

**DEVELOPMENT OF STRATEGIES TO INCREASE PARTICIPATION OF
PHARMACISTS IN THE RENAL MULTIDISCIPLINARY HEALTH CARE TEAM AT
POLOKWANE HOSPITAL, LIMPOPO PROVINCE**

by

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DECLARATION

I, **Noko Brilliant Moloto** [REDACTED], hereby declare that the work on which this study is based is original, except where acknowledgements indicate otherwise. This thesis is submitted for the degree **Master of Pharmacy** at the University of Limpopo. Neither the whole work nor any part of it has been submitted before for any degree or examination at this or any other university.

Signed..... on the Day of.....

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DEFINITION OF CONCEPTS

Chronic kidney disease (CKD) is a general term for heterogeneous disorders affecting kidney structure and function (Levey & Coresh, 2012). In this study CKD is the progressive loss of renal function occurring over several months to years and is characterized by the gradual scarring of the kidney

Comorbidity is the presence of one or more additional diseases or multiple chronic conditions occurring in an individual in the context of a single disease (Sambamoorthi, Tan & Deb, 2015). In this study, comorbidity refers to the presence of more than one distinct condition in an individual.

Multidisciplinary team (MDT) involves a group of professions from different disciplines communicating and collaborating in a team to plan, agree, and implement optimal standard of care (Ezziane, Maruthappu, Gawn, Thompson, Athanasiou *et al.*, 2012). In this study, multidisciplinary team refers to the renal staff at Polokwane hospital, which includes pharmacists, registered nurses, physicians, dieticians and nephrologists, who interact and coordinate their efforts to diagnose, treat, and plan for health care services in patients with chronic kidney disease.

Patient is a recipient or receiver of health care service, either ill or hospitalized (Daniel, 2013). In this study patient refers to people who are suffering from chronic kidney disease and receiving care at Polokwane hospital.

Pharmaceutical care is the responsible provision of drug therapy for achieving definite outcomes that improve a patient's quality of life (Hepler & Strand, 1990). In this study, pharmaceutical care is defined as interventions from pharmacists that aim to identify medicine-related problems and make recommendations to prevent or resolve them in patients with chronic kidney disease.

Strategies are the frameworks, which guides the choices that determine the nature and direction of an organization (Mintzberg, 1987). In this study, strategies are the plans, which will be chosen based on the results obtained, to improve participation of pharmacists in care of renal patients.

ABBREVIATIONS AND ACRONYMS

ACEI	Angiotensin Converting Enzyme inhibitors
ARBs	Angiotensin Receptor Blockers
CKD	Chronic Kidney Disease
CPD	Continuous Professional Development
CVD	Cardiovascular Diseases
eGFR	Estimated Glomerular Filtration Rate
ESRD	End Stage Renal Disease
DoH	Department
HD	Haemodialysis
MDT	Multidisciplinary team
P	Pharmacist
PD	Peritoneal Dialysis
RRT	Renal Replacement therapies
Rtm	Renal team member
TCA	Thematic Content Analysis
SAPC	South African Pharmacy Council

ABSTRACT

Introduction

Multidisciplinary team (MDT) approach has emerged as one solution to improving chronic kidney disease (CKD) care. The MDT may include a nephrologist, physicians, nurses, dietitians, pharmacists, and social workers, all working together to deliver effective care to patients with CKD. Participation of pharmacists within the renal MDT at Polokwane hospital seems to be limited. The perceived barriers to pharmacists providing renal care services to CKD patients at Polokwane hospital could inform future strategy development, to enhance their participation. The aim of this study was to explore the role of pharmacists in renal care and develop strategies to maximise their participation in the renal multidisciplinary health care team, based on their participation at Polokwane hospital, Limpopo province.

Method

A qualitative study using semi-structured interviews was conducted with a purposeful sample of 8 members of the renal MDT and 9 pharmacists. The audiotaped interviews were transcribed exactly as said and analysed using thematic content analysis.

Results

Four themes emerged from the analysis: 'pharmacist's current scope of practice within the renal MDT', 'potential future roles of pharmacists', 'perceived barriers to participation of pharmacists within the renal MDT' and 'recommendation/Strategies to incorporate pharmacists into the MDT'. Results have shown that pharmacists have an absent role within the renal MDT. Their role is limited to just dispensing and managing stock, with no role in direct patient care. Both pharmacists and MDT members showed preference to working together during renal care. Pharmacy services suggested include medication reviews, provision of patient education and counselling, patient adherence improvement, dosage workouts, patient monitoring and education on contraindicated drugs and drug interactions. Shortage of staff, pharmacists lack of clinical skills, lack of communication and attitude of pharmacists were perceived as the major barriers to participation of pharmacists within the renal

MDT. To overcome these barriers, it was recommended that the department of health (DoH) provide more pharmacy staff and educational opportunities in the form of workshops, to equip pharmacists clinically and broaden competency and knowledge on effective communication and coordination. In addition, it was recommended that the clinical curriculum at Universities be revised, to build solid foundation on MDT care and pharmacology and that the MDT programme be standardized through standard treatment guidelines (SOP's), policies and drawing of job descriptions.

Conclusion

The role of pharmacists at Polokwane hospital is confined to just stock management and dispensing. There are promising avenues for future development of their role during patient care, which can be achieved by addressing the barriers highlighted

Recommendations

The expansion of the role of pharmacists within the renal MDT will require improved partnership between health care professionals, resources, legislations and guidance from formal SOPs. Having a national framework for pharmacy practice from Ministry of Health, supported by educational opportunities and a pro-active professional association would be key to incorporating pharmacists within the renal MDT.

CONFERENCE PRESENTATION

N.B. Moloto, T.L. Manyama, R.M. Tshitake. Development of strategies to increase participation of pharmacists in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province. 3rd Faculty of Health Sciences Research Day, (2018), University of Limpopo, Turfloop, South Africa. (Poster presentation)

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Chronic kidney disease is a growing health concern and a major cause of morbidity and mortality worldwide. Lack of awareness, failure to recognize early signs, and improper management contribute to CKD burden. Despite the growing prevalence of CKD, it remains under-recognized and not optimally treated by both health care providers and patients (Fink, Brown, Seliger, Walker & Zhan, 2009). This is because CKD presents with a lot of comorbidities and necessitates complex therapy which involves the utilization of multiple drugs (Tonelli, Wiebe, Guthrie, James, Quan, *et al.*, 2015). Therefore, proper selection of drugs at the prescribing stage and appropriate dosage adjustment is required to avoid drug related problems, renal damage, and poor outcomes (Doogue & Polasek, 2011).

1.2 BACKGROUND AND RATIONALE FOR THE STUDY

Chronic kidney disease (CKD) is defined by a progressive and irreversible damage to kidney function. When the kidneys are impaired, fluids, electrolytes and waste accumulate and adversely affect other organs in the body (Weiner, Mitch & Sands, 2015). Because CKD is incurable, patients are put on renal replacement therapy (RRT) which includes dialysis or transplantation (Haller, Gutjahr, Kramar, Harnoncourt & Oberbauer, 2011). Management of CKD is complex, and involves medications, diet, lifestyle changes, and patient education (Zuccaro, 2015)

CKD is associated with a poor prognosis, including the development of premature cardiovascular disease, increased rate of hospitalization, decreased life expectancy and increased mortality (Gansevoort, Correa-Rotter, Hemmelgarn, Jafar, Heerspink, *et al.*, 2013; Go, Chertow, Fan, McCulloch & Hsu, 2004). Disease progression generally results in the onset of additional symptoms, complications and comorbidities (Stemer & Lemmens-Gruber, 2011). This includes cardiovascular diseases, malnutrition, hormonal imbalance, and bone disease (Zuccaro, 2015).

Given the multiple comorbidities and complexity of care for patients with CKD, drug related problems (DRPs) are common (Peterson & Gustafsson, 2017; Stemer & Lemmens-Gruber, 2011). In a prospective cohort study conducted by Breton, Froissart, Janus, Launay-Vacher, Berr *et al.* (2011), an overall of 13% DRPs were reported resulting from exposure to contraindicated medications and the use of medications requiring renal dosage adjustment, among elderly people with impaired kidney function.

This DRPs together with disease complications, decrease patient's quality of life, increase long-term health care spending and puts a strain on health care delivery (Sultana, Cutroneo & Trifirò, 2013). Thus, effective management solutions such as multidisciplinary team approach, is required in the management of CKD, to prevent overwhelming public health burden (Zuccaro, 2015).

