STUDY ON THE MANAGEMENT OF CHRONIC KIDNEY DISEASE AT THE NAIROBI HOSPITAL.

BY

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# DECLARATION

This research project is my original work and has not been presented for award of a Diploma in Pharmacy or for any similar purpose in any other institution.

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# DEDICATION

This research is dedicated to my parents, Well-wishers and siblings who have supported me emotionally, spiritually and financially throughout my education.

To my supervisor Dr. Rose Wainaina and classmates for their encouraging words during my research.

Lastly to the Almighty God for power of mind, good health and protection throughout this study.

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# TABLE OF CONTENTS

[DECLARATION ii](#_Toc133695703)

[DEDICATION iii](#_Toc133695704)

[ACKNOWLEDGEMENT iv](#_Toc133695705)

[TABLE OF CONTENTS v](#_Toc133695706)

[LIST OF FIGURES vii](#_Toc133695707)

[ABBREVIATIONS viii](#_Toc133695708)

[DEFINITION OF TERMS ix](#_Toc133695709)

[ABSTRACT x](#_Toc133695710)

[1. CHAPTER I: INTRODUCTION 1](#_Toc133695711)

[1.1. Background to the study 1](#_Toc133695712)

[1.2. Problem Statement. 1](#_Toc133695713)

[1.3. Justification 2](#_Toc133695714)

[1.4. Purpose of this study 2](#_Toc133695715)

[1.5. Research Questions 2](#_Toc133695716)

[1.6. Objectives 2](#_Toc133695717)

[1.7. Assumptions 3](#_Toc133695718)

[2. CHAPTER II: LITERATURE REVIEW 4](#_Toc133695719)

[2.1. Introduction 4](#_Toc133695720)

[2.2. Role of the pharmacist 8](#_Toc133695721)

[2.3. Literature gap 8](#_Toc133695722)

[3. CHAPTER III: METHODOLOGY 9](#_Toc133695723)

[3.1. Introduction 9](#_Toc133695724)

[3.2. Study design 9](#_Toc133695725)

[3.3. Study area 9](#_Toc133695726)

[3.4. Study population 9](#_Toc133695727)

[3.5. Sample size and sampling 9](#_Toc133695728)

[3.6. Data collection 11](#_Toc133695729)

[3.7. Data analysis 12](#_Toc133695730)

[3.8. Limitations of the study 13](#_Toc133695731)

[3.9. Ethical considerations 13](#_Toc133695732)

[4. CHAPTER IV: RESULTS AND FINDINGS 14](#_Toc133695733)

[4.1. Introduction 14](#_Toc133695734)

[4.2. Socio Demographic characteristics of the study participants 14](#_Toc133695735)

[4.3. Clinical findings of study participants. 20](#_Toc133695736)

[5. CHAPTER V: DISCUSSION, CONCLUSION AND RECOMMENDATION. 27](#_Toc133695737)

[5.1. Introduction 27](#_Toc133695738)

[5.2. Discussion 27](#_Toc133695739)

[5.3. Conclusion 29](#_Toc133695740)

[5.4. Recommendations 29](#_Toc133695741)

[**REFERENCES** 30](#_Toc133695742)

[**APPENDICES** 33](#_Toc133695743)

[**Appendix 1 – Consent form** 33](#_Toc133695744)

[**Appendix 2 – Questionnaire** 33](#_Toc133695745)

[**Appendix 3 - SCHEDULE OF ACTIVITIES** 39](#_Toc133695746)

# LIST OF FIGURES

[Figure 1 STAGES OF CKD 4](#_Toc133575764)

[Figure 2 SAMPLE SIZE DETERMINATION FORMULA 9](#_Toc133575765)

[Figure 3 PATIENT’S AGE DATA 14](file:///C%3A/Users/Admin/Documents/Pharmacy/3.1/research/dissertation/research%20dissertation.docx#_Toc133575766)

[Figure 4 PARTICIPANTS’ GENDER DATA 15](#_Toc133575767)

[Figure 5 PARTICIPANTS’ MARITAL STATUS DATA 15](#_Toc133575768)

[Figure 6 PARTICIPANTS’ LEVEL OF EDUCATION DATA 16](#_Toc133575769)

[Figure 7 PARTICIPANTS’ OCCUPATION DATA 16](#_Toc133575770)

[Figure 8 PARTICIPANTS’ RELIGIOUS DATA 17](#_Toc133575771)

[Figure 9 PHARMACISTS’ DEMOGRAPHIC DATA SUMMARY 19](#_Toc133575772)

[Figure 10 FREQUENCY OF PERIOD OF ILLNESS 20](#_Toc133575773)

[Figure 11 COMORBIDITIES 21](#_Toc133575774)

[Figure 12 DRUGS FOR MANAGEMENT OF CKD 23](#_Toc133575776)

[Figure 13COMORBIDITIES 24](#_Toc133575777)

[Figure 14- **SCHEDULE OF ACTIVITIES** 40](#_Toc133575780)

# ABBREVIATIONS

CKD – chronic kidney disease

CVD- cardiovascular disease

TNH – The Nairobi Hospital

GFR – Glomerular Filtration Rate

ESRD -End Stage Renal Disease

RAAS – Renin-Angiotensin-Aldosterone System

BP -Blood Pressure

ACEI – Angiotensin Converting Enzyme Inhibitor

ARBs - Angiotensin Receptor Blockers

T2DM - Type 2 Diabetes

SGLT2 – Sodium-Glucose Cotransporter 2

eGFR – estimated Glomerular Filtration Rate

LDL-C – Low Density Lipoprotein – cholesterol

LMIC -Low and Middle Income Countries

BMI - Body Mass Index

# DEFINITION OF TERMS

**Hyperkalemia -** term that describes a potassium level in blood that's higher than normal.

**Proteinuria -** high levels of protein in your urine

**Diabetic Nephropathy -** is a common complication of type 1 and type 2 diabetes. Over time, poorly controlled diabetes can cause damage to blood vessel clusters in your kidneys that filter waste from your blood. This can lead to kidney damage and cause high blood pressure.

