparison to the ones who were single and lived a solitary life. The spouses were found to offer emotional and financial support which promoted adherence (Russell & Dellen, 2016). However, a study

done in USA to determine the association between marital status and adherence, reported no significance association between the two (Ladin et al., 2018).

2.4.4 Education level

Adequate knowledge is the key to the success of any health program. High level of education has been found to positively affect the aspects of treatment therapy. Patients with post primary education were found to have satisfactory recognition of medication, their indications, doses, adverse effects and duration of therapy. They were found to have higher level of adherence as compared to those with low education level (Russell &Dellen 2016). In a study done in Denmark on improving adherence among kidney recipients patients with high level of education were found to have greatest level of adherence to diet and exercise as compared to those who had insufficient knowledge (Nielsen et al., 2018).

Low level of education was found to highly influence non adherence. This group of patients was found to have low self-confidence, less autonomy to their health and poor understanding of their treatment plan which made it difficult to follow their treatment plan (Russell & Dellen, 2016). In addition low education is an important determinant of unemployment which leads to a heavy financial burden to the patient and their family posing a challenge to health needs (Hedayati et al., 2017).

2.4.5 Self-efficacy

An individual's belief in their innate ability to achieve goals positively influences adherence. It is known to have a positive influence to adherence. Individuals with high

level of self-efficacy were found to exercise more efforts towards achieving adherence. They were found to be more enthusiastic in overcoming any challenges that would hinder adherence (Adhikari et al., 2017). In different studies done in Jamaica and USA on promoting adherence to post kidney transplant patients, individuals with high levels of self-efficacy were found to have high level of adherence as compared to those who did not believe in themselves. They were found to engage in health behaviors particularly self-directed exercises, keeping clinic appointments, dietary modification and avoidance of substance abuse (Nakamoto et al., 2017 ; Israni et al., 2016).

2.4.6 Patients' beliefs and attitudes

These are important predictors of the level of adherence to recommended health behaviors. In a study done in Netherlands, patients who had positive attitudes and beliefs on the effectiveness of treatment and lifestyle changes were found to have high levels of adherence as compared to those who felt a low need for medication and lifestyle adjustments and perceived treatment regimen as a hindrance in their daily routines (Scheel et al., 2018)

However, a study done in Spain on factors predisposing to non-adherence in kidney recipients reported a higher non adherence rate in those patients who did not trust that the post kidney treatment therapy was the one responsible for maintaining graft function. These patients were found to intentionally skip medications, revert to their pre-morbid lifestyle of substance use and no dietary modifications. They were found to seek medical advice when they were already in chronic graft failure (Moreso et al.,2015).

2.5 Treatment related factors that influence adherence to treatment and lifestyle changes

There are several treatment factors that are known to influence adherence. These include and not limited to expected therapeutic effects, adverse effects, cost and complexity of treatment regimen (Nielsen et al., 2018).

2.5.1 Therapeutic effect of medical therapy

Immunosuppressive medications are known to extend graft function and prolong the patient's lifespan. Patients who were seen to appreciate the effectiveness of this combined therapy and those who experienced positive clinical improvement were found to have higher level of adherence as compared to those who did not. This group of patients was found to enjoy their life out of the hospital post kidney transplant and was therefore found to adhere more in order to maintain the graft function (Moreso et al., 2015).

In addition, patients who appreciated diet modification, self-governed exercises as a means of reducing or maintaining healthy weight, preventing development of high blood pressure or controlling already existing high blood pressure and were found to have a higher level adherence as compared to those routinely followed the therapeutic modifications (Romano et al., 2012).

2.5.2 Adverse effects

Immunosuppressive drugs come along with adverse effects which include but not limited to bloatedness, appearance of moon shaped face, excessive weight gain, acne, excessive hair growth nausea, vomiting and diarrhea (Moreso et al., 2015). In UK, a study carried

out to evaluate adherence among kidney recipient found out that recipients took a drug "holiday", self-adjusted the medicines downwards and/or skipped their daily doses with the aim of overcoming the drug adverse effects (Russell & Dellen, 2016).

However, for those patients whose medication benefits outweighed the adverse effects that viewed themselves susceptible to graft rejection and feared the prognosis of recurred chronic kidney disease the level of adherence was reported to be high. In addition, those patients were found to have self-drive in engaging in regular exercises, modifying diet as per their individual requirements and abstaining from substance use with the aim of maintaining health and preventing comorbidities (Goncalves et al., 2016).

2.5.3 Cost

Immunosuppressive medications are known to be expensive. In a study done in Denmark on adherence to immunosuppressant among kidney recipients, it was found out that the cost of the drugs was a barrier to adherence. The patients who were financially compromised particularly those without medical covers were found to miss or reduce the drug dosage in order to extend the supply of the drugs (Nielsen et al., 2018). The same study pointed out that some patients skipped the clinic appointments and laboratory blood works due to lack of finances to cater for transport and laboratory charges (Nielsen et al., 2018).

A study done in Ivory-Cost on adherence factors affecting kidney transplant recipients pointed out that poor economic status of people living in middle and low income countries was a main threat to non-adherence. Those countries were found to have little emphasis put on health schemes. Kidney transplant recipients were found to miss clinic

appointments, spared no time for exercises as they labored for the cost of treatment. In addition, kidney recipients were viewed by their families and community as well people and thus they failed to modify their diet (Lagou et al., 2017).

2.5.4 Complexity of treatment

Any treatment therapy with several instructions poses a challenge to the patients. Kidney recipients have a load of medicines to take, regular clinic appointments, regular dosage adjustments, dietary restrictions, isolated exercises, have to take precautions to prevent infection owing to their reduced immunity. Due to this complexity, patients were found to adhere to what they valued important and was favorable to them. Most patients were found to adhere to medications and overlooked the rest (Nielsen et al., 2018)

Kidney recipients take a minimum of 10 pills per dose several times a day. This load is even worse for those with several comorbidities. Patients who were taking treatment in two or more doses were found to have low levels of adherence as compared to those patients who took once daily dosing medications (Moreso et al., 2015).

A study carried out in Australia on encouraging adherence among kidney recipients reported that those patients who had many pills with fixed timings poorly adhered to treatment. In addition, it found that some patients skipped immunosuppressive medications due to the fact that they were too big to swallow and left bad taste in the mouth making it difficult for them to take a meal thereafter (Usherwood, 2017).

According to a study done in Iran, on non-adherent behavior among kidney recipients, given that the post kidney transplant treatment and lifestyle adjustments is life long,

patient demonstrated fatigue in maintaining it. The study reported decreased level of adherence to medication, clinic appointment and lifestyle changes as time post kidney transplant passed by (Hedayati et al., 2017).

2.5.5 Donor type

This plays a major role in adherence to post kidney transplant treatment and lifestyle changes. In a study done in Brazil, kidney transplant recipients who got their kidneys from living related donors showed a very high level of adherence at 90% as compared to those who received from living non related donors at 7% with the poorest adherence seen in those who received from cadaveric donors at 3% (Marsicano et al.,2015).

2.5.6 Duration on dialysis

The period of time patient took before transplant is an important determinant of adherence. Patients who had been on dialysis for long before kidney transplant were found to be more adherent to treatment than those who had pre-emptive transplant or those who had dialyzed for a few months. This was associated to the fear of graft failure with eventual resumption to dialysis which is associated with physical and psychosocial problems (Lagou et al., 2017).

2.5.7 Time after transplant

Adherence has been shown to decrease with increase in time post kidney transplant. This has been linked to wellness where an individual feel that with improved symptoms they may take a “therapy holiday”. In addition, the long standing financial burden associated with therapy maintenance may be a challenge. Patients who were over a year post kidney

transplant were found to be poorer in adherence as compared to those less than a year old and this worsened with time. (Russell & Dellen, 2016).

However, a study done in Spain contradicted the above findings. It was reported that the more the patients advance in age post kidney transplant, the more they enjoyed freedom and quality of life associated with successful kidney transplantation. This group of patients showed full adaptation to post kidney transplant life and thus they demonstrated a higher level of adherence than the newly transplanted patient with the aim of elongating their graft function (Ortega et al., 2015).

2.6 Institutional related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients

Several institutional related factors have been found to influence adherence behavior in kidney recipients. They consist of but not restricted to distance to the health facility, hospital charges, availability of services and medicines, hospital layout, and attitudes of the health professionals. These factors were found to be interrelated, thus the health facility that has all systems in place reported high level of adherence in their patient population (Israni et al., 2016; Akoh, 2011).

Most kidney transplant centers are located in urban areas far from patients' residents. Most of these patients travel for long distances and face transport challenges related to cost and the means of transportation which is linked to missed clinic appointments (Akoh, 2011). A study carried out in Cairo, Egypt identified that kidney recipients missed their clinic appointments due to the far away locations of the health facilities from their homes. These patients were seen to visit the health facilities mostly when in ill health and

rarely for health checkups (Hamza et al., 2016).

However, in USA, institutions that had affordable services, a fully functional laboratory, well stocked pharmacy all under one roof, flexible appointment days and staffs with a positive attitude to the clients were able to overcome the distance barrier and reported high level of adherence. In those institutions clients reported satisfaction with the services that led to high level of adherence particularly to clinic appointments (Israni et al., 2016).

In addition, a study done in South Africa on motivators and barriers of non-adherence in kidney recipients revealed that negative attitude of medical staff, rudeness, being unapproachable contributed to patients shying away from keeping their clinic appointments. This negative attitude led the patients to withhold their questions thus not getting instructions clearly. Unclear information is known to influence non adherence behavior (Ndemera & Bhengu 2017).

Therapeutic relationship has been shown to promote adherence. It creates a positive and free connection amid healthcare givers and the clients. In addition, therapeutic relationship enhances an open non-judgmental dialogue between the two parties (Nevis et al., 2017). In a study done in Portugal, it was found that patients looked forward to their clinic days so that they could share their lived experience in between appointments as they received a non-judgmental response from the nurses and doctors in the clinic (Nevis et al., 2017).