A multidisciplinary team approach of nephrologists, doctors, nurses, social workers, psychologists, cardiologists, pharmacists and dietitians is crucial in the management of CKD (Epstein, 2014). Thus, CKD is considered a disorder of varying severity that not only requires attention from nephrologists, but also from the renal multidisciplinary health care team (Chen, Yang, Wang, Chiu, Chou *et al.*, 2012).

When this team is properly implemented, it provides patient education, diet consultations and close monitoring system (Nancarrow, Booth, Ariss, Smith, Enderby *et al.*, 2013). In one study, this team has been advocated to reducing the possibility of emergency dialysis and hospitalization, lowered medical costs and slowed the rate of decline in renal function (Chen *et al.*, 2012).

Within the MDT, pharmacists as specialists in pharmacotherapy contribute or assist by addressing and preventing drug related problems, preparing medication reconciliation and providing recommendations on drug selection and treatment plans (Splawski & Minger, 2016; Bryant, Coster, Gamble & McCormick, 2009). Their role also includes guiding other health care professionals on starting, stopping and adjusting doses in patients with CKD and to educate patients on inappropriate medication use, contraindicated drugs and to enhance patient adherence (Biradar Kapatae, Reddy & Raju, 2012).

Although, pharmacist participation in the renal multidisciplinary team is of increasing interest for better pharmaceutical care, most pharmacists do not take part in this activity, but rather have their roles limited to drug dispensing, providing limited medicine information and compounding within the hospital (Sello & Dambisya, 2014). Their participation is limited due to factors such as time and staff shortage, academic training, relationship with physicians, administrators' approval, and attitudes of pharmacists, renal team, and patients (Salgado, Moles, Benrimoj & Fernandez-Llimos, 2012). Other factors include getting consent from the team and the managers (Suleiman, Melaibari, Alkhaldi, Almuhsen, Alharbi *et al.*, 2016).

It has been proposed that multidisciplinary care (MDC) that is delivered by different health care professionals from various disciplines may improve health outcomes in patients with CKD (Suleiman *et al.*, 2016). As such, strategies need to be developed and incorporated into the healthcare system, to encourage team work that will optimize and provide high-quality chronic disease care (Grover & Joshi, 2015).

In a study conducted by Galbraith (2015), pharmacist's participation in the dialysis units was shown to be of scarcity in the provinces of Gauteng, Eastern Cape, Western Cape and Botswana. This was because the team only comprised of nephrologists, vascular surgeons, intensivists, cardiologists, endocrinologists, experienced renal nurses and technologists, psychologists, dieticians and social workers.

Again, in a study conducted by Bronkhorst, Schellack, Gous & Pretorius (2014) at Steve Biko Academic hospital, a pharmacist was not part of routine care in medication monitoring to evaluate prescribing patterns or identify potential or actual medication errors during patient care. This was because pharmacist activities in wards did not involve interaction with doctors but involved checking ward stock and the schedule 5 and schedule 6 registers and checking on storage and management of medicines by nurses (Sello & Dambisya, 2014).

It is against this background that the study saw it fit to explore the experiences of pharmacists and the renal MDT, towards the role pharmacists can play in the renal MDT, their extent of participation, limiting barriers and develop strategies thereof.

1.3 PROBLEM STATEMENT

Clinical pharmacy services are limited in South Africa (Sello & Dambisya, 2014). Pharmaceutical care services are not provided systematically by all practicing pharmacists in the country, except some individual attempts made by motivated pharmacists (Kheir, Saad & Al Naimi, 2013). This is because they have their roles limited to managing pharmaceutical stock and providing information on drug use and storage (Sello & Dambisya, 2014). While there are numerous studies documenting pharmacists' renal care practices in developed countries (Salgado, *et al.*, 2012), nothing is known about pharmacists' role during renal care in Polokwane hospital. There is also little published research about pharmaceutical care in South Africa, but none of these publications has investigated this area of practice. The aim of this study was to explore the role of pharmacists in renal care and develop strategies based on their participation that will increase their collaboration with the renal multidisciplinary health care team, during renal care at Polokwane hospital, Limpopo province.

1.4 RESEARCH QUESTION

- What are the experiences of pharmacists regarding their role and involvement in the management of patients with CKD at Polokwane hospital?
- What are the experiences of the renal multidisciplinary team regarding the role and involvement of pharmacists in the management of patients with CKD at Polokwane hospital?
- What are the barriers limiting the participation of pharmacists, in the management of patients with CKD at Polokwane hospital?
- Which strategies can be used to enhance the participation of pharmacists in the management of patients with CKD at Polokwane hospital?

1.5 AIM OF THE STUDY

The aim of this study was to explore the role of pharmacists in renal care and develop strategies to increase participation of pharmacist in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province.

1.6 OBJECTIVES OF THE STUDY

The objectives of the study were as follows:

- To explore the experiences of the renal multidisciplinary team, regarding the role and involvement of pharmacists in the management of patients with CKD, at Polokwane hospital, Limpopo province
- To explore experiences of pharmacists, regarding their role and involvement in the management of patients with CKD, at Polokwane hospital, Limpopo province.
- To understand the barriers limiting the involvement of pharmacists in the management of patients with CKD at Polokwane hospital, Limpopo province.
- To develop strategies that will enhance the participation of pharmacists, in the management of patients with CKD at Polokwane hospital, Limpopo province.

1.7 IMPORTANCE OR SIGNIFICANCE OF THE STUDY

This study explored the role of pharmacists in the management of CKD, within the renal MDT at Polokwane hospital and developed strategies to maximize their participation in the renal MDT. The results obtained helped develop strategies that will encourage team-based or collaborative practice focusing on pharmacist provider teams. In addition, documented data was made available on experiences of pharmacists and the renal multidisciplinary team on the involvement of pharmacists during care of patients with chronic kidney disease at Polokwane hospital, Limpopo province. The study also provided a channel for further research on reviewing or assessing the effects of the strategies developed

1.8 SUMMARY

Chapter 1 provides the overview of the study, including introduction and background as well as the research problem. The theoretical background was discussed in detail, the aim of the study, research question and the significance of the study. The next chapter will focus on the literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of the literature review is to provide an appraisal of current research that relate to the study and to discuss and provide a supportive theoretical framework. In this chapter, the literature provided an overview of chronic kidney disease, the extent of its growth and burden, the pathophysiology, complications and treatment. This chapter further outlined the expected role of pharmacists in relation to the provision of pharmaceutical care during renal care and the perceived barriers to their participation in the multidisciplinary teams.

2.2 AN OVERVIEW OF CHRONIC KIDNEY DISEASE

Chronic kidney disease (CKD) rises from many varied disease pathways that change the function and structure of the kidney permanently, over months or years (Webster, Nagler, Morton & Masson, 2017; Thomas, Kanso & Sedor, 2008). The diagnosis of CKD is based on establishing a chronic reduction in kidney function and structural kidney damage. The best existing indicator of overall kidney function is glomerular filtration rate (GFR), which is the total amount of fluid filtered through all the functioning nephrons per unit of time (Richardson & Nolin, 2012).

The definition and classification of CKD have been refined over time, but current international guidelines define CKD as decreased kidney function shown by GFR of less than 60 mL/min per 1.73 m², or signs of kidney damage, or both, of at least 3 months, irrespective of the underlying cause (Delanaye, Glassock, Pottel & Rule, 2016). Table 2.1 conveys the classification of CKD based on KDOQI guidelines.

Stage	Description	GFR, mL/min per 1.73 m ²
1	Kidney damage with normal or increased GFR	≥90
2	Kidney damage with mildly decreased GFR	60 to 89
3	Moderately decreased GFR	30 to 59
4	Severely decreased GFR	15 to 29
5	Kidney failure	<15 or dialysis

Adopted from National, K.F., 2002. K/DOQI practice guidelines for chronic kidney disease: evaluation, classification, and stratification. American journal of kidney diseases: the official journal of the National Kidney Foundation, 39(2 Suppl 1), S1-S266.

Table 2.1: Classification of chronic kidney disease

CKD is classified into 5 stages based on the level of glomerular filtration (Levey, Coresh, Balk, Kausz, Levin, *et al.*, 2003). Stages 1 and 2 are described by the markers that resemble the kidney damage which include electrolyte imbalance and other abnormalities caused by the tubular disorders. Stages 3 to 5 are when the glomerular filtration rate is less than 60ml/min/1.73m² with or without the presence of markers of renal damage (Tangkiatcumjai, Boardman, Praditpornsilpa & Walker, 2013). End stage renal disease (ESRD) which is stage 5 of CKD, presents the most severe form of CKD and requires renal replacement therapy (Thomas, *et al.*, 2008; Webster, *et al.*, 2017).