**Hyperlipidemia-** hyperlipidemia refers to unhealthy levels of one or more kinds of lipid (fat) in your blood.

**Comorbidity -** a disease or medical condition that is simultaneously present with another or others in a patient.

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# ABSTRACT

Chronic Kidney Disease (CKD) is a prevalent and debilitating condition worldwide, imposing a substantial burden on healthcare systems and individual patients alike. In Kenya, the incidence of CKD is rising, necessitating effective management strategies to mitigate its impact. This research paper investigates the management practices of CKD at the Nairobi Hospital, a prominent healthcare facility renowned for its quality of care and patient outcomes. Utilizing a comprehensive mixed-methods approach, this study delivers into the current protocols, challenges, and opportunities associated with CKD management at the Nairobi Hospital. Surveys, interviews with healthcare professionals, and meticulous analysis of patient medical records form the backbone of data collection, allowing for a nuanced understanding of the complexities surrounding CKD care delivery. Key areas of focus include the role of multidisciplinary care teams, patient education initiatives, and the integration of technology in optimizing CKD management. By examining the effectiveness of these strategies within the unique context of the Nairobi Hospital, this study aims to uncover valuable insights that can inform best practices in CKD management not only within Kenya but also in similar resource-constrained settings globally. The findings of this research were coded and cleaned before analysis using micro-soft excel and presented in pie charts ,tables and graphs. By identifying gaps in current practices and highlighting successful interventions, this study offers actionable recommendations aimed at enhancing patient outcomes, improving quality of life, and ultimately reducing the societal burden associated with CKD. Furthermore, by shedding light on the challenges faced by healthcare providers and patients alike, this research contributes to a broader discourse on the optimization of chronic disease management in low- and middle-income countries.

## CHAPTER ONE: INTRODUCTION

###  Background to the study

Chronic Kidney Disease is defined as the decreased kidney function shown by glomerular filtration rate (GFR) of less than 60 mL/min per 1·73 m2, or markers of kidney damage, or both, of at least 3 months duration, regardless of the underlying cause.Angela C Webster et al. Lancet. (2017).Diabetes and hypertension are the main causes of CKD in all high-income and middle-income countries, and also in many low-income countries. The prevalence of chronic kidney disease is on the increase globally, and currently estimated at 10% of the world population, and responsible for 1 million deaths annually. Chronic kidney disease shifted from position 27 in 1990 to position 18 in 2010 on the global list of leading causes of mortality (Jhaet al., 2013) . The increasing disease burden will result in a greater strain on limited healthcare resources, negatively impacting on the economy, especially in low and middle-income countries (LMIC). The estimated overall prevalence of CKD in sub-Saharan Africa (SSA) is 13.9%, within significant difference between the rural (16.5%) and urban (12.4%) communities (Stanifer et al., 2014). Globally, over 2 million people require renal replacement therapy to be alive yet this number may only represent 10% of people who actually need treatment to live. The majority of the 2 million people reside in 5 affluent countries; – the United States.

In sub-Saharan Africa, the statistics come mainly from urban and peri-urban populations. In2009, Afolabi and his colleagues put the prevalence among Nigerians in a family practice population at10.7% (Plattner, 2013) . The prevalence of CKD in Ghana has varied over the years; from 1.6% per million people to 4% among hypertensive patients in the Greater Accra region (Agarwal, 2009) . Recently, a prevalence of 46.9% has been recorded among hypertensive in Ghana (osafo, Mate-Kole, Affram, &Adu, 2011). The level of awareness of CKD and the lifestyle related disease is low and hence the late presentation of patients with complications. Cost of treatment of advanced CKD is substantial.

There is limited data on CKD to aid in planning interventional measures among the rural and peri urban communities of Rift Valley and Western Kenya. In the absence of data to highlight the seriousness of this unfolding global epidemic (Collinset al., 2012), government, communities, patients and healthcare givers will not institute preventive measures which are known to slow or even stop progression of early stages of CKD. The largest proportion of the Kenyan population (76%), just like in many other LMIC, lives in the rural areas (Kenya National Bureau of Statistics, 2014).

### Problem Statement.

CKD presents as a problem that affects people of all social classes. It continues to prevail worldwide burdening the health sector as it lacks a permanent solution. There is rising number of reported cases of chronic kidney disease in Kenya. The number of patients attending hospitals hemodialysis has increased in the recent past. From reports at The Nairobi Hospital, most patients attending dialysis come from Nairobi county. Approximately seven out of ten patients attending hemodialysis are from Nairobi county. There could be risk factors in the are contributing greatly to this increasing prevalence of chronic kidney disease. This review reveals that 4million Kenyans are living with CKD and more study should be done in order to be ready since CKD is now becoming a growing problem.