Information from Physicians is very critical; however, in institutions where the physicians give conflicting information to patients, apprehension is created in the patients

leading to non-adherence. In a study done Denmark, some patients missed the clinic appointment due to the conflicting information they received each time they went for review. The study emphasized that the patients were confused on which instructions to uphold and therefore they opted to skip the appointments (Nielsen et al., 2018)

In addition, Israni et al. (2016) stated that the institutions that organized for home visits often called their clients to find out how they are progressing; reminded them on their clinic appointments and need for regular laboratory monitoring, recorded high level of adherence. They pointed out that this strengthened the therapeutic relationship thus promoting adherence.

2.7 Overview of theoretical model

The study will be guided by the Roy Adaptation Model. Sister Calista Roy who is the founder of this model began her work in 1960 and published it in 1970. Her primary focus was on adaptation. The model comprises of five abstract ideas of nursing theory; person, environment, health, nursing and adaptation.

Roy viewed the person as a holistic adaptive system who must learn to adapt by being consciously aware and use of personal choice in order to integrate their condition with their environment with the help of nursing. In this study, the person is the kidney recipient who has undergone a major change in life to attain “new” life and therefore must adhere to the post-transplant recommendations in order to maintain health (Roy and Andrews, 1999).

Environment is the internal and external stimuli in which the person responds to. Sister

Roy classified the environment into three categories; focal, contextual and residual environment. Focal stimuli are those external and internal stimuli that confront the human system(Naga & AL-Khasib, 2014). In this study, focal stimuli will be the level of adherence and patient related factors that influence adherence.

Contextual stimuli are other stimuli present that can affect the focal stimuli (Naga & AL-Khasib, 2014). In this study, contextual stimuli will be both treatment related factors and institutional related factors that influence adherence to post kidney transplant treatment and lifestyle changes. Residual stimuli are those other stimuli present but whose current effect is not clear but when they become clear , they are moved to either focal or contextual stimuli (Naga & AL-Khasib, 2014). In this study residual stimuli will not be applicable.

Health is represented in the health continuum. It is the outcome of the person's ability to adapt to the stimuli. In this study health is represented by prolonged patient and graft function while illness is represented by graft failure. Nursing represents the nurses who manipulate the environment and promote the person's adaptation via health messages and other interventions as deemed necessary. Adaptation is the main goal of this model. It is the process and outcome of individuals or groups who use conscious awareness, self-reflection and choice to create human and environmental integration (Naga & AL-Khasib, 2014).

In this study, behavioral adaptation which is the adherence to post kidney treatment and lifestyle changes will be the main focus. It leads to optimal health and well-being of the kidney recipient.

2.7.1 The adaptation level

This is a changing point influenced by the situation and the internal resource of the person, family or group. There are three levels of human adaptive systems namely; Integrated, Compensatory and Compromised.

Integrated life processes are structure and functions of a life process working as a whole to meet human needs. Compensatory is the level at which coping mechanisms have been achieved by a challenge to the person or group. While compromised is where integrated and compensatory processes have failed.

2.7.2 Coping mechanisms

Adaptation is considered as an effective response to stimulus whereas negative response to a stimulus is described as ineffective. Coping mechanisms are habits that individuals develop in order to adapt. They are categorized into two namely; regulator and cognator processes (Roy & Andrews 1999).

Regulator processes have been identified by Roy and Andrews (1999) as those processes that respond automatically to internal and external stimuli. These are endocrine and neuro-chemical processes. In this study, the regulator processes will be physiological and psychological reactions experienced by the patient as they make decisions on adherence to post kidney transplant medications and lifestyle changes.

Cognator processes respond through four cognitive-emotive channels which result to behavioral responses. They include; perceptive and information processing, learning, judgment and emotions (Roy& Andrews 1999). In this study, these processes are related

to learning and information processing of kidney recipient, decision making on adherence to post kidney transplant and lifestyle changes.

Roy and Andrews (1999) identified four modes through which the responses of behavior of person to environment can be observed. These include; physiological-physical mode, role function, self-concept and interdependence modes.

Physiological- physical mode includes body behavior and it has 9 components, 5 of which are basic needs; (oxygenation, nutrition, elimination, activity and rest) and 4 are complex processes (senses, fluid/electrolyte and acid/base balance, neurological functions and endocrine functions).

Role functions are personal roles in the society and societal roles expected by the person. Self-concept refers to spiritual integrity and body image while interdependence focuses on relationships and the need for relational integrity. In this study, kidney transplant and the subsequent lifelong treatment and lifestyle changes mostly affects all the four modes of adaptation.

Physiological-physical adaption will entail; good blood sugar and blood pressure control, correction of anemia, control of bone mineral disease absence of preventable complications and absence of graft rejection syndrome. Role function will be related to need to adhere to treatment and lifestyle changes, alteration of daily routines. Self-concept will be related to the body image while interdependence will entail social support.

Adherence to post kidney treatment and lifestyle changes involves a process of adaptation to a situation, in this case kidney transplant through self re organization where order

develops simultaneously and sometimes over time. Health and wellness are affected by a person's ability to adapt. In this study, adherence is the health while non-adherence is the sickness.

2.8 Research gaps identified

Long term graft function is the main goal of kidney transplantation in order to prolong patient survival and improve the quality of life. This is achievable through strict adherence to treatment and lifestyle changes. However, gaps exist on the holistic adherence to medication and lifestyle changes.

From the above literature search, non-adherence has been identified as a main issue among the post kidney transplant recipients. Generally, the cost of drugs and complexity of the treatment regimen has been linked to non-adherence. However, this has been poorly studied in low income countries particularly in Kenya. Most studies identified are focusing on middle and high income countries. This is a major gap identified in spite of kidney transplant being widely known to researchers to be the best treatment modality for patients with ESKD.

Scarcity of published data has also been identified on institutional factors and how they influence adherence. Limited literature exists on the strategies to improve medication and lifestyle changes in spite of non-adherence being ranked as the third leading cause of graft loss in kidney recipients.

Therefore, the researcher identified a critical need to carry out this study in order to describe adherence patterns among post kidney transplant recipients and add knowledge

to what is already known. More researches on lifestyle adjustments are needed. Furthermore, there is need to formulate policies and interventions to promote adherence that are cost effective and have a high chance of success.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research design adopted in this study. Study area, study population, sample size determination, sampling method have been described. The study instruments, method of data collection, data management, analysis and presentation have also been explained. In addition, study limitations /delimitations and ethical considerations have been addressed.

3.2 Research design

This was a descriptive cross-sectional hospital based study. This design was chosen because the study aimed at giving a "snap shot" of adherence to treatment and lifestyle changes among kidney transplant recipients within a particular period of data collection. In addition, the study measured the independent variables as they were without manipulating them. Moreover, data was collected at one specific point (transplant clinic) in a patient population with similar characteristics with the kidney transplantation being the key factor.

3.3 Study area

The study was carried out at the renal unit of Kenyatta National Hospital (KNH) in Nairobi County, Kenya. KNH is the largest referral hospital in Central and East Africa and the main referral hospital in Kenya with a bed capacity of 2000. It is located in Nairobi County which is also the capital city of Kenya, Upper Hill area, 3 kilometers from the Nairobi central business district along Hospital road off Ngong road. The hospital serves as a research, teaching and main referral center in Kenya. It offers quality medical and surgical services, obstetrics and gynecology services and specialized

intensive care services. The renal Unit is situated on the first floor of the old hospital wing. It is one of the specialized units in the hospital serving both inpatients and outpatients with kidney and kidney related illnesses irrespective of age and gender. KNH Renal unit was a suitable study area for this study since it has a fully equipped transplant unit which remains the largest among public hospitals in Kenya. Data from the renal unit health information records showed that the department conducted an average of 20 kidney transplants annually.

3.4 Study population

The study population was all kidney transplant recipients transplanted between January 2010 and December 2017. This period was chosen because kidney transplants were carried out consistently and the records were available.

Table 3.1: List of Patients Transplanted from 2010 to 2017

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**
Number of patients transplanted	24	23	16	26	25	15	6	8	143

Source: (KNH renal unit health records June 2019)

3.5 Sampling procedures

3.5.1 Sample size determination

Sample size was calculated from the accessible population of 143 patients. For statistical purposes, Yamane (1967) formula for finite population was adopted in calculation of the minimum sample size since it is a proportionate formula for small populations. The formula has a margin error of 0.05.

$n = N/ (1+Ne^2)$

Where;

n = sample size

N= accessible population (143)

e = margin of error (0.05)

By substitution;

$n =143/ (1+ [143*0.05^2])$

$n = 143/ (1+[143* 0.0025])$

$n =143/1.3575=105.3$

n = ~ 106 respondents

the sample size for the study was 106 patients

3.5.2 Sampling method

This study adopted census sampling method where all patients attending the transplant clinic and who met the inclusion criteria were approached and requested to participate in the study. This method was chosen because it is the preferred method where the accessible population is small. In addition, the method targets all individuals allowing for comprehensive data collection. Further to this, the method does not allow for sampling error.

3.5.3 Inclusion criteria/exclusion criteria

3.5.3.1 Inclusion criteria

All kidney recipients transplanted between January 2010 and December 2017 attending transplant clinic at KNH. These patients have been on post-transplant care for over year and are expected to have adapted to the post kidney transplant recommendations. Kidney recipients over 18 years of age since they are independent adults who have a choice to adhere to instructions or not and those who consented to the study were included since participation was own volition.

3.5.3.2 Exclusion criteria

All kidney recipients transplanted between January 2010 and December 2017 who had experienced kidney graft failure and were back to dialysis. This is because this group of patients was no longer on post kidney transplant care. Critically ill patients were excluded since they were not able to fill the questionnaire and they could not be interviewed, patients who could neither speak English nor Swahili due to language barrier and non-consenting kidney recipients since participation was voluntary.