2.3 THE PREVALENCE OF CKD GLOBALLY

On a global level, the burden of CKD is significant. CKD is found in 10% of the global population and is one major cause of mortality in SA (Moosa, Van der Walt, Naicker & Meyers, 2015). According to the American National Health and Nutrition Examination Survey, CKD has shown a drastic increase, in patients with stage 1 to 4, in between the years 1994 to 2004 (Coresh, Selvin, Stevens, Manzi, Kusek *et al.*, 2007). Its ranking has also shifted from position 27 to 18, as observed by Global

Burden of Disease study 2010 (Lozano, Naghavi, Foreman, Lim, Shibuya *et al.*, 2012). The disease is more prevalent in low to middle income countries as they are overburdened with the epidemiology of non-communicable diseases such as diabetes mellitus, obesity, hypertension and cardiovascular disease, which are the main cause of CKD (Stanifer, Muiru, Jafar & Patel, 2016; Couser, Remuzzi, Mendis & Tonelli, 2011).

2.4 THE BURDEN OF CKD GLOBALLY

CKD also imposes health burden to the health care system and the patients financially. This is because the disease is associated with complications, comorbidities and drug related problems which further necessitates treatment. CKD is more dominant in sub-Saharan Africa (Ojo, 2014; Naicker, 2013), ranging between 34 and 200 per million people in the North Africa (Barsoum, 2003). Currently, projections show that none of the 54 countries in Sub-Saharan Africa (SSA) can afford the cost of medical care associated with pre-dialysis, which is estimated to be \$2500 to \$20,000 per patient annually (Ojo, 2014) and that for dialysis treatment, which amounts between \$20,000 to \$30,000 per person yearly (Katz, Gerntholtz & Naicker, 2011). CKD is also associated with a lot of morbidity and in 2012, 2 968 600 of disability-adjusted life-years and 2 546 700 deaths worldwide were attributable to CKD (Chen, 2010).

The cause of CKD differs by region, age, gender and race. Diabetic nephropathy is the main cause of CKD in Europe, Japan and the United States, while in the developing countries; chronic glomerulonephritis and systemic hypertension are the major causes (Alebiosu & Ayodele, 2005). Data from the South African dialysis and transplant registry (SADTR) revealed that hypertension was the main cause of ESRD in 1994, with 45.6% of 1549 patients being affected and occurring in relatively young black patients who often also had severe target organ damage (heart and kidney) (Naicker, 2003). In the years 1999 to 2006, South Africa (SA) has seen a 67% increase in deaths owing to CKD (Moosa, *et al.*, 2015).

2.5 MANAGEMENT OF CKD

Management of CKD focuses on the prevention of disease progression to ESRD with renal replacement therapy and ideal management of comorbid conditions such as hypertension, diabetes and cardiovascular risk factors (Meyers & Davies, 2017). Also essential are patient education and a multidisciplinary approach to disease management that utilizes dieticians, nurses, pharmacists and social workers in addition to physicians (Johns, Yee, Smith-Jules, Campbell & Bauer, 2015). Figure 2.1 conveys the clinical presentation of CKD, including the commorbidities.

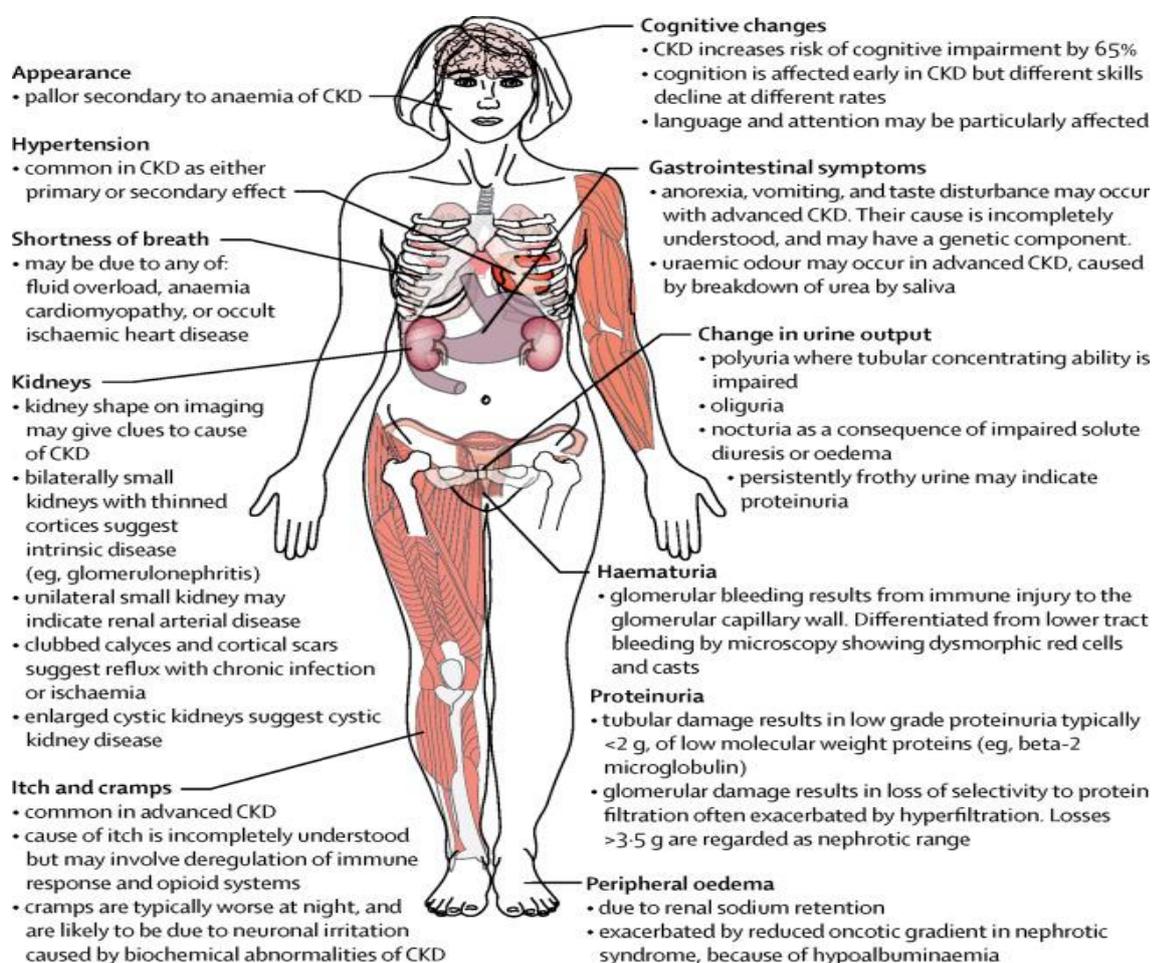


Figure 2.1: Complications of CKD (Adapted from Webster, *et al.*, 2017)

2.5.1 Renal replacement therapy

When the disease progresses to ESRD, patients are put on renal replacement therapy, through either dialysis or transplantation (Rodger, 2012). Dialysis comes in two forms namely hemodialysis and peritoneal dialysis. Hemodialysis works by filtering waste from blood that is diverted in an external machine, and then returned

to the body (Sadala & Lorençon, 2006), while peritoneal dialysis involves pumping dialysis fluid into a space within the abdomen, with the aim to draw out waste products from blood vessels lining the inside of the abdomen (Mehrotra, Devuyst, Davies & Johnson, 2016). Haemodialysis which is accessible only to a few, is expensive and convenience is compromised as patients depend on the machine. Unlike haemodialysis, peritoneal dialysis provides personal freedom, control of blood pressure and fluid balance (Naicker, 2003). Transplant, which is another form of RRT involves surgery, whereby patients receive donors of kidneys that are healthy, replacing the impaired ones. In this patient population, immunosuppressants are prescribed to avoid graft rejection, which is an autoimmune disorder caused by antibodies reactive to donor (kidney) antigens (Bhatti & Usman, 2015).