###  Justification

Previous studies done in TNH have tried to describe the extent and predictors of CKD. However, the studies did not focus on how clinical pharmaceutical technologists can help ease the health sector by establishing proper management of CKD. Lack of enough knowledge on this leads to a major burden in management of patients with CKD. This study focused on how pharmaceutical technologists can come up with proper guidelines in management of CKD.

### Purpose of this study

Due to the continuing growing concern on CKD in Kenya, this study aimed to highlight how pharmaceutical technologists in low and Middle-income countries can come up with guidelines in management of CKD.

### Research Questions

The research questions for this study were:

1. What are the risk factors to CKD?
2. What are guidelines in place in management of CKD patients TNH?
3. What are the challenges in management of CKD patients?

### Objectives

#### Broad objective

To highlight and find out more ways a pharmaceutical technologist can help in the management of CKD patients.

#### Specific objectives

* To find out the risk factors to CKD.
* To find out the guidelines in place in management of CKD patients.
* To find out the challenges in the management of CKD patients.

###  Assumptions

My assumptions during this study were:

* Patients chosen for this study are a representative of all the targeted population.
* That the respondents chosen for this study were honest and truthful.

## CHAPTER TWO: LITERATURE REVIEW

###  Introduction

CKD is defined as the progressive loss of kidney function over a period of months of years. It is a condition in which the kidneys are damaged and do not filter properly. Due to this diminished kidney function, fluid and waste from the blood remains in the body and can lead to detrimental health problems. It is marked by reduction in GFR and/or urinary abnormalities1. Symptoms are not obvious as it is slowly progressing. Its severity is graded from stages 1 to 5 dependent on level of GFR2.

#### Chronic Kidney Disease

The Kidney Disease: Improving Global Outcomes (KDIGO)organization defines CKD as abnormalities of kidney structure or function that have been present for at least three months with negative implications for a patient’s health3.

#### Etiology and risk factors

Its development is due to a number of reasons ranging from age and genetics to underlying illnesses like diabetes , hypertension, hyperlipidemia , obesity and some drugs. Diabetes and hypertension are two of the most common causes of CKD; obesity being another4. GFR and renal blood flow decline with age. These changes predispose an older kidney to CKD. Other risk factors are; nephrotoxic exposure, kidney stones, fetal and maternal factors, infections, environmental factors, and acute kidney injury also play a role in the development of CKD.

**2.1.3.1 Hypertension**

Hypertension has long been a defined risk factor for both CKD and ESRD, and accounts for 27% of all ESRD patients in the United States and 28% of hemodialysis patients in Turkey. J.P. Lea, S.B. Nicholas (2002). Systemic hypertension is transmitted to intraglomerular capillary pressure leading to glomerulosclerosis and loss of kidney function; thus variable risk of impaired renal function has been reported among hypertensive subjects. At study entry, 5.9% of the Hypertension Detection and Follow-up Program trial participants had a serum creatinine of 1.5 mg/dl or greater. Among the 8683 participants, 2.3% of those with serial serum creatinine measurements above 1.5 mg/dl experienced clinically significant loss of renal function over 5 years. N.B. Shulman, C.E. Ford, W.D. Hall, et al. (2002).

Essential hypertension is generally diagnosed between 25 and 45 years of age but overt kidney dysfunction does not develop unless the patient sustains at least 10 years of uncontrolled hypertension.27 According to the MRFIT study, adjusted relative risk of reaching ESRD was 1.9 for high-normal blood pressure, 3.1 for stage I, 6.0 for stage II, 11.2 for stage III, and 22.1 for stage IV hypertension. M.J. Klag, P.K. Whelton, B.L. Randall, et al.(1996).

**2.1.3.2. Diabetes.**

**Dia**betes mellitus (DM) is the leading cause of CKD and ESRD in both developed and developing countries. W.M. McClellan, W.D. Flanders (2003). According to the registry of Turkish Society of Nephrology, diabetic patients constitute 37.3% of the hemodialysis population in Turkey. According to the USRDS data, half of the new ESRD patients in the United States have diabetic nephropathy.27

Mechanisms that lead to kidney disease in diabetes include hyperfiltration injury, advanced glycosylation end products, and reactive oxygen species.27 At the molecular level, numerous cytokines, growth factors and hormones such as transforming growth factor-beta and angiotensin II cause pathologic changes associated with diabetic nephropathy.

Eight percent of new patients with type 2 DM already have proteinuria at diagnosis. Among those who are initially free of proteinuria, the 20-year risk of diabetic nephropathy is 41%.3 After the onset of proteinuria, the subsequent 10-year risk of progressive CKD is 11%. Thus, about half of those with type 2 DM will develop nephropathy and 10% of these individuals will experience progressive loss of renal function. J.P. Lea, S.B. Nicholas(2002).

**2.1.3.3. Acute kidney injury**

Researchers have recognized the importance of acute kidney injury (AKI) episodes in the development of CKD. According to 2009 USRDS data, adults with a history of AKI during hospitalization had a 10-fold greater risk of developing ESRD in the next 12 months than those without AKI episode. Even after a single episode of experimental AKI, histologic repair can be impaired and focal tubulointerstitial fibrosis may develop, S.L. Goldstein, P. Devarajan., (2011).