3.6 Study variables

3.6.1 Independent variables

Patient related characteristics, treatment related variable and Institution related variables

3.6.2 Dependent variable

Adherence to post kidney transplant treatment and lifestyle changes

3.7 Data collection method

3.7.1 Data collection instrument

A self-administered questionnaire was used to collect data. This instrument was chosen because it permitted anonymity and thus the respondents could genuinely express themselves without fear of victimization. The instrument was administered to individual subjects thus allowing them to fill without interferences. In addition, the questionnaires could be mailed to the subjects who could not be reached physically.

3.7.2 Recruitment of research assistants

The researcher visited KNH School of Nursing in order to identify 2 BScN nurse interns through the training coordinator. The nurse interns were fit for this task because they had some basic knowledge in nursing research and with the study topic. In addition, the patients were required to give personal opinions that they might not be comfortable to share with the nurses they interacted with on daily basis. The BScN nurse interns worked out of renal unit but had already done their clinical rotation in renal unit. This made them familiar with the running of the unit and the respondents too. They collected data when on off duty. The principal researcher trained the research assistants with the aim of ensuring quality data collection.

3.7.3 Pretesting of the questionnaire

This was done at Moi Teaching and Referral Hospital (MTRH) in Uasin-Gishu County, Kenya. This is because MTRH is a level 6 Hospital just like KNH; it is the second largest public referral and teaching hospital in Kenya. In addition, MTRH performs kidney transplant surgeries thus has the same patient population just like KNH. This made it an ideal area for pre-testing the study tool. To adopt this, questionnaires were administered

to ten per cent of the sample size that is ten patients from MTRH so as to get as much opinions as possible. The aim of the pre-test was to evaluate clarity of the questions; ambiguous questions and omissions were identified and necessary amendments made. A test re-test was done with an interval of two weeks in order to ensure reliability of the tool. Content validity was done by the two supervisors and a practicing Nephrologist.

3.7.4 Data collection process

This was done by the principal investigator aided by two research assistants. Data was collected in the transplant clinic over a period of ten weeks. The principal investigator and the research assistants established rapport with the clients at the waiting bay, explained to them the intentions and aims of the study and thereafter, obtained a signed informed consent. The questionnaires were then administered to the clients and 10 minutes allowed for them to respond to the questions. To reduce the chances of patients over reporting their adherence due to concerns that their clinicians could become aware of their responses, all questionnaires were filled privately and anonymously. The post kidney transplant patients' health records were reviewed to evaluate adherence to clinic appointment, serum creatinine level, BMI and concentration of drug levels in the blood as part of the post-kidney transplant care.

3.8 Data management

The questionnaires were checked for completeness before allowing the respondents to leave. They were stored in a lockable cabinet within the reach of only the principal investigator for safety purposes. At the end of each day during data collection period, data was entered into a Microsoft excel program where data cleaning was done. The

computer was secured with a password known only to the principal investigator. Data backup was done in a versatile compact disk and a flash disk.

3.9 Quality assurance

All data was collected using a pretested questionnaire. Similar data collection methods were used till the end of the process. Data was stored in a security guarded computer to reduce the possibility of accidental and/or deliberate manipulation.

3.10 Data analysis and presentation

3.10.1 Data analysis

This was done using computer Software Statistical Package for Social Scientists (SPSS) version 25. Descriptive statistics were used to describe patients' demographic data in order to give meaning to information and for easy presentation. Chi square test of significance was used to test the influence of independent variables on the dependent variable. Logistic regression was performed to analyze identified patients' factors, treatment related factors and institutional related factors and determine their influence on the dependent variable. Associations between variables were conducted at 95% confidence level. A p value of less than 0.05 was considered statistically significant.

3.10.2 Data presentation

The study findings were presented in figures and tables for ease of reading and interpretation.

3.11 Ethical consideration

Ethical clearance was sought from Kenyatta University, Moi Teaching and Referral Hospital for the pre-test study and the University of Nairobi-Kenyatta National Hospital Ethics and Research Committee for the main study. In addition, KNH Renal department

was informed and authority for data collection obtained. Research permit was sought from NACOSTI.

Participation of subjects was by own volition; signed informed consent was acquired from all respondents prior to administration of the questionnaire. Confidentiality was highly maintained by withholding the names of the study subjects. Privacy was maintained by interviewing the clients individually from the location of their choice and concealing the information obtained from the study.

3.12 Study limitations/delimitations

3.12.1 Limitations

The main limitation for this study was use of a single center so results might not be generalizable to the larger population of kidney transplant recipients. Data collection was very challenging following the Covid 19 pandemic which led to drop in the number of patients seeking services in the transplant clinic.

3.12.2 Delimitations

KNH being the main public hospital offering kidney transplant, it receives patients from all over the country, East and Central Africa. The researcher included all patients within reach who met the inclusion criteria with the aim of getting diverse information thus allowing the findings from this study to be generalizable. The challenge of data collection was overcome by extending the data collection period to ten weeks from the projected period of four weeks.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter gives the results of the study findings. These findings are presented based on the study objectives. The results are presented in sections that include: response rate, patients related characteristics, treatment related characteristics and institutional related characteristics.

4.2 Response Rate

A total of 106 patients participated in the study giving a response rate of 75%.

4.3. Demographic characteristics of the respondents

On demographic characteristics, the study findings showed that 31(29%) of the respondents were aged between 35-44 years, 70(66%) were female with most of them 64(60%) being married. More than half of respondents 54(51%) had tertiary level of education as the highest level obtained. Nearly half of the respondents 52(49%) were self- employed with a greater number of them 62(64%) earning more than Kshs 20,000 monthly. In addition, majority of the respondents underwent kidney transplant in the year 2010 constituting 19(18%). On the relationship with the donors, siblings were the majority constituting 72(68%). A total of 68(64%) of the respondents had dialyzed for 3-4 years before transplantation. This is shown in table 4.1

Table 4.1: Demographic Characteristics of the Respondents

Variable		Frequency (n)	Percent (%)
Gender	Male	36	34
	Female	70	66
Age	15 – 24	8	7.5
	25 – 34	22	20.8
	35- 44	31	29.2
	45 – 54	22	20.8
	55 – 64	19	17.9
	65 – 74	4	3.8
Marital Status	Single	37	34.9
	Married	64	60.4
	Divorced/separated/widowed	5	4.7
Religion	Muslim	1	0.9
	Christian	105	99.1
Level of Education	Primary	12	11.3
	Secondary	40	37.7
	Tertiary	54	50.9
Occupation	Self-Employment	52	49.1
	Formal Employment	43	40.6
	Unemployed	11	10.4
Monthly Income(Ksh)	10,000 or less	20	20.6
	10,001 to 20000	15	15.5
	above 20000	62	63.9
Donor Relationship	Parent	15	14.2
	Sibling	72	67.9
	Extended family member	12	11.3
	Offspring	7	6.6
Duration of dialysis	< 2 years	2	1.9
	3 to 4 years	68	64.2
	> 5 years	36	34
Year of transplant	2010	19	17.9
	2011	14	13.2
	2012	13	12.3
	2013	16	15.1
	2014	17	16
	2015	12	11.3
	2016	6	5.7
	2017	9	8.5

4.4 Adherence to Post Kidney Transplant Treatment and Lifestyle Changes among Post Kidney Recipients

The study evaluated the patients' adherence to medication, fluid, clinic attendance, exercises and abstinence from alcohol use and cigarette smoking.

4.4.1 Adherence to medication

In order to assess adherence to medication, the respondents were asked to indicate whether they ever missed medication in the last one month and if so, to indicate the number of times they did. Almost half of the respondents 49(46%) indicated missed medication in the last one month with majority of them having missed twice accounting for 18(38 %). This is shown in table 4.2

Table 4.2: Adherence to Medication

Variable		Frequency	Percent
Number of patients who missed medication in the last one month		49	46
Number of times patient missed medication in the last one month	Once	16	33
	Twice	18	38
	Thrice	5	10
	More than thrice	9	19

4.4.1.1 Reasons Given by Patients for Taking Medication

The entire sample 106(100%), indicated that they adhered to medication in order to prevent graft rejection. Majority 102(96%) of the respondents indicated that they adhered to medication because the quality of their life improved after kidney transplant while 84(81%) adhered to medication as an appreciation of the donors and health care providers. In addition, 75(71%) of the respondents adhered to medication since they scheduled them at meal times while 74(70%) of the respondents adhered to medications because family members offered financial support. More than half of the respondents

56(53%) indicated that their family members reminded them to take medications. This is as shown in table 4.3

Table 4.3: Reasons given by patients for taking medication

Variable	Frequency	Percent
Medication prevent rejection	106	100
Appreciation to donor and health care provider	84	81
Improved quality of life after kidney transplant	102	96
Family members offer financial support	74	70
“Family members remind me to take medication”	56	53
“I use alarm as a reminder to take medication”	40	38
“I use a pill box to organize my medicines”	30	29
“I schedule medicines on meal times”	75	71

4.4.1.2 Reasons given by Patients for Missed Medication Doses

Patients who missed medications (N=49) were probed to indicate reasons that led to this. Majority of the respondents 43(88%) pointed out that the cost of the medicines was the main reason for missed doses since they could not manage to stock the medicines at all times. More than half of the respondents 26(54%) indicated that they forgot to take their medicines. This is as shown in table 4.4

Table 4.4: Reasons given by Patients for Missed Medication Doses

Variable	Frequency	Percent
"I forgot"	26	54
"I took a drug break"	0	0
"I felt worse after taking medication"	4	8
"I feel embarrassed taking medication in public"	2	4
"The doses are too frequent"	1	2
"The pills are too many to take all at once"	4	8
"The medicines are too expensive to buy"	43	88
"Busy work schedule"	4	8

4.4.2 Adherence to daily fluid intake

In order to assess adherence to fluid intake, respondents were requested to indicate their daily fluid intake. Majority of the respondents 77(73%) adhered to the recommended fluid intake of ≥3liters daily. This is shown in figure 4.1