The global prevalence of patients treated with dialysis is about 280 per million people, compared with those on transplant with a prevalence of 65 per million people (Grassmann, Gioberge, Moeller & Brown, 2005). Approximately 42% of patients receiving RRT in South Africa receive haemodialysis, 40% peritoneal dialysis and 18% per million people receive transplantation (Naicker, 2003). Survival of patients with ESRD undergoing dialysis ranges between 13% and 60% after each five year (Nordio, Limido, Maggiore, Nichelatti, Postorino *et al.*, 2012). Roughly, about 56% of patients on dialysis are on a line up for kidney transplant. Because the demand for transplant outweighs availability, about only 25% of patients on ESRD receive a donor whereas 6% die waiting each year (Webster *et al.*, 2017)

2.5.2 Pharmacotherapy for complications of CKD

Treatment for CKD patients with anaemia is based on the use of iron and recombinant erythropoietin and its derivatives such as epoetin alfa, epoetin beta etc. These derivatives are collectively known as erythropoiesis-stimulating agents (ESAs) and have been shown to decrease the requirement for blood transfusion in patients with CKD, mainly when used in combination (Padhi, Glen, Pordes & Thomas, 2015; Hung, Wright, Blacklock & Needle, 2015). According to the essential drug list, patients with mineral bone disease are expected to avoid phosphate containing diet and to use calcium or non-calcium-based phosphate binders such as calcium acetate and calcium carbonate to obtain serum phosphate concentrations of

between 0.87mmol/L and 1.49mmol/L (Chan, Au, Francis, Mudge, Johnson *et al.*, 2017).

For patients with metabolic acidosis, the recommend use of serum bicarbonates, should be maintained at concentrations of 22mEq/L to reduce complications that can arise from metabolic acidosis. To prevent progression of secondary hyperthyroidism and high bone turnover, patients are recommended to take oral sodium bicarbonate supplements (Chen & Abramowitz, 2014).

For hypertension, the use of diuretics is recommended in patients with stage 1 of CKD, which is meant to reduce fluid overload and oedema (Taler, Agarwal, Bakris, Flynn, Nilsson *et al.*, 2013) and the use of angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB) to prevent or decrease the rate of disease progression (Levey *et al.*, 2003; Qaseem, Hopkins, Sweet, Starkey & Shekelle, 2013). An ACEI or ARB is recommended as a first-line agent for antihypertensive patients with CKD and albuminuria, regardless of the need for blood pressure control (Baltatzi, Savopoulos & Hatzitolios, 2011).

Management of CKD requires a vast number of drugs and as such, a highly variable pharmacotherapy, monitoring and evaluation is required in the medical management of CKD, which can also be brought through MDTs, to ensure and obtain optimal pharmacotherapy, improved adherence, and control of comorbidities and other risk factors associated with CKD (Bayliss, Bhardwaja, Ross, Beck & Lanese, 2011)

2.5.3 Renal Multidisciplinary Team

A multidisciplinary healthcare team is a group of healthcare professionals from a range of disciplines, that work together to deliver comprehensive care which addressees many of the patients' needs as possible (Babiker, El Hussein, Al Nemri, Al Frayh, Al Juryyan *et al.*, 2014; Tieman, Mitchell & Shelby-James, 2008). This includes physicians, nurses, pharmacists, dieticians, physical therapists, social workers and health educators.

Generally, patients who benefit most from MDT care are those with chronic diseases and multiple conditions. Thus, the renal multidisciplinary care team (rMDT) integrates the care of nephrologists, nurses, dieticians and pharmacists who provide integrated

care to patients with renal disorders (Chen, *et al.*, 2012). This team renders a complete range of consultative, diagnostic and treatment services for patients with kidney diseases, including CKD (Kausz & Levey, 2002). Figure 2.2 illustrates the domains of a renal multidisciplinary team in managing patients with CKD.

Optimum functioning of this team is achieved through respect and trust between team members; through agreed governance structures and agreed systems and protocols for communication and interaction (Gerber, Reimer, Williams, Gill, Loudat Priddy, *et al.*, 2016). When properly implemented, this team meet the health demands of the patients when compared to an individual patient physician care (Clarke, 2013).

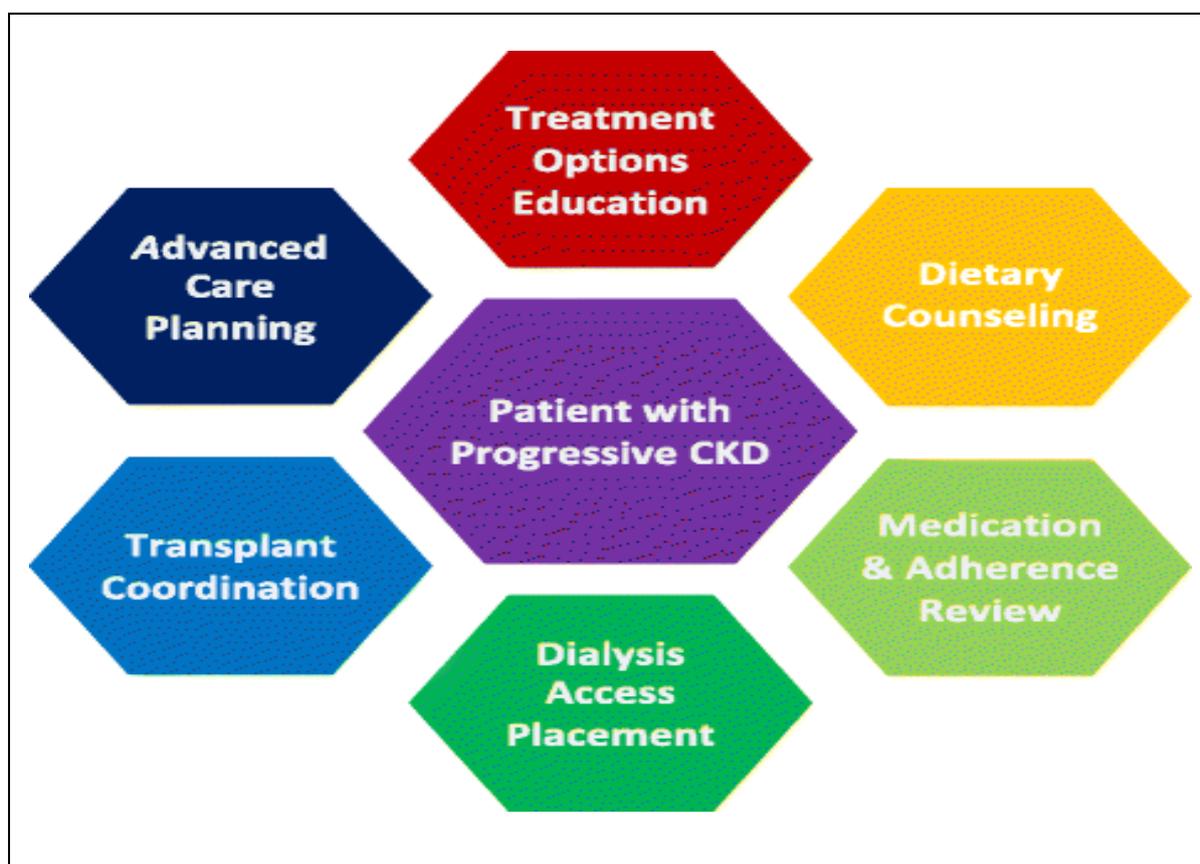


Figure 2.2: Domains of the renal MDT during CKD care (Adapted from Johns, *et al.*, 2005)

Nephrologist	Evaluates aetiology of CKD and determines the care plan
Physician	Educates about CKD and kidney failure treatment options
	Coordinates care with family and members of the MDT
Dieticians	Dietary counselling and fluid management
Pharmacist	Reviews medications, dosing, and adherence
	Educates patients about the use of over the counter medications and herbal preparations
Social worker	Assists patients to obtain needed resources (e.g., transportation and issues with housing)
Transplant team	Educates patients about transplant options
	Evaluates potential transplant candidates with progressive CKD
Nurses	Coordinates care, educate and encourage adherence

Table 2.2: Potential roles for the renal multidisciplinary team (Adapted from Johns, *et al.*, 2015).

Benefits of this team in patients with CKD involves decreasing the rate of decline of GFR, improving the health outcomes of patients until discharge, reducing medication variance and improving follow-up and outcomes of the patients (Balachandran & Duckett, 2015). Consequently, this avoids inappropriate, potentially harmful

treatment while increasing treatment success and patient satisfaction. The team approach further minimizes medical costs by ensuring best resource utilization, which benefits the economy, patients and the hospital (Shelgikar, Durmer, Joynt, Olson, Riney *et al.*, 2014). Table 2.2 conveys the roles of a renal multidisciplinary team.