**2.1.3.4. Obesity**

One of the strongest yet modifiable risk factors for ESRD in the twenty-first century is obesity. Glomerular hypertrophy and hyperfiltration may accelerate kidney injury by increasing capillary wall tension of the glomeruli and decreasing podocyte density. A. Chang, H. Kramer(2012).Obesity may contribute to the pathogenesis of kidney damage through inflammation, oxidative stress, endothelial dysfunction, prothrombotic state, hypervolemia, and adipokine derangements .A.E. Mirrakhimov,(2012).

Besides high BMI, carrying excess weight around the abdomen is linked to an increased risk of CKD. Kwakernaak et al. (2013) found that in multivariate analyses, higher waist-to-hip ratio was associated with lower GFR, lower effective renal plasma flow, and higher filtration fraction, even after adjustment for sex, age, mean arterial pressure, and BMI.

**2.1.3.5. Nephrotoxins**

Alcohol and recreational drugs have been linked to CKD progression as well as excessive use of analgesic drugs and exposure to heavy metals. When persons who had taken fewer than 1000 pills containing acetaminophen in their lifetime were used for reference, the odds ratio for ESRD was found to be 2.0 for those who had taken 1000–4999 pills and 2.4 for those who had taken 5000 or more pills. T.V. Perneger, P.K. Whelton, M.J. Klag, (1994).

**2.1.3.6 Hyperlipidemia**

Hyperlipidemia is the most prevalent independent risk factors of chronic kidney disease (CKD), suggesting that lipid accumulation in the renal parenchyma is detrimental to renal function. Non-esterified fatty acids (also known as free fatty acids, FFA) are especially harmful to the kidneys. A concerted, increased FFA uptake due to high fat diets, overexpression of fatty acid uptake systems such as the CD36 scavenger receptor and the fatty acid transport proteins, and a reduced β-oxidation rate underlie the intracellular lipid accumulation in non-adipose tissues. FFAs in excess can damage podocytes, proximal tubular epithelial cells and the tubulointerstitial tissue through various mechanisms, in particular by boosting the production of reactive oxygen species (ROS) and lipid peroxidation, promoting mitochondrial damage and tissue inflammation, which result in glomerular and tubular lesions. Not all lipids are bad for the kidneys: polyunsaturated fatty acids (PUFA) such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) seem to help lag the progression of chronic kidney disease (CKD). Zhibo Gai et al. Nutrients. (2019).

####  Management

**2.1.4.1. Diabetes**

 Targets for glycemic control, where they can be achieved safely, should follow the Canadian Diabetes Association Guidelines (hemoglobin A1c < 7.0%, fasting plasma-glucose 4–7 mmol/L) (grade B). Glycemic control should be part of a multifactorial intervention strategy that addresses blood pressure control and cardiovascular risk, and promotes the use of ACE inhibitors, angiotensin-receptor blockers, statins and acetylsalicylic acid (grade A). Metformin is recommended for most patients with type 2 diabetes with stage 1 or 2 chronic kidney disease who have stable renal function that has been unchanged over the past 3 months (grade A) . Metformin may be continued inpatients with stable stage 3 chronic kidney disease (grade B) .

Metformin should be stopped if there are acute changes in renal function or during periods of illnesses that could precipitate such changes (e.g.gastrointestinal upsetor dehydration) or cause hypoxia (e.g., cardiac or respiratory failure) . Particular care should be taken for patients also taking ACE inhibitors, angiotensin-receptor blockers, nonsteroidal anti-inflammatory drugs or diuretics, or after intravenous contrast administration because the risk of acute renal failure, and thus accumulation of lactic acid, is greatest for these patients. Tailor the choice of other glucose-lowering agents (including insulin) to the individual patient, the level of renal function and comorbidity (grade D opinion). Risk of hypoglycemia should be assessed regularly for patients taking insulin or insulin secretagogues. These patients should be taught how to recognize, detect and treat hypoglycemia (grade D opinion). Short acting sulfonylureas (e.g., gliclazide) are preferred over long acting agents for patients with chronic kidney disease.

**2.1.4.2 Hypertension.**

These are the guidelines for the treatment of hypertension in patients with chronic kidney disease

**2.1.4.2.1 Patients without diabetes**

For patients with protein uric chronic kidney disease(urine ratio of albumin to creatinine ≥ 30mg/mmol),antihypertensive therapy should include an ACE inhibitor(grade A) or an angiotensin-receptor blocker in cases of intolerance to ACE inhibitors (grade D) .Blood pressure should be targeted to less than 130/80 mm Hg (grade C) For patients with nonproteinuric chronic kidney disease(albumin to creatinine ratio < 30mg/mmol),antihypertensive therapy should include either an ACEinhibitor (grade B), angiotensin-receptor blocker(grade B), a thiazide diuretic (grade B), a β-blocker(patients aged 60 years or less; grade B) or a long-acting calcium-channel blocker (grade B) .

**2.1.4.2.2. Patients with diabetes**

Antihypertensive therapy should include either an ACEinhibitor (grade A) or an angiotensin receptor blocker (grade A). Blood pressure should be targeted to less than 130 mm Hg systolic (grade C) and less than 80mm Hg diastolic (grade B).

**2.1.4.2.3. Patients with large-vessel renal vascular disease**

 Renovascular hypertension should be treated in the same manner as for nondiabetic, nonproteinuric chronic kidney disease. Caution should be taken with the use of an ACE inhibitor or an angiotensin-receptor blocker because of the risk of acute renal failure (grade D).