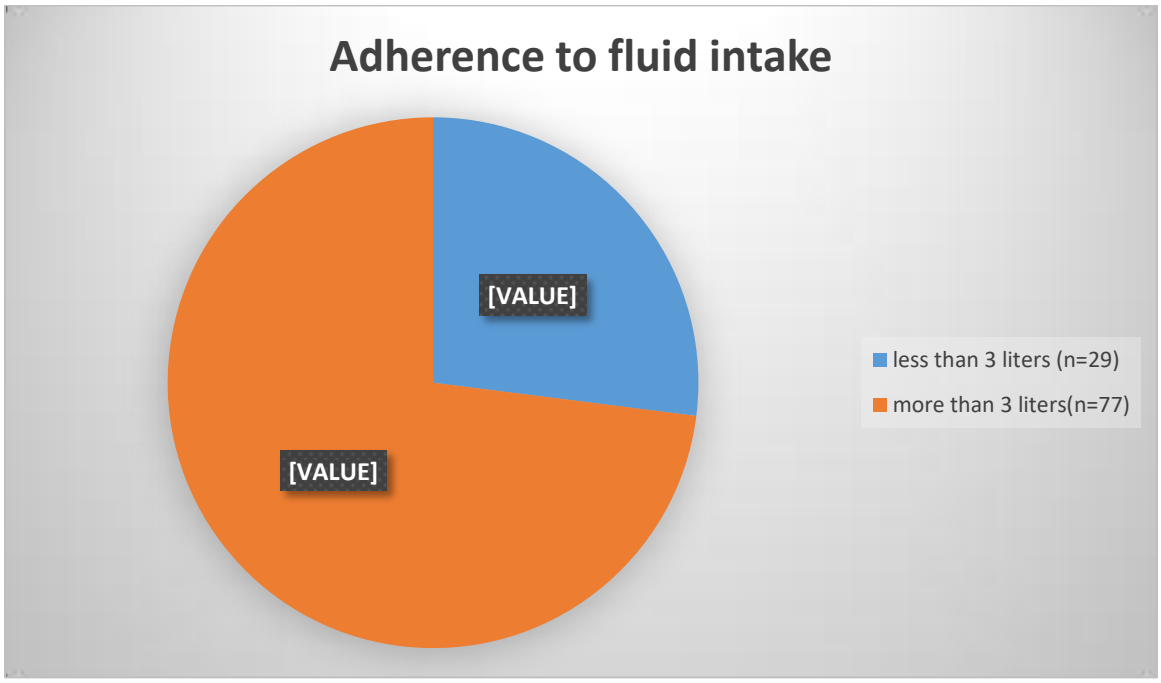

Figure 4.1: Adherence to Daily Fluid Intake

4.4.3 Adherence to Clinic Attendance

To assess adherence to clinic attendance, respondents were asked to indicate whether they missed any appointment and if they did, to indicate the number of missed appointments in the last 3 bookings. A greater number of patients reported to have missed their clinic appointment accounting for 63(60%) with a majority of them 23(22%) missing two appointments. This is shown in table 4.5

Table 4.5 Adherence to Clinic Attendance

Variable		Frequency	Percent
Number of patients who missed clinic appointment			
		63	60
Number of missed appointments in the past three clinic schedules	0	43	40
	1	21	20
	2	23	22
	3	19	18

4.4.3.1 Reasons given by Patients for Missed Clinic Appointment

Patients who missed clinic appointment (N=63) were further probed to indicate the reasons that made them miss the appointments. More than half 33(52%) of the respondents indicated that the hospital was too far from their homes and that they felt better so they had no reason to attend the clinic. This is as shown in table 4.6

Table 4.6: Reasons given by Patients for Missed Clinic Appointment

Variable		Frequency	Percent
Reasons for Missed Appointment			
I forgot about the appointment	NO	44	70
	YES	19	30
The hospital is too far from home	NO	30	48
	YES	33	52
The appointments are too frequent	NO	59	94
	YES	4	6
I felt better so I had no reason to attend the clinic	NO	30	48
	YES	33	52

4.4.4 Adherence to Exercises

This was assessed by asking patients to indicate whether they engaged in any self/instructor guided exercises. Adherence to exercises requires a patient to have ≥3 sessions in week each lasting for ≥30 minutes. More than half of the respondents, 63(59%) reported to engage in either self or instructor guided exercises. Of those who engaged in exercises, 46(73%) adhered to ≥3 times weekly while 48(76%) adhered to ≥30 min sessions. This is as shown in table 4.7

Table 4.7: Adherence to Exercises

Variable		Frequency	Percent
Do you engage in self-guided /instructor guided exercises?	YES	63	59
How many times do you exercise in a week?	1	3	5
	2	14	22
	≥3	46	73
How long do your exercise sessions last?	<30 Min	15	24
	≥30 Min	48	76

4.4.4.1. Reasons given by Patients for lack of Exercises

Respondents who did not engage in exercises and those who exercised for less than three times a week (N=60) were asked to indicate the reasons associated with lack of exercises. Majority of the respondents 51(85%) indicated they had no clear instructions on exercises that are fit for them. In addition, a greater number of respondents 42(70%) pointed out that they were not comfortable exercising due to their health status. This is as shown in table 4.8

Table 4.8: Reasons given by Patients for lack of Exercises

Variable	Frequency	Percent
"I lack motivation to exercise"	28	47
"I feel uncomfortable when I exercise"	21	35
"I am not confident to exercise due to my health status"	42	70
"I have no time to exercise due to my tight schedules"	23	38
"I have no clear instructions on exercises that are fit for me"	51	85

4.4.5 Adherence to Abstinence from Cigarette Smoking and Alcohol Use

Patients were asked to indicate whether they smoked cigarette and or took alcohol. Almost the entire sample 104(98%) reported adherence to abstinence from cigarette smoking and 103(97%) refrained from alcohol consumption. This is shown in table 4.9

Table 4.9: Adherence to abstinence from Cigarette Smoking and Alcohol Use

Variable		Frequency	Percent
Do you normally smoke?	No	104	98
Do you take alcohol?	Yes	103	97

4.4.6 Level of adherence to post kidney transplant treatment and lifestyle changes

In order to determine the level of adherence to medication and lifestyle changes, patients' health records were reviewed for regularity of clinic attendance, drug trough levels,

serum creatinine and BMI. Majority of the participants 93(89%) had normal drug trough level, regular clinic attendance was found in 66(62%) of the sample, 65(61%) of the respondents had normal BMI, while only 56(53%) of the respondents had normal serum creatinine. This is as shown in table 4.10

Table 4.10: Level of Adherence to Post Kidney Transplant Treatment and Lifestyle Changes

Variable		**Frequency**	**Percent**
Clinic attendance	Regular	66	62
	Irregular	40	38
Drug trough levels	Normal Level	93	89
	Low Levels	12	11
Serum Creatinine levels	Normal	56	53
	High	49	47
Current Body Mass Index (BMI)	Underweight	2	2
	Healthy weight	65	61
	Pre obesity	32	30
	Obesity class I	7	7

4.5 Patient related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients

Chi square was computed to establish existence of any significant association between patient related factors and adherence to clinic attendance, immunosuppressive drug trough levels, serum creatinine levels and BMI. No statistical significance was found on clinic attendance, immunosuppressive drug trough levels and serum creatinine. However, there was a statistical significance on the influence of age and marital status on BMI.

4.5.1 Patient related factors that influence Current Body Mass Index

Among the patient related factors assessed, there was found to be a significant association between age and current body mass index, ($x^2(15) = 30.09$, $p = .012$). Older people were more likely to have a higher BMI. A significant association was also found between marital status and BMI, ($x^2(6) = 18.00$, $p = .006$). Married respondents were more likely to have a higher BMI. This is shown in table 4.11

.

Table 4.11: Patient Related Factors that Influence Current Body Mass Index

Variable		**Frequency**				**DF**	**Chi-square Value**	***p*-value**
Gender		**Under weight**	**Healthy weight**	**Pre-obesity**	**Obesity class-1**			
	Female	1	22	11	2	3	0.323	.956
	Male	1	43	21	5			
	15 – 24	1	7	0	0			
	25 – 34	1	18	1	2			
Age	35 – 44	0	19	11	1			
	45 – 54	0	12	7	3	15	**30.088**	**.012**
	55 – 64	0	6	12	1			
	65 – 74	0	3	1	0			
	Single	1	31	3	2			
Marital	Married	1	33	25	5	6	**17.998**	**.006**
status	Widowed/divorced/separated	0	1	4	0			
Religion	Muslim	0	0	1	0	3	2.335	.506
	Christian	2	65	32	7			
Level of	Primary	0	7	5	0			
education	Secondary	2	22	13	3	6	5.643	.464
	Tertiary	0	36	14	4			
Occupation	Self employed	0	30	19	3			
	Formal employed	1	25	13	4	6	11.075	.86
	Unemployed	1	10	0	0			
Monthly	10000 or less	0	16	5	0			
income	11000 – 20000	1	9	5	0	6	11.147	.084
	Above 20000	0	33	22	7			
	2010	1	9	6	3			
Year of	2011	1	8	4	1			
Transplant	2012	0	8	5	0			
	2013	0	11	3	2	21	14.322	.855
	2014	0	13	4	0			
	2015	0	7	4	1			
	2016	0	4	2	0			
	2017	0	5	4	0			
Duration	Less than 2 years	0	1	1	0			
of dialysis						6	3.139	.791
	3 to 4 years	2	41	19	6			
	Over 5 years	0	23	12	1			

4.6 Treatment related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients

Chi square was computed to determine whether there was any significant association between treatment related factors and clinic attendance, immunosuppressive drug tough levels, serum creatinine and BMI. There was no statistically significant association between treatment related factors and clinic attendance. However, statistical significance was found on the drug trough level, serum creatinine level and BMI.