In the literature, several observational cohort studies have revealed that timely referral of patients with progressive CKD (stages 4-5) to a multidisciplinary renal unit is associated with reduced rates of decline of kidney function, hospitalization rate and decreased patient morbidity and mortality (Curtis, Ravani, Malberti, Kennett, Taylor *et al.*, 2005; Chan, Dall, Fletcher, Lu & Trivedi *et al.*, 2007).

2.6 AN OVERVIEW ON THE ROLE OF PHARMACISTS

When pharmacy entered in the 20th century, a pharmacist's main obligation was to dispense, ensure that the medicines sold were pure, and to provide a good service to customers (Hepler & Strand, 1990). However, when clinical pharmacy practice was introduced in the 1960s, so was established pharmaceutical care or a responsible provision of medicine-related patient care in the 1980s which enabled the practice of pharmacy to be actively engaged with patients (Pearson, 2007)

Through pharmaceutical care, pharmacists' roles include reviewing prescribing patterns, providing feedback to prescribers, educating providers and the public and providing medicinal information to aid physicians in medicine selection; monitor and provide compliance aids and report adverse drug reactions or drug-drug interactions (Bryant, *et al.*, 2009; Pedersen, Schneider & Scheckelhoff, 2010).

Pharmacists provide economic benefits from their services, by minimizing the inappropriate use of drugs, avoiding medication errors, and by reducing drug wastage due to non-adherence (Hughes, Mendelssohn, Tobe, McFarlane & Mendelssohn, 2012). This cost benefit is achieved through cost savings on medicines and cost avoidance. Through cost savings, pharmacists intervene by reducing the current spending on the patient's medical treatment, for example, they can advocate on switching a patient from intravenous to oral use where appropriate. In avoiding costs, pharmacists reduce potential future spending by advocating for the

discontinuation of contraindicated medications in patients with CKD, which ultimately reduces further treatment of adverse drug reactions, referrals and hospital admissions (Gallagher, Byrne, Woods, Lynch & McCarthy, 2014) Moreover, pharmacists monitor patient progress during hospital admission and post discharge to add value to therapy and to save and avoid cost.

Pharmacists also perform medication reconciliation, medication history update, implement anaemia/phosphate management protocols, provide medication education about contraindicated drugs and how to perform dosage adjustments related to renal function, which helps minimise drug related problems (Salgado, *et al.*, 2012; Parker, Jang, Muzzy & Cardone, 2015).

A drug-related problem (DRP) is defined as an undesirable event, risk or condition involving drug treatment that interferes or potentially interferes with the patient achieving an optimum outcome of medical care. This may include adverse drug reactions, untreated indication, drug interaction and drug use without indication (Belaiche, Romanet, Allenet, Calop & Zaoui, 2012). Factors independently influencing the development of DRPs are educational level, improper drug selection, improper dosage adjustment and the number of drugs being taken which then leads to poor medication adherence (Andreazza, De Castro, Köche & Heineck 2011)

The identification, prevention, and resolution of DRPs are the fundamental practices of pharmaceutical care (Primejdie, Mallet, Popa & Bojita 2014). It is evident with the undertaken studies that drug related problems prevail more in patients with end stage renal disease and at present, it has been reported that there is one medication-related problem for every 2.7 dialysis patients, due to factors such as improper dosage adjustments and the use of contraindicated drugs (Belaiche, *et al.*, 2012; Manley, Cannella, Bailie & Peter, 2005)

2.6.1 Dosage adjustments in patients with CKD

Medications requiring dosage adjustments for impaired renal function are commonly prescribed for hospitalized patients. Renal function changes can frequently occur during hospitalization and therefore, drug dosing in hospitalized patients should be monitored to help decrease errors that may adversely affect outcomes (Hassan, Al-Ramahi, Aziz & Ghazali, 2009). Renal function must be estimated to appropriately

make dosage adjustments for medications that exhibit extensive renal elimination, as drugs may cease to be effective during renal failure and expose patients to unwanted effects that may be poorly tolerated (Doogue & Polasek, 2011).

Dosage adjustments are necessary in patients with CKD and can be achieved by either increasing dosing intervals of drugs or by reducing or increasing the dose. A dose reduction is necessary when the drug is renally eliminated and has a narrow therapeutic index. Maintenance doses can be lowered by increasing the dosing interval or by reducing the dose (Waller, Sampson & Renwick, 2014).

In a study examining the prevalence and course of kidney disease, patients screened with CKD were prescribed medications requiring dosage adjustment in excessive doses, averaging 2.5 times higher than the manufacturer's recommended dose for the degree of kidney disease. These drugs included ceftazidime, gentamicin, ticarcillin, vancomycin, ganciclovir, and digoxin (Cantu, Ellerbeck, Yun, Castine & Kornhauser 1992).

According to a study conducted by Alahdal & Elberry (2012), the most common DRP observed was inappropriate dosing with about 53.1%. In a similar study conducted by Salomon, Deray, Jaudon, Chebassier, Bossi *et al.* (2003), inappropriate medication dosing was still revealed as the main cause of DRP in patients with renal impairment.

Although dosage adjustment is crucial in patients with CKD, it is rarely and precisely performed (Matzke, Aronoff, Atkinson, Bennett, Decker *et al.*, 2011). One of the major causes of inappropriate dosage adjustment is the underestimation of potential adverse consequences, prescribers' and nurses' poor knowledge of medications requiring dosage adjustment and lack of pharmacists within multidisciplinary services for patients with CKD (Yang, Chen, Wang, Li & Jiang, 2016). It is thus important for health care providers to work together, to achieve appropriate dosing in patients with CKD; so as to maximize the therapeutic efficacy of drugs while minimizing toxicity.

2.6.2 Contraindicated drugs in patients with CKD

The kidneys excrete majority of drugs utilized by patients and their metabolites, and 30% of all adverse effects of medication have either a renal cause or a renal effect

(Hartmann, Czock, Keller, 2010). When a patient is in stage 3 and above of CKD, the use of certain drugs is prohibited, either because they tend to damage the kidneys or because they are inadequately eliminated by the malfunctioning kidneys and will therefore accumulate in the body and cause toxic effects on other organs (Waller *et al.*, 2014).

However, inappropriate drug prescribing occurs in patients with renal failure. In a retrospective study reviewing discharge drug prescribing, patients were prescribed drugs contraindicated by British National Formulary dosing guidelines such as opiates, nonsteroidal anti-inflammatory drugs, antibiotics, chlorpropamide, sulfipyrazone, domperidone, ranitidine, and colchicine (Kendall & Enright, 2012)

Youssef, Almubarak, Aljohnai, Alnuaimi, Alshehri *et al.* (2015) found that 14% of medication orders for patients with renal failure were nephrotoxic and renally excreted. This included aspirin, gliclazide, nitrofurantoin, and spironolactone. This error was attributed to lack of knowledge on nephrotoxic drugs. In a large case control study conducted by Whittaker, Miklich, Patel, Fink, *et al.* (2018), patients with CKD were prescribed at least one medication that was renally excreted or nephrotoxic. These medications were contraindicated and resulted in a system alert and yet were administered to the patients.

A study conducted by Yang, *et al.* (2016) in China, on the prevalence of inappropriate medication prescriptions in CKD patients found about 15 medication errors, of which, unreasonable dosage, contraindicated and cautiously used medicines accounted for 3.23%, 2.65%, and 9.29%, respectively

2.6.3 The influence of CKD on drugs

- First pass metabolism in the liver can be impaired in patients with uremia, particularly metabolic reactions involving reduction, acetylation and ester hydrolysis (Waller, Sampson, Renwick & Hillier, 2014).
- The kidneys metabolic activities such as 1 α hydroxylation of vitamin D and degradation of insulin become impaired (Bosworth & de Boer, 2013).

- Changes in fluid balance and decreased albumin level in the blood disrupt distribution of drugs and lead to enhanced response or elimination of the drug (Mangoni & Jackson, 2004)
- Lower loading doses of digoxin should be given in patients with CKD, as tissue binding decreases and to compensate for the reduced volume of distribution (Chan, Lazarus & Hakim, 2010)

Even though the demand and skills of pharmacotherapy are required in this patient population to help prevent DRPs, active interactions between pharmacists and other health care providers within the renal MDT do not exist or is limited.