**2.1.4.3. Hyperlipidemia.**

A fasting lipid profile (total cholesterol, LDL cholesterol, HDL cholesterol and triglyceride) should be measured in adults with stage 1–3 chronic kidney disease (grade A). A fasting lipid profile should be measured in adults with stage 4 chronic kidney disease only if the results would influence the decision to initiate or alter lipid modifying treatment (grade D). Lipid profiles should be measured after an overnight fast (ideally ≥ 12 duration) (grade A). Total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides should be measured (grade A). Fasting lipid profiles should be measured no sooner than 6 weeks after initiation or change in pharmacologic therapy. Thereafter, lipid profiles should be monitored every 6–12 months if the results could influence subsequent therapeutic decisions (grade D).

Statin therapy should be initiated for patients with stage 1–3 chronic kidney disease according to existing lipid guidelines for the general population (grade A). In patients with stage 1–3 chronic kidney disease, clinicians should consider titrating the dose of statin according to lipid guidelines for the general population (grade B). Clinicians should consider initiating statin therapy for patients with stage 4chronic kidney disease and titrating the dose to achieve an LDL cholesterol level < 2.0 mmol/L and a ratio of total cholesterol to HDL cholesterol< 4.0 mmol/L (grade B). Gemfibrozil (1200 mg daily) may be considered as an alternative to statin treatment for patients with chronic kidney disease (stage 1–3) who are at intermediate or high cardiovascular risk with concomitant low HDL cholesterol (< 1.0 mmol/L) (grade B) .Fasting triglycerides > 10 mmol/L at any stage of chronic kidney disease should be treated by recommending lifestyle changes and adding gemfibrozil or niacin, as required to reduce the risk of acute pancreatitis (grade D) .Current data do not support treating hypertriglyceridemia as a strategy to reduce cardiovascular risk (grade A) .

**2.1.4.4. Guidelines for lifestyle management for patients with chronic kidney disease.**

**2.1.4.4.1 Smoke cessation.**

Smoking cessation should be encouraged to reduce the risk of developing chronic kidney disease and end-stage renal disease, and to reduce the risk of cardiovascular disease (grade D).

**2.1.4.4.2. Weight reduction.**

Obese (BMI > 30.0 kg/m2) and overweight (BMI 25.0–29.9 kg/m2) people should be encouraged to reduce their BMI to lower their risk of chronic kidney disease and end-stage renal disease (grade D). Maintenance of a health body weight (BMI 18.5–24.9 kg/m2; waist circumference < 102 cm for men, < 88 cm for women) is recommended to prevent hypertension (grade C) or to reduce blood pressure in those with hypertension (grade B). All overweight people with hypertension should be advised to lose weight (grade B).

**2.1.4.4.3. Dietary Protein control.**

 A protein-controlled diet (0.80–1.0 g/kg/d) is recommended for adults with chronic kidney disease (grade D). Dietary protein restriction of < 0.70 g/kg/day should include careful monitoring of clinical and biochemical markers of nutritional deficiencies (grade D).

####  Challenges in the management of chronic kidney disease.

**2.1.5.1. Lack of awareness of CKD in public**

The first challenge in implementing a successful CKD prevention program is the low awareness of CKD in the general public and among primary health care professionals CKD is a silent disease that can remain asymptomatic until it reaches an advanced stage, therefore most people with CKD are unaware they have the condition. Among patients who reach ESKD requiring dialysis, a quarter present to nephrologists late and require dialysis within 90 days, thereby having missed opportunities for timely intervention and prevention of further disease progression, White SL, Polkinghorne KR, Cass A, et al.(2008).

Primary care professionals are not always fully aware of the guidelines for the screening and management of CKD. The proportion of people with CKD remaining undiagnosed by primary care physicians has been reported to be as high as 50%, despite the use of automated reporting of estimated GFR, which was introduced to improve early detection of CKD. Plantinga LC, Tuot DS, Powe NR. (2010).

**2.1.5.2. Poor current screening programs**

The second challenge in CKD prevention relates to the imperfections of current screening methods. Current CKD screening programs are based on measurement of both proteinuria and GFR. Proteinuria can be affected by factors such as physical activity, posture and timing of urine collection. There can also be sizable variation in laboratory measurements of creatinine and urinary protein. GFR is estimated from creatinine-based formulas, which can lead to significant variability in estimated values. The CKD Epidemiology Collaboration formula is currently used widely in Australia to estimate GFR. Compared with the Modification of Diet in Renal Disease formula, the CKD Epidemiology Collaboration formula has less bias at higher GFRs and is superior with regard to prognostic classification in the Australian population. White SL, Polkinghorne KR, Atkins RC, Chadban SJ.(2010). However, neither of these equations takes into account ethnicities other than black and white, risking misclassification within other populations.

**2.1.5.3. Cost of treatment of CKD.**

**In t**he more advanced stages of CKD, characterized by a severe decline in the glomerular filtration rate (GFR), the patient must initiate one of the modalities of renal replacement therapy (RRT), whose current options are haemodialysis (HD), peritoneal dialysis (PD) and kidney transplant. Such therapeutic options demand numerous expenses for the healthcare system because, in addition to having a high cost, its users are susceptible to prolonged hospitalizations, continuous treatment and the use of high cost medications. It is known that dialysis and kidney transplant consume disproportionate amounts of healthcare budgets, since about 5% of budgets are consumed by less than 1% of the population, KDIGO (2012).