4.6.1 Treatment related factors associated with the drug trough levels

Patients with more drugs were less likely to adhere to medication (odds; 0.778; *p*-value-.014). With every increase in the number of pills, the adherence is likely to decrease with about 22%. This is as shown in table 4.12

Table 4.12: Relationship between Number of tablets and drug trough levels

	B	**S.E.**	**Wald**	**DF**	***p*-value**	**Odds**
TABLETS1	-0.251	0.102	5.993	1	**0.014**	0.778
Constant	0.55	0.994	0.306	1	0.58	1.733

4.6.2 Treatment related factors that influence Serum Creatinine Levels

There was statistically significant association between the frequency of drug intake and the creatinine levels, (x^2 (1) = 6.61, p = .019). Patients with more frequencies were less likely to adhere to medication and thus higher creatinine levels. This is shown in table 4.13

Table 4.13: Treatment Related Factors that Influence Creatinine levels

Variable		Frequency		DF	Chi-square value	*p*-value
		Normal creatinine level	High creatinine level			
Number of tablets	1 – 5 tablets	5	1	5	6.253	0.282
	6 – 10 tablets	26	17			
	11 – 15 tablets	17	22			
	16 – 20 tablets	3	5			
	21 to 25 tablets	4	4			
	26 – 30 tablets	1	0			
Drug frequency	Twice daily	53	38	**1**	**6.607**	**0.019**
	Thrice daily	3	11			
Missing drugs	Once	8	8	3	3.337	0.343
	Twice	9	9			
	Thrice	1	4			
	More than thrice	2	7			

4.6.4 Treatment related factors that influence the current BMI

There was a statistically significant association between the number of missed medication and the current BMI, (x^2 (9) = 22.36, p =.008). This is shown in table 4.14

Table 4.14: Treatment Related Factors that Influence on the Current BMI

Variable		Frequency				df	Chi-square value	*p*-value
		Under weight	Healthy weight	Pre-obesity	Obesity class 1			
Number of tablets	1 – 5	0	4	2	0	15	7.157	.953
	6 – 10	3	25	13	3			
	11 – 15	0	26	11	3			
	16 – 20	0	5	3	0			
	21 to 25	0	5	2	1			
	26 – 30	0	0	1	0			
Drug frequency	Twice daily	2	58	27	5	3	2.246	.523
	Thrice daily	0	7	5	2			
Missing drugs	Once	0	10	3	3	9	22.358	**.008**
	Twice	0	12	5	1			
	Thrice	2	3	0	0			
	More than thrice	0	7	2	0			

4.7 Institutional related factors that influence adherence to post kidney transplant treatment and lifestyle changes among kidney recipients

Chi square was computed to determine the association between institutional related factors and adherence to treatment and lifestyle changes. No statistically significant association was found between institutional related factors and drug trough levels, serum creatinine and BMI. However, institutional related factors were found to have a significant association with clinic attendance.

4.7.1 Institutional related factors that influence adherence to clinic attendance

Several institutional factors were evaluated on their association with clinic attendance. Duration of time a patient took to reach the hospital was statistically significant, (x^2 (2) = 12.63, p = .002). Patients who took 5 hours or less to reach the hospital were more likely to have regular clinic attendance. In addition, location of the transplant clinic had a statistical influence on clinic attendance, (x^2 (1) =3.87, p = .49). Patients who agreed that the transplant clinic was well located within the hospital were more likely to have regular clinic attendance. This is shown in table 4.15

Table 4.15: Institutional Related Factors that Influence Adherence to Clinic Attendance

Variable		Frequency		DF	Chi-square value	*p*-value
		Regular	Irregular			
How long does it take to reach the hospital	5 hours or less	48	20	2	12.630	**.002**
	6 – 10 hours	16	10			
	More than 11 hours	2	10			
The transplant clinic is well located within the hospital	Agree	25	23	1	3.870	**.049**
	Strongly agree	41	17			
The staff in the transplant clinic are easily approachable	Disagree	1	1	3	2.480	.479
	Not sure	1	1			
	Agree	24	20			
	Strongly agree	40	18			
Services in the transplant clinic are patient friendly	Disagree	1	1	3	4.661	.198
	Not sure	3	3			
	Agree	23	21			
	Strongly agree	39	15			
Hospital charges are pocket friendly	Strongly disagree	22	20	4	4.049	.399
	Disagree	22	9			
	Not sure	8	3			
	Agree	8	3			
	Strongly agree	6	5			

I can visit the clinic any time without appointment and get the desired services	Strongly disagree	1	2			
	disagree	4	2			
	Not sure	13	8	4	1.673	.796
	Agree	25	17			
	Strongly agree	23	11			
Drugs are always available in the pharmacy	Strongly disagree	38	19			
	Disagree	22	20			
	Not sure	2	1	4	4.665	.323
	Agree	3	0			
	Strongly agree	1	0			
The cost of the drugs is affordable	Strongly disagree	42	31			
	Disagree	12	7			
	Not sure	2	0	4	4.654	.325
	Agree	8	1			
	Strongly agree	2	1			

4.8 Predictors of Adherence to Treatment and Lifestyle Changes Among Post Kidney Recipients

Logistic regression was used to compute the predictors of adherence to treatment and lifestyle changes on the factors that were statistically significant.

4.8.1 Relationship between Patient Related Factors (age and marital status) and Current BMI

An ordinal logistic regression was computed to predict the relationship between age and the current BMI; marital status and the current BMI. Age was found to be significant, p = .013 and an odds ratio of 1.054. Therefore, an increase in age by one year increases the

odds of getting a high BMI by approximately 5%. However, marital status was found to be insignificant, p =.383. This information is shown in table 4.16

Table 4.16: Relationship between Age, Marital Status and Current BMI

	Variable	**Estimate**	**OR**	**D.F**	***p*-Value**	**95% Confidence Interval**	
						Lower	**Upper**
Threshold	Underweight	-3.174	0.042	1	.031	-6.065	-0.283
	Healthy weight	1.957	7.08	1	.146	-0.684	4.599
	Pre-obesity	4.293	73.2	1	.002	1.528	7.058
Location	Age	0.053	**1.054**	**1**	**.013**	0.011	0.095
Marital	Single	-1.604	0.201	1	.113	-3.587	0.379
status	Married	-0.781	0.46	1	.383	-2.535	0.974
	Divorced separated widowed	Reference					

4.8.2 Relationship between Frequency of Medicine and Serum Creatinine Levels

Logistic regression was used to predict the relationship between the frequency of medicine intake and the serum creatinine levels. Patients who took their drugs twice daily were 80 % less likely to have high creatinine levels (Odds ratio 0.196, *p*-value- .017) as compared to those who took thrice daily. This is because with less frequency the patients are more likely to adhere to medication; promoting the effectiveness of the drugs thus a normal serum creatinine level This is shown in table 4.17

Table 4.17: Relationship Between Frequency of Medicine and Serum Creatinine Levels

	B	**SE**	**Wald**	**DF**	***P*-value**	**OR**
Twice daily	-1.632	0.685	5.674	1	**.017**	0.196
Constant	1.299	0.651	3.979	1	.046	3.667

4.8.3 Relationship between Institutional Related Factors and Adherence to Clinic Attendance

Binary logistic regression was computed to predict the relationship between duration of time taken to the hospital, location of the clinic and clinic attendance. Patients who took 5 hours or less to reach the hospital were 90% less likely to have irregular clinic attendance as compared to those who took more than 11hours (OR 0.101, *p*-Value- 0.006). Patients who took 6 to 10 hours to hospital were 86% less likely to have irregular clinic attendance as compared to those who took more than 11 hours (OR 0.143, *p*-Value 0.028). However, location of the clinic was found to be insignificant. This is shown in table 4.18

Table 4.18: Relationship between Institutional Related Factors and Adherence to Clinic Attendance (binary logistic regression)

Variable in the equation	**Coefficient Beta**	**DF**	**Odds ratio**	***p*-value**
Time to hospital		2		.023
5 hour or less	-2.294	1	0.101	**.006**
5 – 10 hours	-1.944	1	0.143	**.028**
Agree (clinic well located)	0.451	1	1.57	.305
Strongly agree (clinic is well located)	1.243	1	3.466	.144

4.9 Summary of the Study Findings

The study found that adherence to treatment and lifestyle changes among post kidney transplant recipients at Kenyatta National Hospital is sub-optimal. However, adherence to fluid, alcohol use and cigarette smoking was found to be satisfactory.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Demographic Characteristics of the Respondents

The study findings revealed that greater number of respondents were female. The findings are in line with a study conducted in South Africa on motivators and barriers to self-management among kidney recipients which reported more females than male respondents (Ndemera & Bhengu, 2017b). The findings also compare with reports of a study conducted in USA which had a higher response rate of females than male patients (CDC, 2019).

The findings could probably be explained by the fact that females are more prone to chronic kidney diseases due complications that arise from pregnancies and child bearing processes. In addition, the anatomical orientation of female genitals expose them to urinary tract infections which may lead to kidney damage (CDC, 2019). In addition, males have been reported to have a poorer health seeking behavior than do the female patients and thus diagnosis of kidney disease may be slower (Thompson et al., 2016).

The findings are in contrast with findings of a study done by Hedayati et al. (2017) who reported more male than female respondents. They argued that kidney disease was more common in males due to their unhealthy lifestyle behaviors that predisposed them to lifestyle related diseases like obesity, diabetes and hypertension which are the leading causes of chronic kidney disease.

The study reported a middle aged population with majority of the respondents being under 50 years. This is in line with report of Weng et al. (2017) in a study on factors that determine self-reports of non-adherence on post kidney transplant patients where

majority of the respondents were aged 45 years. The findings are also comparable with a study done in Iran on non-adherence behavior in kidney transplant recipients where the mean age of the participants was 40 years (Hedayati et al., 2017). These findings indicate that prevalence of kidney disease is high among the middle aged population. However, the findings contradicted a study done in China and Australia where kidney diseases were reported in older population (Ji et al., 2019). They argued that chronic kidney disease was more prevalent in population over 50 years of age due to the physiological changes in the kidneys related to advanced age and the existence of comorbidities like hypertension, diabetes and arthritis which double the risk of developing kidney disease.