2.7 LIMITATIONS TO PHARMACY SERVICES IN THE RENAL MDT

In most countries, the role of a pharmacist in rMDT is either limited or absent (Salgado, *et al.*, 2012). The programme of team-based care to CKD is rolled out in the United States of America, China, Australia and other countries (Johns *et al.*, 2015; Chen *et al.*, 2015). Even though this programme is laid out in some parts of the world, pharmacists are often underutilized members of the healthcare teams. Thus, the composition of CKD care teams, the outcomes studied, and length of follow-up time all have been variable, limiting meaningful comparisons. This suggests that, although promising, MDT approaches to managing CKD requires further investigation, as there are limitations to this practice (St Peter, Wazny & Patel, 2013)

Factors such as conflicting departmental priorities, workload, resource-related constraints (space, finance, and qualified personnel), system-related constraints, lack of clinical knowledge and discrepant attitudes of doctors and nurses are barriers to pharmaceutical care (Walker, Lo, Compani, Ko, Le *et al.*, 2014; Acheampong & Anto, 2015).

2.7.1 Relationship between pharmacists and other healthcare providers

Evidence in literature shows that physicians are receptive to several clinical services provided by pharmacists and have a positive overall attitude if pharmacy services

were provided in the form of consultations or in a supportive manner (Alkhateeb, Unni, Latif, Shawaqfeh & Al-Rousan *et al.*, 2009; Azhar, Hassali & Ibrahim, 2010)

Resistance of physicians to the role of pharmacists is attributed to lack of physicians' exposure to pharmacist participation in clinical activities and lack of continuity in the services provided by the pharmacist due to other non-clinical roles (Abduelkarem & Sharif, 2010). As such this leaves doubts to other healthcare professionals in that they are unaware of the benefits of having a pharmacist on their team and are unable to judge the knowledge and skill level of pharmacists (Almazrou, Alnaim & Al-Kofide, 2015; Mekonnen, Yesuf, Odegard & Wega, 2013).

Moreover, physicians see nurses as the main health professional responsible for interacting with patients and pharmacists as auditors of the medical practitioners' performance, who provide advice on what to do, if the prescription was wrong or if the drug was not available; and upon dispensing, furnished patients with medicinal information and advice (Salgado, *et al.*, 2012).

Physicians also feel that their professional duties are being threatened, while others embrace it as a complimentary role that borders on team work toward improving patients' treatment outcomes (Salgado, *et al.*, 2012; Ogbonna, Ezenduka, Soni & Oparah, 2015). Even though some physicians show some resilience to multidisciplinary ward round based pharmacy services, some physicians do not (Salgado, *et al.*, 2012). However, nurses from SriLanka did not see a need of a ward-based pharmacy service and do not agree that pharmacists could make a useful contribution in patient management (Shanika, Wijekoon, Jayamanne, Coombes, Coombes *et al.*, 2018)

2.7.2 Pharmacist related factors to participating in the rMDT

2.7.2.1. Human resource

According to a study conducted by Sello & Dambisya (2014), pharmacists reported that they were not involved in ward rounds as they were already over-burdened with work. This is because they were always available for consultation by other professionals, and therefore should concentrate on their existing responsibilities without taking part in MDT activities. The non-availability of trained pharmacist

assistants for minor dispensing work is also considered a limitation to successful implementation of pharmaceutical care (Sello & Dambisya, 2014). Again, pharmacists do not have distinct role from that of pharmacist assistants hence they are always behind the counter dispensing and sparing no time for renal care services (El Hajj, Hammad & Afifi, 2014). Pharmacist assistants should help alleviate pharmacists for more clinical work by managing and distributing stock to the renal unit and dispense under supervision (Okonta, Okonta & Ofoegbu, 2012).

2.7.2.2. Finance

The pharmacists' inability to bill for clinical and pharmaceutical care significantly reduces the revenue stream of the pharmacy not related to medication dispensing, hence they do not want to engage in MDT services (Houle, Grindrod, Chatterley, Tsuyuki, 2014). Health system pharmacists are caught in a circuitous paradigm because they are not compensated for clinical services they provide, and hospitals do not have the revenue to support pharmacists in these activities (Philip & Weber, 2013; Sello & Dambisya, 2014). Not only money is required to remunerate pharmacists for their services, but funds are also required to make and implement pharmaceutical care services and to create an environment favourable for conducting MDT services (Okonta, *et al.*, 2012).

A funding model for remunerating pharmacists providing clinical services in wards has shown significant improvements in hypertension and hyperlipidaemia in the countries that remunerated pharmacists on a fee-for-service model such as US, Canada, United Kingdom, Australia, and New Zealand (Hatah, Braund, Tordoff & Duffull, 2014).

2.7.2.3. Inadequate skills of pharmacists on therapeutics

The limitations to pharmaceutical care also include poor pharmacists' attitude toward pharmaceutical care practice. According to Suleiman, *et al.* (2016) pharmacists lack therapeutic knowledge in CKD and knowledge about solutions to DRPs and are thus not confident enough to engage in and provide pharmaceutical care for CKD/ESRD patients.

According to Fouche, Butler & Shaw (2013), inadequate training workshops on the elements of pharmaceutical care is also an attributing factor to the limited participation of pharmacist in MDTs. Pharmacists lack access to continuing professional development programmes on renal therapy and case-based conference tutorials (Katoue & Al-Taweel, 2016; Shanika, *et al.*, 2018). Hughes & McCann, (2003) also found the curriculum in undergraduate level as an attributing factor to the incompetency of pharmacists regarding providing pharmaceutical care.

Another perceived barrier is insufficient reference material or drug information sources in the pharmacy, either in the form of hardcopies or electronic that can contribute to their knowledge (El Hajj, *et al.*, 2014). While some other pharmacists feel that their knowledge on therapeutics is inadequate and serves as a barrier, some saw no need in learning and providing pharmaceutical care as direct patient care and patient monitoring were more of the physician role (Okonta, *et al.*, 2012).

2.7.3 System related factors to participation of pharmacists in the rMDT

It is also believed that lack of recognition and support to pharmaceutical care services also serve as a barrier to participation of pharmacists within the renal MDT. According to a study conducted by Okonta, *et al.* (2012), the pharmacy council in Nigeria does not support the practice of pharmaceutical care. Similarly, in South Africa, the South African Pharmacy Council is working on recognizing and supporting pharmaceutical care or clinical pharmacy as a specialty (Sello & Dambisya, 2014). Poor distinction of the job description for different health care providers within the MDT is also perceived as a significant barrier as it contributes to the confusion, different expectations, misconceptions between different MDT staff and tensions in the MDT network (Hung, Wright, Blacklock & Needle, 2017; Elissen, Van Raak & Paulus, 2011).

A study conducted by Bayliss *et al.* (2011) in USA revealed that pharmacists who specialized in renal conditions (renal clinical pharmacists) integrated with nephrologists, diabetes nurse doctor, renal dietician social worker and a nephrology nurse to manage CKD, which included an educational class with review of patient-education materials on CKD, medication therapy management and medication reconciliation, nephrology consultation including medical recommendations for

hypertension, DM, and CVD comorbidities, as well as metabolic abnormalities consistent with CKD such as anemia and bone and mineral metabolism, depression screen. In Kuwait, where pharmacy is in its infancy, clinical pharmacy is in its infancy and pharmacists are not automatically included in the multidisciplinary patient circle of care (Lemay et al., 2018).

2.8 SUMMARY

The burden of chronic kidney disease (CKD) is substantial. Literature has proven that there is a strong rationale for quality improvement initiatives in CKD care, such as the MDT approach. MDTs which also benefit from a pharmacist expertise have emerged as one solution to improving care of patients with CKD. This chapter explicitly explained in detail the role of pharmacists in the management of CKD and barriers to implementation of clinical pharmaceutical services, to cover the objective of this study. The next coming chapter will explain in detail the method used in conducting the study.

CHAPTER 3

METHOD

3.1 INTRODUCTION

This chapter gives a detailed description of the research methodology used in this study. This includes the research design, sampling, data analysis and data collecting instrument and method.

3.2 STUDY DESIGN

The study employed a descriptive qualitative approach, which was exploratory in nature. This method of study was chosen because it allowed the researcher to have an in-depth understanding on the experiences, views and attitudes from the perspectives of the participants. The descriptive part of the design was achieved by giving the participants' opportunity to describe the problem studied using central and follow-up questions. The results obtained from the interviews were used to develop strategies using Nagy & Fawcett five steps of strategic planning. The steps include developing a vision and mission statement, objectives, developing strategies and action plan (Nagy & Fawcett, 2003). The strategies were further developed using the literature review.