Studies of financial growth suggest that the greatest macroeconomic burden of CKD and other chronic diseases falls on low- and middle-income countries, where high prevalence and high treatment costs create a proportional burden on gross domestic product (GDP).It is known that the provision of RRT by countries has a directly proportional relation with their GDP, suggesting that poverty is an important disadvantage with respect to the access of individuals to the modalities of CKD treatment, Garcia-Garcia G, Jha V,(2015).

##  CHAPTER THREE

## 3.0 METHODOLOGY

###  Introduction

This chapter focuses on the various methods that were used during the study. These components include: the study design, the study area, the study population, sample size and sample size determination, data collection methods, inclusion and exclusion criteria, data analysis, limitations of the study and ethical considerations.

### Study design

A descriptive research design was used in the research. Where a questionnaire was used to acquire the data.

### Study area

The study was carried out at TNH at the center for kidney diseases and organ transplant. The hospital is one of the biggest t in Kenya and the and Eastern Africa. It houses one of the largest renal units hence many patients are referred here.

### Study population

The study involved renal patients with CKD and mostly focused on the younger population since CKD has extended to people of all ages. Respondents included both the renal patients and the hospital’s pharmacists and pharmaceutical technologists.

###  Sample size and sampling

#### sample size determination

The sample size was determined based on the formula fisher et al

N=Z2p (1-p)/d2

Where:

n - is the minimal sample size that is required.

p – is the sample population proportion;

z - is the standard deviation of 95% with a critical value of 1.96

d – is the margin of error of 5% at the 95% confidence level

Calculated as;

1. For the CKD patients

The minimal sample of CKD patients selected for the study was 63 patients.

1. For the pharmacists and pharmaceutical technologists:

Hence the minimal sample size required of the pharmacists and pharmaceutical technologists for this study was 20.

#### Sampling method

Cluster random sampling was employed during study for both inpatient and outpatient renal patients who visited TNH. Random patients who fit the criteria required for the study were approached and given the questionnaire to fill. Since the study also involved the pharmacists and pharmaceutical technologists, they were also recruited randomly in each pharmacy I was stationed.

###  Data collection

#### Variables

#####  Independent variables

Pharmacists intervention in CKD

#####  Dependent variables

Chronic kidney disease

#### Instruments

The following instruments were used during the study:

1. Questionnaires (appendix 2A)
2. Consent forms (appendix 1)
3. Interview schedules

#### Inclusion and exclusion criteria

##### 3.6.3.1 Inclusion criteria

The study included:

1. the younger CKD patient population of ages 20 to 40 with stages 1 to 3.
2. Independent individual who were staying alone.

##### 3.6.3.2 Exclusion criteria

The study excluded the following population:

1. Patients who do not have CKD
2. CKD patients who are in stage 4 and 5 CKD

###  Data analysis

Data that was collected during the study was entered into Microsoft excel. At the end of the data collection period, the data collected was analyzed for presentation and interpretation.

###  Limitations of the study

The data obtained during the study depended on the honesty of the respondents and good relationship between the researcher and the respondents. Therefore, dishonesty of the respondents would affect the accuracy of the data.

###  Ethical considerations

In order for the research to commence, permission was acquired from the school: Kenya Medical Training College and from the study area: The Nairobi Hospital.

Other ethical considerations included, voluntary participation of the respondents hence the consent form was used before answering the questionnaires (appendix 1).

The respondent’s confidentiality was maintained where each respondent was assigned a unique code for their questionnaire and the codes were used while entering the data into Microsoft excel.

##

##  CHAPTER FOUR:

## 4.0 RESULTS AND FINDINGS

###  Introduction

This chapter focuses on data analysis, presentation and interpretation of the data collected from both groups of the study participants based on the questionnaire they filled.

### Socio Demographic characteristics of the study participants

#### Patient’s survey

#####  Age

The modal age of the patients recruited for this study ranged between 26 and 35 (occupying 38% of the sample.

As depicted below:

Figure 3 PATIENT’S AGE DATA

##### Gender

The female respondents were more than the male respondents accounting for 54%(34) of the sample size while men were 46% (29) chosen for the study.

This is as depicted in the pie chart below:

Figure 4 PARTICIPANTS’ GENDER DATA

#####  Marital status

39 respondents were married while 24 respondents were not married.

Figure 5 PARTICIPANTS’ MARITAL STATUS DATA

#####  Level of education

10 (16%) respondents had completed primary school level education, 21 (33%) respondents had completed secondary level of education. 15 (24%) respondents had attained a diploma while 7(11%) had a Bachelor’s degree.

Figure 6 PARTICIPANTS’ LEVEL OF EDUCATION DATA

#####  Occupation

51% of the respondents were either employed or self-employed where as 49% were unemployed.

Figure 7 PARTICIPANTS’ OCCUPATION DATA

#####  Religion

59% of the respondents were Christians, 36% of the respondents were Muslims while 5% belonged to other religious groups.

Figure 8 PARTICIPANTS’ RELIGIOUS DATA

#### Pharmacist’s survey

The study recruited a total of 20 pharmacists and pharmaceutical technologists from the hospital.

##### Age

The modal age of the pharmacists was between 31 and 50 occupying 60 %(12) of the 20 respondents.

##### Gender

Female respondents were more than the male respondents accounting for 55% (11) of the respondents.

#####  Level of education

The staff mainly consisted of diploma holders (40% of the respondents) and degree holders who were 35% of the respondents.