From this study findings, majority of the respondents had tertiary level of education, formal employment and earned more than Kshs 20,000. The findings are similar to a study done in Kuwait where majority of the participants had post- secondary education and had more than sufficient monthly income (Kenawy et al., 2019).

High level of education increases the chance of getting a well-paying job. Post kidney transplant treatment regimen is generally expensive particularly in third world country where universal health care is not applicable (Scheel et al., 2018). This requires one to have sufficient income to be able to handle the financial burden. In addition, the treatment is complex and therefore secondary or post-secondary education is required for ease of reading and understanding of the instructions (Kenawy et al., 2019).The findings contradict a study conducted in Luxembourg where medical services are subsidized through the Universal Health coverage and medical insurance coverage thus making post kidney transplant medications to be affordable (Alkerwi et al., 2017).This eases the

financial burden on the patients and their relatives so even with low income they can still afford medications.

On the relationship with the donors, this study revealed that the entire population had living related donors with siblings carrying the greater number. The findings are in line with reports of a study done in Nigeria on kidney transplantation where all donors were living with majority of them being related to the recipients (Okafor et al, 2016). This could probably be explained by lack of gazette rules that allow for unrelated or cadaveric organ donation in Kenya.

On the other hand, the findings contradict a study done in Kuwait by Kenawy et al. (2019).They reported a larger number of living emotionally related donations and cadaveric donations respectively. These countries allow for organ donations from deceased and unrelated persons.

From the study findings, greater number of respondents had dialyzed for a period of 3 to 4 years prior to kidney transplantation. The findings are in agreement with a study conducted in Nigeria Okafor et al, (2016) where patients were reported to wait for long before transplantation due to shortage of donors and financial burden involved in pre-transplant preparations. The long waiting period in this study could most likely be explained by financial burden required for pre-transplant recipient and donor preparation. In addition, the shortage of donors could also contribute given that there is no gazette bill to allow for non-related or cadaveric organ donation. Contrary findings were reported in Kuwait where most of the kidney recipients had dialyzed for a period less than one year (Kenawy et al., 2019).

5.1.2 Level of Adherence to Post Kidney Treatment and Lifestyle Changes Among Post Kidney Transplant Recipients

The study findings revealed full adherence to abstinence from alcohol and cigarette smoking; suboptimal adherence to medication, fluid intake and poor adherence to exercises and clinic attendance. The findings compare with a study conducted in USA where patients were found to refrain from substance use; give more attention to medications than to lifestyle adjustments (Kenawy et al., 2019). Non-adherence to clinic appointment quadruples the risk of graft failure due to lack of proper follow up, dose adjustment and regular blood monitoring which may eventually lead to death (Gebregziabher et al., 2018). In this study, non-adherence to clinic attendance could be explained by financial constrains experienced by most patients, whereby they prioritized medication expenditure over clinic charges. Kidney transplant recipients are regarded as chronic patients because they are on life-long medications. However, most of them lead a near normal life and thus are asymptomatic (Adhikari et al., 2018a). This could also probably explain why these patients don't give priority to clinic attendance. Furthermore, they are able to purchase the medicines over the counter and therefore they may not find importance of prescription refill from the clinic.

However, the findings from this study contradict a study done in China by Weng et al. (2017) where patients were found to adhere to immunosuppressive medications as well as clinic appointments and lifestyle modifications. The patients benefited from government subsidy on medical services.

This study found out that almost half of the patients did not engage in any form of exercises. This is in line with Hedayati et al. (2017) who reported that kidney recipients

gave less attention to lifestyle adjustments. In this study, lack of exercises could be linked to health care providers counselling sessions where exercises were not emphasized before and after kidney transplant as expressed by most of the respondents. Sedentary lifestyle coupled with the corticosteroids which is part of the immunosuppressive therapy is a risk factor for obesity indicated by high BMI and development of new onset Diabetes Mellitus after kidney transplant (Ndemera & Bhengu, 2017a). Cardiovascular diseases and Diabetes Mellitus are the leading causes of mortality in this special population (Sofi et al., 2020).

In contrast to this study is Sofi et al. (2020) who reported an almost entire population of kidney recipients actively engaging in self-guided exercises. The same study presented a well taught population on lifestyle changes who were highly motivated to adhere to exercises in order

5.1.3 Patient Related Factors That Influence Adherence to Post Kidney Treatment and Lifestyle Changes Among Post Kidney Transplant Recipients

Various patient related factors are known to positively or negatively influence adherence to medication and lifestyle changes. The current study findings demonstrated that family support was an important factor in promoting adherence. The findings tie well with a study done in South Africa which pointed out that family support is vital in adherence to post kidney medication and lifestyle changes (Ndemera & Bhengu, 2017b). Comparable findings were also reported in a study conducted in India where post kidney transplant patients with family support were found to be more adherent to treatment and lifestyle changes than those without family support (Adhikari et al., 2018a).

Post kidney transplant medications are quite expensive; the frequent clinic appointments and routine laboratory investigations also pose a financial burden to the patient. Therefore, patients may require some financial support from their families in order to maintain medication stock and to cater for the hospital expenses. In addition, post kidney transplant recipients require love and emotional support to be able to cope with the demands of the "new normal" life. Furthermore, the patients need regular encouragement to be able to adhere to the treatment recommendation.

From this study, it is clear that the kidney recipients adhered to medication and lifestyle changes because the quality of their life improved after kidney transplantation. The findings concur with a study done in South Africa where kidney recipients were seen to adhere to recommended medications and lifestyle changes in order to maintain the transplanted graft which had brought back the premorbid state of life (Ndemera & Bhengu, 2017b). The findings also concur with a study done by Moreso et al. (2015) which reported that patients adhered to medication because the quality of their life improved after kidney transplant as compared to dialysis period and they feared to go back to dialysis.

Successful kidney transplantation is aimed at improving the patient's quality of life. Kidney recipients enjoy the new "near normal" life away from dietary and fluid restrictions with frequent hospital admissions for dialysis sessions. The fear of reverting to dialysis motivates the patients to adhere to the recommended medicines and lifestyle changes.

The study findings indicated age as a significant factor in influencing BMI. BMI was found to be increasing with every increase in age. The findings are in harmony with a study done in Germany on obesity post kidney transplantation which revealed advanced age was directly proportional to high BMI (Nöhre et al., 2020). Similar to this finding is report of a study by Liñán González et al. (2020) on weight and BMI after graft loss conducted in Spain which pointed out that higher age positively influenced BMI.

Post kidney recipients take steroids as part of the immunosuppressive therapy. Steroids are known to increase appetite and in return increase in weight. As age advances, the individual tend to lose muscle and to gain body fat. These two factors coupled with inactivity quadruples the risk of obesity indicated by high BMI (de Souto Barreto et al.,2018). Post kidney transplant follow up is very crucial for close monitoring of obesity since increase in age is a continuous process.

From the study findings, forgetfulness had a significant negative influence on medication adherence. The findings conform with a study done in Australia on identifying the barriers to immunosuppressive therapy which reported forgetfulness as the main barrier to immunosuppressive therapy (Cossart et al., 2017). Similar findings were reported in Spain where forgetfulness was reported to be the main psychosocial factors leading to non-adherence of medication and lifestyle changes among kidney recipients (Scheel et al., 2018).

Cognitive disability is a common challenge among kidney transplant population. This is linked to the prolonged effect of high urea levels on the brain blood vessels during the dialysis period. The high urea levels are known to damage the brain cells leading to

memory impairment (David et al., 2019). In addition, long term use of immunosuppressant is associated with cognitive dysfunction which impairs the memory (Jurgensen et al., 2020). These challenges could adversely affect medication and lifestyle adherence.

5.1.4 Treatment related factors that influence adherence to post kidney treatment and lifestyle changes in post kidney transplant recipients

The study established several factors that influenced adherence to post kidney transplant treatment and lifestyle changes among post kidney recipients either positively or negatively. From the study findings, the significant factor that positively influenced adherence to treatment was its effectiveness in preventing kidney graft rejection as expressed by the entire study sample. Evidence from a study done by Israni et al. (2016) supported these findings where patients were reported to adhere to medications in order to prevent the body from rejecting the grafted kidney. Immunosuppressive therapy is aimed at repressing patient's immune system so that it does not recognize the grafted kidney as foreign (Moreso et al., 2015). This makes the grafted kidney remain in the recipients' body for long as though it were its own organ without being rejected.

The study also showed that the cost of drugs was a challenge to most of the patients. Patients expressed financial burden caused by the recurrent need to buy medicines and feared for eventual financial drain. The findings agree with a study done in India that reported financial constrain as a barrier to medication adherence since the purchase of medication is recurrent and life-long (Adhikari et al., 2018b).

Financial burden is reported as a major challenge particularly in third world countries particularly where no health policies are put in place to cater for such expenses(Lagou et al., 2017). Immunosuppressive therapy is known to be expensive. Patients are required to maintain this therapy for as long as they live or as long as the graft is functional. Further to this, they are also required to keep clinic appointment and maintain regular routine blood works which worsens the financial burden.

This study also established pill burden as a hindrance to medication adherence. Pill burden was found to be inversely proportion to medication adherence. The findings are in line with a study conducted in UK which identified increase in number of pills taken per day as a barrier to medication adherence (Russell & Dellen, 2016). Similar to these findings were reports from a study done in America on non-adherence to therapy after kidney transplant which revealed that pill burden promoted non-adherence (Doyle et al., 2016).

Post kidney recipients take multiple immunosuppressive pills in a day. This load is even worse for those patients with other comorbidities. These pills have fixed timings and should be taken daily and for life. This burden coupled with other lifestyle adjustments may induce fatigue in the patients and in turn negatively impact adherence (Ndemera & Bhengu, 2017a).