3.3 STUDY SITE

The study was carried out at Polokwane hospital, which is situated in the city of Polokwane, Capricorn district, Limpopo province, South Africa. Polokwane hospital is part of the Mankweng-Polokwane complex and is the only hospital in the province to offer renal health care. The unit is a public private entity, whereby the services offered are private but offered in a public or state hospital, free of charge to the patients. In this unit, services are provided to all patients around the Limpopo province and those referred from regional and district hospital. The unit caters for about 270 patients with CKD, including glomerulonephritis and other kidney related disorders, where 140 are on HD and 130 on PD. Patients undergoing dialysis are

catered for in the hospital and those requiring transplant are referred to Fresenius Medical Care, a hospital in Gauteng.

3.4 STUDY POPULATION

The population of the study were pharmacists and all registered health care professionals in the renal multidisciplinary team. The pharmacy department consist of 26 pharmacists, 7 community service pharmacists. The renal multidisciplinary team is made up of 10 health care professionals, of which 5 are registered nurses, 1 nephrologist, 1 physician, 1 social worker, 1 psychologist and 2 dieticians. The population for the study thus includes of 43 participants.

3.5 STUDY PERIOD

The study took place at Polokwane hospital from the month of March to April 2018.

3.6 SAMPLE SELECTION

The study utilised a non-probability method of sampling called purposive sampling. With purposive sampling method, participants were selected based on their working experience and knowledge on their experiences towards the role and participation of pharmacists in the renal multidisciplinary team, as it is known that they were the only ones who possessed such knowledge and would reveal the beliefs and experiences that would be most informative to the research questions. Selection was also based on the clinical knowledge participants have, hence assistants were excluded since they have not covered the clinical aspect of pharmacy in detail. Meanwhile, the researcher also ensured that the participants chosen were registered health care professionals, with one year of working experience by enquiring staff cards as proof of registration. In this study data saturation was reached at 17 participants.

3.6.1 Inclusion and exclusion criteria

Inclusion criteria

- Pharmacists working in the renal unit at Polokwane hospital during dayshift.

- Registered healthcare professionals who form part of the renal multidisciplinary team at Polokwane hospital.
- Those who have practiced for at least more than 1 year in the renal unit
- Those who gave their informed consent to participate in the study

Exclusion criteria

- Community pharmacist and intern pharmacist who work within the renal unit at Polokwane hospital
- Assistant pharmacists who work at Polokwane hospital within the renal unit
- Multidisciplinary team members on leave
- Pharmacists on leave and those working on night shifts.
- All health care professionals who did not give their informed consent to participate in the study
- Those who are not registered healthcare professionals
- All newly employed healthcare professionals who have not practiced for more than 1 year in the renal unit.

3.7 DATA COLLECTION INSTRUMENTS

The study employed the use of an audio device and semi-structured questions that were developed based on a literature review (Appendix A). The interview questions were broadly divided into two parts: the classification section to capture demographic data and the second part was designed to provide a broader description and comprehensive understanding on the pharmacists' role in the provision of services during renal care of patients at Polokwane hospital, views of the multidisciplinary team on their participation, opinions on the barriers to pharmaceutical care practice and suggestions on how to overcome these barriers. Questions were constructed in English and made short and clear to avoid uncertainty. The interview was directed by central questions which were followed up. Leading questions relating to the subject matter were avoided in order not to influence the thought of the respondents while covering the subject area. Open-ended questions were used for flexibility and to

allow the respondents to state their insight thoughts for greater validity of the instrument.

3.8 DATA COLLECTING METHOD

Semi-structured interviews were conducted with pharmacists and the renal multidisciplinary team at Polokwane hospital, to get their experiences about the involvement of pharmacists in the management of patients with CKD, together with the perceived ease or difficulties in implementing pharmacy services during renal care. Recruitment of participants was mediated through the head of pharmacy for pharmacists and the head of the renal MDT. Participants were approached directly at the hospital, where face-to face interviews were conducted. The researcher used semi-structured questions (Appendix A) and interviewed participants individually to obtain the personal and intimate views of each participant without the influence of others. Participants were asked one central question which also included probing questions. Each interview lasted between fifteen to twenty minutes. Notes were used as a backup if the recorder failed and to document facial expressions and emotions of participants. Data was collected until saturation was achieved.

3.9 DATA ENTRY AND ANALYSIS

Data were analysed using thematic content analysis, with assistance of NVivo software version 11 for qualitative research. These methods were selected based on the nature of the study, that is it provided a ground-based method for ordering and synthesizing data (Bryman, 2016). The audiotaped interviews were recorded, transcribed exactly as said, and then analysed. The transcripts were then imported into the NVivo software for coding recurring themes. The study employed Braun & Clarke (2006) steps of TCA, which are as follows:

3.9.1 Familiarization with the transcripts

The researcher transcribed the interactions and then read, and proof read the transcripts with assistance from the audio tapes, to gain a clear understanding of the views of the participants. Furthermore, a summary of each discussion was written thereafter.

3.9.2 Generating initial codes

Once familiar with the data, the researcher identified initial codes, which are the features of the data that appeared interesting and meaningful. These codes were more numerous and specific than themes but provided an indication of the context of the conversation.

3.9.3 Reviewing themes

The researcher combined, refined, separated and discarded the initial themes that seemed unnecessary. This was done to ensure that data within the themes cohered together meaningfully, with a clear and identifiable distinction between themes.

3.9.4 Defining and naming themes

The researcher refined and defined the themes and potential subthemes within the data, to emerge a unified story from the themes. This was achieved by providing theme names (which will currently have working titles) that captured the essence of each theme in a concise and effective manner; and immediately gave sense or meaning to the reader.

3.9.5 Writing a report

The final step as noted by Braun & Clarke (2006) was to write a report based on the final views extracted.

3.10 BIAS

Bias in qualitative studies is an ever-present concern. In this study, bias was minimized by transcribing and interpreting verbal information as said and ensuring consistency of methodological approaches of analysing data of all participants. The use of open-ended questions and probing questions further helped in minimizing bias hence they emerged as the interview unfolded. Probing of these questions differed between participants; as wording of these questions was directed by the interviews. Bias was also minimized through the use of a tape recorder, which was audited by the supervisor to check correlation between what was said and transcribed.

The Hawthorne effect is the behaviour that is displayed by participants just because they are aware that they are involved in a study (Chiesa & Hobbs, 2008). Being aware that they are involved in a study may affect their answering, as they might give answers to please the interviewer, instead of providing information about their real experiences. This type of threat was minimised by providing explanations to participants, and by not pressurising them into giving any responses. The participants were also requested to be as honest as possible and data collection was done in a private area (boardroom), where the participants were free to answer without any influence from colleagues. The interview was conducted by the researcher.

3.11 RELIABILITY AND VALIDITY

Lincoln & Guba (1985) have developed criteria's that ensures reliability and validity in qualitative studies. This study therefore adopted their criteria, which is as follows:

3.11.1 Credibility

Credibility of the research was attained through the approval system employed at the University of Limpopo (Appendix B) and the hospital (Appendix C). Credibility of the research findings was achieved by employing peer examination approach, whereby the research method was discussed with colleagues who were impartial to the study, but familiar with the topic under study, while the supervisor was used extensively for this purpose. After transcription, a copy of the transcript was given to an independent coder who was well-versed in qualitative data-analysis to conduct a data analysis different from the researchers. To further enhance credibility of the study, the researcher's outcome together with the coders' outcome, were consolidated through a consensus discussion with the presence of the supervisor. Furthermore, interviewing techniques such as probing, paraphrasing, and summarizing; and the use of open-ended questions, a tape recorder and field notes further ensured credibility of this study. The researcher also established a rapport with the participants by thoroughly explaining the nature of the study and the implications of their participation, which was made voluntary.

3.11.2 Transferability

Transferability can only be attained when a study is immersed in existing literature that contains similar characteristics as the study (Shenton, 2004). In this study, the researcher indicated by means of detailed literature review the applicability of the study in multiple environments.

3.11.3 Dependability

Dependability refers to the ability of a study to produce similar results if not identical, when other researchers in the same settings (Shenton, 2004) repeat the same procedures. The researcher provided a descriptive discussion on the methods used to attain the results of the study. Moreover, the methods that were followed by the researcher for data collection were made auditable to ensure reliability and consistency. The study responses obtained through the interview schedule, were split into two equal halves, between an independent coder and the researcher, and then scored independently to check correlation.