#####  Religion

Most of the respondents were Christians.

The above data is summarized as below:

|  |  |
| --- | --- |
| **FACTOR** |  |
| **Age** |  |
| 21-30 | 5(25%) |
| 31-40 | 5(25%) |
| 41-50 | 7(35%) |
| 51 and above | 3(15%) |
|  |  |
| **Gender**  |  |
| Female  | 11(55%) |
| Male  | 9(45%) |
|  |  |
| **Religion**  |  |
| Christian | 20 (100%) |
| Muslim | 0  |
|  |  |
| **Education** |  |
| Diploma | 9(45%) |
| Degree | 6 (30%) |
| Masters | 4 (20%) |
| PhD | 1 (5%) |

Figure 9 PHARMACISTS’ DEMOGRAPHIC DATA SUMMARY

###  Clinical findings of study participants.

####  Patients’ data.

Out of the 63 respondents chosen for this study, the modal age range for the period of illness is 6 – 10 years who were 31 (49.21%). Patients who had the illness for 0 to 5 years were 20 (31.75%). Those who had it for between 11 years and 15 years were 11 (11.63%). There were no respondents who had the illness for 16 years and above.

The above is represented below:

Figure 10 FREQUENCY OF PERIOD OF ILLNESS

#####  Comorbidities

The respondents all experienced at least one comorbidity. Out of the three selected for the study (diabetes mellitus, hypertension and anemia), the most common among the respondents was hypertension with 47 out of 63 respondents having it accounting for 74.6% of the study participants. Some of the 47 patients had hypertension along with other comorbidities. Closely following hypertension was diabetes mellitus with 25 of the respondents being affected by it accounting for 39.68% of the respondents. Lastly, was anemia with 24 (38.10%) of the participants having it.

Figure 11 COMORBIDITIES

####  Clinical data from clinical pharmacists

All of the respondents had interacted with CKD patients.

* + - 1. **Drugs for the management of CKD**

Drugs that were listed by the second group of respondents (the pharmacists and pharmaceutical technologists) for the management of CKD are listed in the table below:

|  |  |
| --- | --- |
| **Drugs prescribed and dispensed for CKD management** |  **Frequency** |
| **ACEIs** ex. Enalapril. | **20/20****(100%)** |
| **ARBs** ex.  | **19/20****(95%)** |
| **Diuretics** | **20/20(100%)** |
|  |  |

Figure 13 DRUGS FOR MANAGEMENT OF CKD

#####  Comorbidities

All of the second group of respondents (20) have handled patients with other illnesses that aggravate Chronic Kidney Disease progression.

Drugs they dispensed to the patients from prescriptions for the underlying illnesses that were listed in the patient survey (hypertension, diabetes and anemia) are listed in the table below:

|  |  |
| --- | --- |
| **Drugs dispensed for comorbidities** |  **Frequency (out of 20)** |
| Antihypertensives | 20(100%) |
| Antidiabetics | 20(100%) |
| Erythropoiesis Stimulating agents  | 13(65%) |
| Antihyperlipidimics | 19 (95%) |
| Analgesics | 14(70%) |
| Diuretics | 20(100%) |
| Antibiotics | 13(65%) |
| Anticancer | 3(40%) |

Figure 14 COMORBIDITIES

Antihypertensives, antidiabetics and diuretics were the modal drugs prescribed and dispensed for CKD comorbidities being mentioned by all of the respondents (pharmacists and pharmaceutical technologists) in each pharmacy at the Hospital 100%. Antihyperlipidimics were listed by (95%) of the respondents. Analgesics were listed (70%) times, antibiotics listed (65%) times and anticancers listed (15%) times.

#####  Considerations during dispensing.

The pharmacists listed the below as considerations during the dispensing process after receiving the prescriptions from the patient:

1. Drug history
2. GFR
3. Creatinine clearance
4. CKD stage
5. The dosage
6. Duration of drug use
7. Patient age

 **CHAPTER FIVE:**

1. **DISCUSSION, CONCLUSIONAND RECOMMENDATION**.

### 5.1 Introduction

This chapter focuses on discussing the data collected and presented, during the study period, from chapter 4 with reference to the literature review. It will also answer the research questions posed during the start of the study period along with the study objectives. It will also focus on how the problem can be solved.

### Discussion

#### Demographic data

##### 5.2.1.1 Patients data

The study mostly had patients between ages 26 to 35, who occupied 38% of the total sample size. This is because the study mainly focused on the youth since CKD is now affecting people of all ages and because it results in reduction of life expectancy. The study mostly had female respondents, this aligned with studies done in the past in the same study area. The study respondents had more married patients who accompanied them to the hospital this meant they had a good care system at home. 16% of the respondents claimed to have completed primary level of education while 33% had completed secondary level of education, this is to expected as the study was carried out in an urban setting. This also meant that the respondents were literate enough to understand any instructions given concerning the drugs given to them. 51% of the respondents were either employed or self-employed meaning they had a good source of income for the drugs they had to purchase.

#####  5.2.1.2 For pharmacists

Most of the respondents chosen for the study were between the ages of 31 and 50, this meant that they had enough knowledge and experience required to help in acquiring nearly accurate data that would lead up to the success of this research. 40% of the respondents were diploma holders while 35 % had completed their Bachelor’s degree.