Findings from this study revealed that frequency of medication was an important hindrance to adherence. In harmony with the findings is report of a study conducted in Spain among Kidney recipients which pointed out that patients who were taking treatment in two or more doses were found to have low levels of adherence as compared

to those patients who took once daily dosing medications (Moreso et al., 2015).

Majority of the kidney transplant recipients are middle aged thus they are in the working age bracket. Most patients travel to their places of work and thus remain out of their house all the day long. The busy working schedules may be challenging to maintain the frequent medicine dosages and patient may most likely forget to carry their medicines to work.

5.1.5 Institutional related factors that influence adherence to treatment and lifestyle changes in post kidney transplant recipients

Results of logistic regression in this study identified distance to the hospital as denoted by the duration of time the patient took to reach the hospital as the main influence to adherence. Patients who lived near the hospital were more adherent to clinic appointments and vice versa. Similar findings were reported in Ethiopia where patients who lived far away from the hospital were found to miss clinic appointments (Gebregziabher et al., 2018).

Transplant centers are mostly in urban areas. Patients whose homes are far from these centers may experience challenges accessing it. They may have poor road network which hinders transportation to and from the hospital (Okafor et al., 2016). This may most likely explain the missed clinic appointments and option of the patient to visit the hospital only when in ill health.

This study also identified failure of the hospital to send any reminders to the patients on their clinic appointment to be an important factor in missed clinic appointments. The findings agree with a study conducted in Nigeria which reported non-adherence to clinic

attendance due to failure of the hospital to send reminders to the patients (Okafor et al., 2016). Frequent reminders are effective in promoting adherence to clinic attendance because they act as a signal to curb against poor memory.

The present study found perceived positive staff attitude to be a promoter of adherence to clinic attendance. This is in line with the report of a study conducted in Ethiopia where perceived staff attitude was found to promote adherence to clinic attendance (Ndemera & Bhengu 2017). Positive staff attitude promotes therapeutic relationship between the patient and the health care providers and in turn positively influencing clinic attendance.

Further to these findings, the current study also pointed out that availability of the drugs in the hospital pharmacy is a promoter of adherence to medication and clinic appointment. Israni et al. (2016) agrees to these findings by reporting that institutions that had affordable services, a fully functional laboratory, well stocked pharmacy, and staffs with a positive attitude, clients reported high level of adherence. Patients get motivated to visit any hospital which stores all the medicines that are required and at an affordable price.

5.2 Conclusions

I. The level of adherence to post kidney transplant treatment, daily fluid intake and clinic attendance was found to be sub-optimal.

II. Improved quality of life after kidney transplantation influenced adherence to medication and lifestyle changes while “forgetfulness” was the main barrier to medication adherence.

III. The main treatment related factor identified by this study to influence adherence was the therapeutic effect of the drugs in prevention of graft rejection. Frequency of drug dosing and high cost of the immunosuppressive medicines was found to influence non-adherence to medication.

IV. Finally, on the institutional related factors, the study identified long distance to the hospital as the major contributor to non-adherence to clinic appointments.

5.3 Recommendations

I. The study recommends that the transplant team through the transplant coordinator develops feasible strategies to curb non adherence to medication and lifestyle changes.

II. The hospital should send reminders to the patients on their clinic appointments. In addition, the patients should be encouraged to use alarms to induce memory for medication timings. On the same note, health messages should continuously be given to the patients with the aim of assisting them develop routine in medication intake and engagement in exercises.

III. The nephrologists should consider using less frequent medicines; daily dosing instead of twice or thrice frequencies to reduce exhaustion related to frequent

dosing. Further to this, the study recommends that the government of Kenya through the Ministry of Health considers comprehensive NHIF coverage of post kidney transplant medications in order to ease the financial burden on the patients.

IV. The government should also consider decentralizing post kidney transplant care to all the county referral hospitals in order to shorten the distance patient has to travel in search of services.

5.4 Areas of Further Studies

I. The study recommends replication of the same study but using a longitudinal study design. This is because adherence behavior keeps changing with time.

II. This study did not evaluate adherence to diet due to lack of consistency in dietary prescription in various post kidney recipient patients. Therefore, it recommends further study to investigate on dietary requirements in post kidney transplant patients.

III. This study has found adherence to be sub-optimal and therefore a study on "strategies to improve adherence" is recommended.

5.5 Dissemination of Study Findings

The findings of the study will be shared with Kenyatta National Hospital Management and Management of the Renal Unit where the study was carried out.

The findings will also be disseminated to KNH-UON ERC, KNH Research Committee, KU ERC and NACOSTI who provided ethical approval for the study.

Finally, the study findings will be shared through publications in local and international journals.

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APPENDICES

APPENDIX I: PATIENT'S CONSENT FORM

Introduction

My Name is Anne Nyambura, post graduate student at Kenyatta University. Research is a part of the training program to enhance understanding of current medical trends. I am conducting a study on "Adherence to Post Kidney Transplant Treatment and Lifestyle Changes among Kidney Transplant Recipients in renal unit at Kenyatta National Hospital". The information will be used by the Ministry of Medical Services, Ministry of Public Health and Sanitation and Kenyatta National Hospital to enhance adherence to post kidney transplant treatment and lifestyle changes with the aim of prolonging graft function in the hospital as well as in other regions of Kenya.

Purpose of the study

To describe adherence to post kidney treatment and lifestyle changes among post kidney recipients at Kenyatta National Hospital.

Procedures to be followed

If you agree to participate in this study, you will be served with a questionnaire for you to fill. If you are not able to read or write, I or the research assistants will ask you some questions and the information from you will be documented in a questionnaire.

You have the right to refuse participation in this study. You will get the same care and medical treatment whether you agree to join the study or not and your decision will not change the care you will receive from the clinic today or any other time.

I would like to remind you that participation in this study is freewill. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this clinic now or any other time.

Risks and discomforts

No physical risks involved. However, the exercise may increase your waiting time with around ten minutes before you receive your regular assistance.

Benefits

The study will have no monetary benefits but if you participate in this study you will benefit from free health education. Any sub optimal adherence will be noted and corrective measures taken.

Confidentiality

The interviews will be carried out in a secluded setting inside the clinic. Respondent's names will not appear on the interview forms. The interview forms will be locked in cabinet for safety at Kenyatta National Hospital. All information will be confidential. No individual reports will be availed but all will be in aggregate form.

Contact information

In case of any questions you may contact me on 0721472265 or Dr. Grace Githemo on 0722787862 or Dr. Jonathan Wala on 0722821514 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, KNH/UON ERC Secretariat on Tel.2726300 extension 44102, uonknherc@uonbi.ac.ke

Participant's statement

The information above concerning my involvement in the study is well understood. I have been allowed time to ask questions which have been answered satisfactorily. My involvement in this study is solely own volition. It is clear to me that the care I will get in this clinic today and in later days will not depend on my participation/lack of participation in this study.

Signature or thumb prints……Date……../……. /…….

Investigator`s statement

I, the aforementioned, have clarified to the participant the proceedings in this study, benefits and risks involved.

Interviewer signature ……Date……/……../……...

Thank you for sparing your precious time to participate in this study.

APPENDIX II: RESEARCH AUTHORIZATION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School

DATE: 10th December, 2019

TO: **Ms. Anne Mumbi Nyambura**
C/o Medical Surgical Nursing &
Pre-Clinical Science Department

REF: R50/37228/2017

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on **25th November, 2019**, approved your Research Proposal for the M.Sc. Degree entitled, **"Adherence to Post Kidney Transplant Treatment and Lifestyle Changes among Kidney Transplant Recipients at Kenyatta National Hospital, Nairobi County, Kenya."**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

HARRIET ISABOKE
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Medical Surgical Nursing & Pre-Clinical Science Department

Supervisors:

1. Dr. Grace Githemo
   C/o Medical Surgical Nursing & Pre-Clinical Science Dept.
   Kenyatta University

2. Dr. Jonathan Wala
   C/o Medicine, Psychiatry, Dermatology & Therapeutics Dept.
   Kenyatta University

HI/cww

APPENDIX III: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **919544**

Date of Issue: **18/March/2020**

RESEARCH LICENSE

This is to Certify that Miss.. ANNE MUMBI NYAMBURA of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: ADHERENCE TO POST KIDNEY TREATMENT AND LIFESTYLE CHANGES AMONG KIDNEY TRANSPLANT RECIPIENTS AT KENYATTA NATIONAL HOSPITAL, NAIROBI COUNTY, KENYA for the period ending : 18/March/2021.

License No: **NACOSTI/P/20/4284**

919544

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX IV: ETHICAL APPROVAL

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/123

14th April 2020

KENYATTA NATIONAL HOSPITAL APPROVED 19 APR 2020 KNH/UoN-ERC P. O. BOX 20723 - 00202 NAIROBI

Anne Mumbi Nyambura
Reg. No.R50/37228/2017
School of Nursing
Kenyatta University

Dear Anne

RESEARCH PROPOSAL –ADHERENCE TO POST KIDNEY TRANSPLANT TREATMENT AND LIFESTYLE CHANGES AMONG KIDNEY TRANSPLANT RECIPIENTS AT KENYATTA NATIONAL HOSPITAL, NAIROBI COUNTY, KENYA (P31/01/2020)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 14th April 2020 – 13th April 2021.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

APPENDIX V: QUESTIONNAIRE

TOPIC: ADHERENCE TO POST KIDNEY TRANSPLANT TREATMENT AND LIFESTYLE CHANGES AMONG KIDNEY TRANSPLANT RECIPIENTS AT KENYATTA NATIONAL HOSPITAL NAIROBI, KENYA.

Date of data collection ……. /……/…… Code

……. **INSTRUCTIONS**

Kindly put a tick (√) in the box next to the right response and where no responses/choices are provided please write your own response in the spaces provided.

PART I: PATIENT RELATED FACTORS

DEMOGRAPHIC INFORMATION

1) Kindly indicate your gender. Male ☐ Female ☐
2) Kindly indicate your age in completed years……
3) Kindly indicate your marital status

   Married ☐ Single ☐ Separated /divorced ☐ Widowed ☐
4) Kindly indicate your religion

   Christian ☐ Muslim ☐ Hindu ☐

   Any other……
5) Kindly indicate your highest level of education?

   Primary ☐ Secondary ☐ Tertiary ☐

   Any other……

SOCIAL ECONOMIC FACTORS

6) What do you normally do for a living?

   Farming ☐ Business ☐ Formal employment ☐

   Any other……
   …
7) What is your average monthly income in Kenya shillings?

   Less or equal to 10,000 ☐ 11,000-20,000 ☐ Above 20,000 ☐

PART II: TREATMENT RELATED FACTORS

A) Medication

8) Kindly indicate the year you were transplanted……

9) How long had you been on dialysis before transplantation?

Less than 2 years ☐ 3-4 years ☐ over 5years ☐

10) Kindly indicate the relationship with your donor

Mother ☐ Father ☐ Sister ☐ Brother ☐ Spouse ☐

Any other, kindly specify……

11) How many tablets do you take in a day? .....

12) How many times do you take your medications in a day?

Once ☐ Twice ☐ Thrice ☐

More than thrice ☐

13) In the past one month, have you missed your medication? Yes ☐ ☐

No

If Yes to the above question, kindly answer question14 and 15 below; if you have not missed any medication kindly proceed to question 16

14) How many times have you missed medication?

Once ☐ Twice ☐ Thrice ☐

More than thrice ☐

15) Below is a list of reasons associated to post kidney transplant patients missing their medications. Kindly tick the reasons that are applicable to you.

Reasons	**Yes**	**No**
I forgot		
I felt better after medication use, so I took a drug break		
The medicines are too expensive for me to maintain the stock so I occasionally run out of stock		
I have a busy work schedule work so I don't have time to take my medicines		
I felt worse after taking medication		

I feel embarrassed to take medications in public so I don't take them when I am out of the house		
The doses are too frequent for me to maintain		
The pills are too many for me to take all at once		
The pills are too big making it difficult for me to swallow		
I have lived for long with the donated kidney and I feel it has gotten used to my body so I don't need to take medication as frequently as I used to take when it was new in my body		
I did not understand the instructions given by the health care provider		

Any other reason…….

16) Below are some of the reasons that promote medication adherence to patients after kidney transplant; kindly tick what applies to you

Reason	**Yes**	**No**
The medications prevent my body from rejecting the new kidney so I take them as instructed in order to keep my transplanted kidney functioning		
I take my medications as instructed in order to maintain my new kidney as an appreciation to my donor and health care providers		
I take my medications as instructed because the quality of my life has improved after kidney transplantation and I would not like to go back to dialysis		
My family members offer financial support to me so I		

don’t run out medication stock		
My family members always remind me to take my pills		
I have an alarm to remind me when it is time to take medication		
I use a medication pill box that helps me to organize my medicines as per the prescribed daily schedules		
I have scheduled my medication on my meal times so that I don’t forget to take them		

Any other reason……

B) Fluid

17) How much fluid do you take in a day?

< 3 liters ☐ ≥ 3 liters ☐

18) Do you have any challenges following your recommended fluid regime?

Yes ☐ No ☐

19) If yes, kindly tick the challenges from the options provide on the table below

Options	**Yes**	**No**
I don’t feel thirsty		
I find it difficult to take a lot of fluid because I was not used to taking fluid while on dialysis		
I have limited access to fluid while out of the house		
I feel full when I take a lot of fluid that I am not able to eat		
I avoid taking a lot of fluid while out of the house because I fear frequent visits to the washroom		

I was not advised on how much fluid to take		

C) Exercise

20) Do you engage in self /instructor guided exercises? Yes ☐ No ☐

21) How many times do you exercise in a week?

Once ☐ Twice ☐ Thrice ☐ More than thrice ☐

22) How long do your exercise sessions last?

< 30 minutes ☐ ≥ 30 minutes ☐

23) Listed below, are some of the reasons associated with lack of exercises in post kidney transplant patients. Kindly indicate the reasons that are applicable to you

Reason	**Yes**	**No**
I lack motivation to exercise		
I feel uncomfortable when I exercise		
I am not confident to exercise due to my health status		
I have no time to exercise due to my tight schedules		
I have no clear no clear instructions on exercises that are fit for me		

Any other reason……

D) Clinic attendance

24) Have you ever missed your clinic appointment? Yes☐ No ☐

25) If yes, how many times have you missed in the past three clinic schedules……

26) Kindly indicate the reasons for missing the clinic appointments

I forgot about the appointment ☐

The hospital is too far from home ☐

The appointments are too frequent ☐

I felt better so I had no reason to attend the clinic ☐

Any other……

E) Lifestyle

33) Do you normally smoke? Yes ☐ No ☐

34) Do you take alcohol? Yes ☐ No ☐

PART III: INSTITUTIONAL RELATED FACTORS

35) How long does it take you to reach the hospital?

Less than 5 hours ☐ 6-10 hours ☐ more than 11 hours ☐

36) How do you feel about the statements below?

Statement	**Strongly agree**	**Agree**	**Not sure**	**Disagree**	**Strongly disagree**
The transplant clinic is well located within the hospital					
The staffs in the transplant clinic are easily approachable					
Services in the transplant clinic are patient friendly					
Hospital charges are pocket friendly					

I can visit the clinic any time without appointment and get the desired services					
Drugs are always available in the pharmacy					
The cost of the drugs is fair					
I get my results from the laboratory without delay					
The cost of the laboratory services is affordable					
The hospital sends reminders for clinic appointments					
The hospital offers home based care for post kidney transplant recipients					
The hospital has a support group for post kidney transplant recipients					
The clinic operates on first come first served basis					
I take a lot of time before being attended at the clinic					

Any other useful information

……

……

37) **Measures of Adherence**

Clinic attendance….. ……Regular ☐ Irregular ☐

38) **Drug trough levels**

Tacrolimus level…….

Cyclosporine level…….

39) **Renal functions tests**

Serum creatinine level……

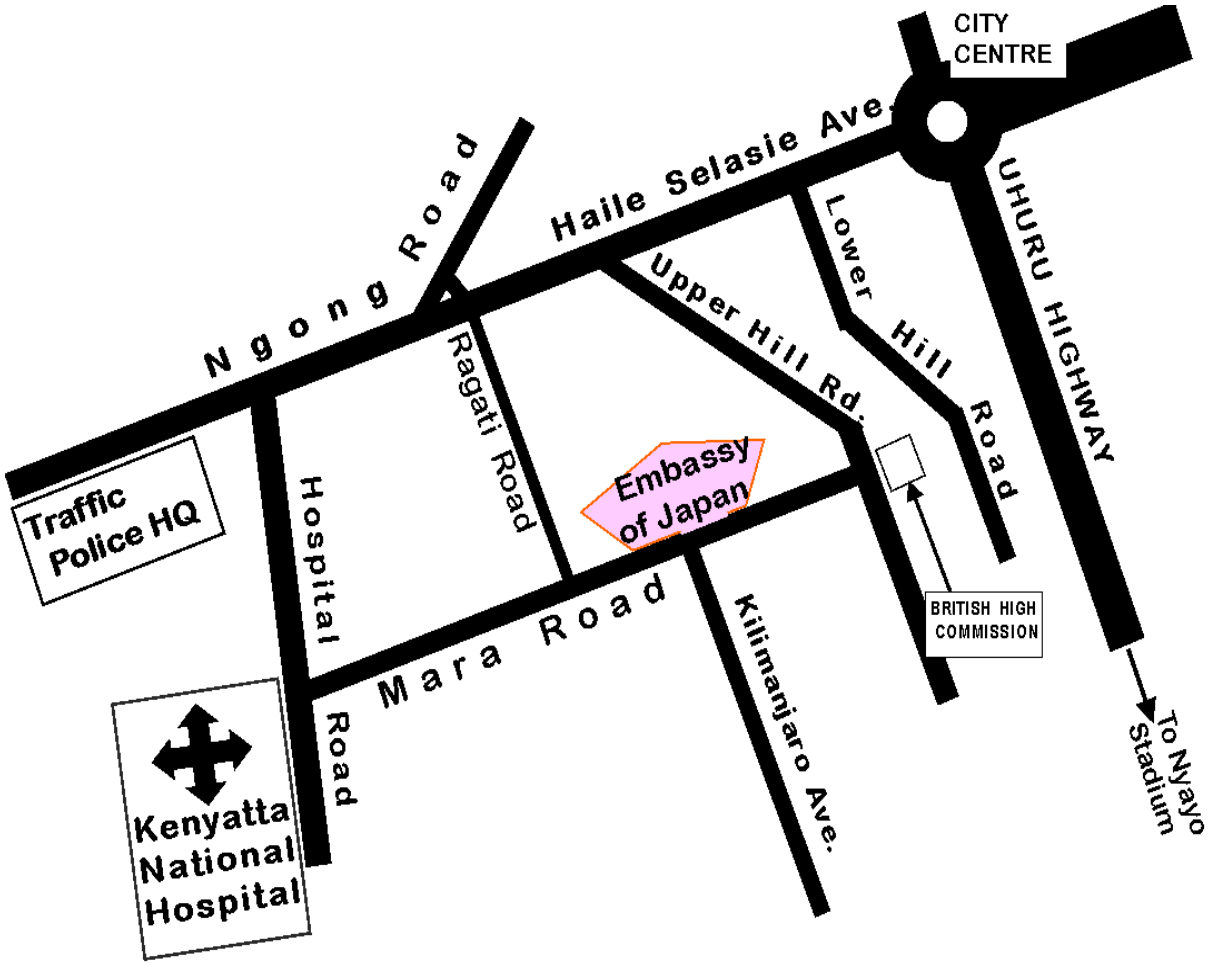
40) **Weight management**

Average weight in the last 6 months……BMI……

Today's weight ……BMI…….

THE END; THANKS FOR YOU PRECIOUS TIME!

APPENDIX VI: KNH LOCATION MAP



Source: Google Map