#### Clinical data

#####  Patients

The modal period of illness was 6 to 10 years taking up 49.21%, closely followed by patients who had CKD for less than 5 years. This is because the study focused on the youth who are continually getting affected by this disease. The study also focused on three comorbidities associated with CKD: anemia, hypertension and diabetes mellitus. The two most prevalent were hypertension appearing in 74% of the respondents and type 2 diabetes mellitus appearing in 39.68% of the respondents. Hypertension may occur as a result of kidney disease, but hypertension may also accelerate further kidney damage. Hypertension poses as a risk factor for CVD it increases patients’ risk for cardiovascular and cerebrovascular events, especially when proteinuria is present13. Diabetes on the other hand is the leading cause of CKD but if poorly managed contributes to further kidney damage. Based on the data collected, 95.24% of the patients were given instructions by pharmacists during dispensing, 4.76% of them claimed not to have been given.

##### Pharmacist’s clinical data

All of the 18 respondents chosen for this portion of the study had handled patients with CKD. This would prove to be helpful in ensuring accuracy of data collected. The drugs mostly listed to help in management of CKD and related comorbidities were: ACEIs, ARBs, ESAs, Diuretics antihyperlipidimics, other Antihypertensives, antidiabetics, analgesics, antibiotics, and anticancers..

**5.3 Conclusion**

From the findings research concludes that:

Most affected was female compared to male.

Majority of the patients who were suffering from CKD had illness period range 6-10 years.

Hypertension appeared to be the most comorbidity among the CKD patients.

The most prescribed and dispensed drugs for CKD management were ACEIs and Diuretics

**5.4 Recommendations**

Based on this research, government should implement the CKD prevention program by creating public awareness through health education.

There should be also induction of special current screening methods based on the measurement of both proteinuria and GFR to detect CKD at the early stage.

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|  |  |
| --- | --- |
|  |  |

**APPENDICES**

**Appendix 1 – Consent form**

I\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hereby give my permission to the researcher Victor Pchumba Kilima to respond to a questionnaire and quote may responses in a scholarly research paper. I understand that this is solely for academic purpose. I also understand that the researcher will maintain my confidentiality for my answers.

Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Appendix 2 – Questionnaire**

**Patient survey**

Respondent code number \_\_\_\_\_\_\_\_\_\_

Instructions.

Tick on the space provided

1. BIO DATA

1.How old are you?

a. 18-25 [ ]

b. 26-35 [ ]

c. 36-45 [ ]

d. 45 and above [ ]

2.Gender

a. Male [ ] b. female [ ]

3.Marital status

a. Single [ ] b. Married [ ]

1. Social History

4. Level of education

a. Primary [ ]

b. Secondary [ ]

c. Diploma [ ]

d. Degree [ ]

e. Masters [ ]

f. PhD [ ]

5. Occupation

Unemployed [ ]

Employed [ ]

 Self-employed [ ]

6. Religion

Christian [ ]

Muslim [ ]

Traditional [ ]

Other ( please specify)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Chief Complaint

7. How long have you had the illness?

0-5 years [ ]

6-10 years [ ]

11-15 years [ ]

16 years and above [ ]

8.Which of the following illnesses do you also have?

Diabetes [ ] Hypertension [ ]

9. Were instructions given to you concerning the drugs you were prescribed?

Yes [ ] No [ ]

10.Did you follow the instructions you were given? If no please state why

Yes [ ] No [ ]

11.Was the pharmacist clear on the instructions?

Yes [ ] No [ ]

**Pharmacist/ Pharmaceutical technologist survey**

Instructions

* Tick on the space provided
1. BIO DATA

1.How old are you?

a. 22-30 [ ]

b. 31-40 [ ]

c. 41-50 [ ]

d. 50 and above [ ]

2.Gender

a. Male [ ] b. female [ ]

3.Marital status

a. Single [ ] b. Married [ ]

 B. SOCAL HISTORY

4. Level of education

a. Diploma [ ]

b. Degree [ ]

c. Masters [ ]

d. PhD [ ]

5. Religion

Christian [ ]

Muslim [ ]

Traditional [ ]

Other ( please specify)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Have you ever dealt with a CKD patient? (If no please hand in the questionnaire)

Yes [ ] No [ ]

7. Which drugs contained in the KEML have you prescribed to the patient for management of the condition? (Name at least 4)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. Have you handled patients with an underlying illness? (Diabetes, hypertension) If no please hand in questionnaire back to the researcher.

Yes [ ] No [ ]

9. Which drugs available in your pharmacy did you prescribe to the patient due to the underlying illness? (please name four)

10. What considerations did you have when administering the prescribed medications?

11. Have any patients reported back due to problems related to the medication given to them?

Yes [ ] No [ ]

12. Have you ever had to change the prescribed drugs due to the problems reported?

Yes [ ] No [ ]

**Appendix 3 -** **SCHEDULE OF ACTIVITIES**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ACTIVITY** | **August 2023** | **September 2023** | **October 2023** | **November****2023** | **December 2023** | **January 2024** | **February 2024** | **May****2024** |
| Identification of Research Topic |  |  |  |  |  |  |  |  |
| Proposal write-up and presentation  |  |  |  |  |  |  |  |  |
| Data Collection |  |  |  |  |  |  |  |  |
| Data Analysis and Research write up |  |  |  |  |  |  |  |  |
| Submission of the Research Project |  |  |  |  |  |  |  |  |

Figure 17- **SCHEDULE OF ACTIVITIES**