3.11.4 Conformability

Conformability of a study is attained through the researcher ensuring that his or her own perception of the phenomena under the study does not have an influence on the study results (Shenton, 2004). The researcher provided full disclosure on the nature of the study to reveal all decisions taken in the study with reasons behind from the beginning of the study to its completion. The researcher also ensure that the study's results were objective as possible and not based on any motives and perspectives. Furthermore, conformability was ensured using an audiotape that was transcribed and audited.

3.12 ETHICAL CONSIDERATIONS

3.12.1 Approval

The research proposal was submitted and approved by the Department of Pharmacy, School of Health Care Sciences Senior Degrees' Committee (SDC) and Faculty Higher Degrees' Committee. Ethical clearance was obtained from Turfloop

Research Ethics Committee (TREC), an ethics committee from the University of Limpopo (Appendix B). Permission to commence the study was sought and approved by the Limpopo Department of Health (Appendix C).

3.12.2 Informed consent and voluntary participation

Participation to the study was made voluntary. Participants were not compelled into participating by means of either psychological manipulation or physical force. The participants, without any penalties were permitted to withdraw from the study at any time. Before the commencement of the study, the researcher fully explained the study to the participants before an informed consent was issued out (Appendix D). This was done to emphasize participants understanding on the nature of the study and to further emphasize their voluntary participation, with their consent and knowledge.

3.12.3 Anonymity and confidentiality

Participants were assured of the confidentiality of the study. The information obtained was not in any way used for any other purpose other than for research purposes. Names or any other information that can link the participants to the study, were not published in the study. The researcher used coding instead of names, for example, the code "Rtm 1" was used throughout the study depending on the number of the participant being interviewed, for members of the rMDT. For example, if the researcher was interviewing the fifth participant, the participant was referred to as Rtm 5 (if was a member of the renal MDT). The coding process was explained to the participants to maintain confidentiality.

3.12.4 Harm to participants

Due to the nature of the study, participants were not subjected to any physical or emotional harm. Dialogue with the participants was healthy and no irrelevant information was asked other than that those stipulated in the data-collecting tool (Appendix A). The study was neither sensitive nor emotional and as such services from social workers and psychologists were not used.

3.13 SUMMARY

In this chapter, methods used in collecting and analysing data have been described to accent on the significance of each step undertaken during the study. The results of the data collected, will be presented in Chapter 4.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION

Chapter four gives in detail the results obtained from the interviews and the themes that emerged after data analysis. The aspects covered includes participants demographic characteristics, results from interviews and discussion.

4.2 PARTICIPANTS DEMOGRAPHIC CHARACTERISTICS

Table 4.1 presents pharmacists' and the renal multidisciplinary team demographic characteristics. Seventeen participants were interviewed. Fourteen (82.4%) were females and three (17.6%) males. Of the participants interviewed, nine (52.9%) were pharmacists and eight (47.1%) were members of the renal multidisciplinary team. This team comprised of nephrologist, physician, two dieticians, a transplant coordinator (nurse), renal unit manager (nurse) and two professional nurses. The basic qualification of all pharmacists was a BPharm degree, while only two pharmacists had a postgraduate degree. Participants ranged between the age group 20-59 (17.6%) and majority were in the age group 30-39 (41.2%) and 50-59 (35.3%). Most of the participants had a working experience of over five years in practice (70.6%).

Profession	Gender		Age group					Experience in practice (years)			
	Female	Male	20-29	30-39	40-49	50-59	60+	<2	2-3	4-5	>5
Pharmacist	8 (47.1)	1 (5.9)	2 (11.8)	4 (23.5)	1(5.9)	2 (11.8)				2 (11.8)	7 (41.2)
Dietician	2 (11,8)		1(5.9)	1 (5.9)					2 (11.8)		
Nurses	4 (23.5)			1 (5.9)		3 (17.6)				1 (5.9)	3 (17.6)
Nephrologist		1 (5.9)		1 (5.9)							1 (5.9)
Physician		1 (5.9)				1 (5.9)					1 (5.9)
Total %	14 (82.4)	3 (17.6)	3 (17.6)	7 (41.2)	1 (5.9)	6 (35.3)			2 (11.8)	3 (17.6)	12 (70.6)

Table 4.1: Participant demographic characteristics in % (n=17) n represents the number of participants

4.3 RESULTS FROM INTERVIEWS

The analysis of the interview transcripts revealed four main themes with a number of sub-themes. The identified themes and subthemes are presented in table 4.2. Respondents from the renal multidisciplinary team are denoted using the symbol Rtm (renal team members), while P symbolises pharmacists.

Themes	Sub-themes
4.3.1. Pharmacist's current scope of practice within the renal multidisciplinary team	4.3.1.1 Lack of clinical participation in the renal MDT 4.3.1.2 Stock management
4.3.2. Potential future role of pharmacists	4.3.2.1 Promote rational drug use 4.3.2.2 Patient education/counselling
4.3. Perceived barriers to participation of pharmacists in the renal MDT.	4.3.3.1 Lack of human resource 4.3.3.2 Attitude of pharmacists 4.3.3.3 Attitude of other health care providers 4.3.3.4 Pharmacists' education and training needs 4.3.3.5 Communication barriers 4.3.3.6 Lack of recognition to pharmacy services
4.3.4 Recommendation/Strategies to incorporate pharmacists into the MDT	4.3.4.1 General organizational enablers 4.3.4.2 Pharmacist-specific enablers

Table 4.2: The identified themes and sub-themes from the interview transcripts**4.3.1 Pharmacist's current scope of practice with the renal multidisciplinary team**

Participants had no conflicting opinions regarding the role of pharmacists in the renal MDT. Clinical roles are seldom attributed to pharmacists within the unit, as the team functions without pharmacists currently. Two subthemes emerged, including 'lack of participation of pharmacists within the unit' and 'pharmacists being involved in only stock management'.

4.3.1.1. Lack of clinical participation in the renal MDT

It was found from the responses that there is an absent role of pharmacists within the renal MDT and that the team only comprised of a physician, nurses, dietician, social worker, psychologist, a nephrologist and an administrator who takes minutes:

"Currently we do not have a pharmacist in the renal multidisciplinary team" (Rtm 4) and "... I think they are just mainly based at their station where they distribute medications and not necessarily in the team". (Rtm 15).

To further support this statement, two (11.1%) members from the renal MDT reported having no clue on the scope of a pharmacist within the team, which proved lack of interaction between the pharmacists and the renal MDT, during care of patients with CKD.

"Besides issuing patients medications as prescribed by the doctor, I don't see anything to be honest and their current role to be honest I don't know because all over pharmacists issue out medications behind the counter. But what I have observed from the PD nurses is when they need to order stock, so that's when a pharmacist feature in" (Rtm 17).

"I form part of the team, but I am not based here, so I am not sure what they do in the unit" (Rtm 15).

In support of the above mentioned statement, pharmacists also reported the lack of participation during care of CKD patients within the renal unit: *"For now as Polokwane hospital, we send pharmacists to wards but not necessarily to deal with*

the patients...”(P 6),“..... so our intervention as pharmacists is just from the pharmacy department, and not actively involved with patients within the unit” (P 8).

Overall, it was reported that pharmacists had no contact with patients in the renal unit, except for one pharmacist who indicated that she visited patients in the renal unit, until she was moved to another unit. Based on the pharmacy department delegating the pharmacist who was responsible for renal patients care to another unit, it is assumed that there is no rationale for having a pharmacist in the renal unit.

“I was previously working in the renal unit but now moved to intensive care unit as I was ordered to, because there is a need for rational medication use evaluation in that department. So as such they had to compromise renal and now at the renal unit they placed an assistant who only manages ordering and stock management other than dispensing” (P 14).

4.3.1.2. Current role of pharmacists in stock management:

Majority of renal MDT members spontaneously reported to interacting with pharmacists in the unit during stock management, which also include logistic and distributive roles within the unit:

“The pharmacists in the unit are responsible for assisting in stock ordering and when we need urgent supplies” (Rtm 10), “.... check on the fridge items and expired medications” (Rtm 16), “.... ensures stock availability” (P 9), “.... check on scheduled medications, stock room and fridge temperature” (P 14) and “.... check for the expired and short dated medications” (Rtm 1).

The only distinction found was in relation to the role pharmacists play in rationalizing the use of antibiotics.

“At the moment, we are just checking the antibiotics. We are busy checking the antimicrobial stewardship and not really focusing on renal patients as such” (P 12).

4.3.2 Potential future role of pharmacists

Even though pharmacists are not yet team players in the renal MDT, participants from the renal MDT and the pharmacists showed preference to working together in the team. The roles of a pharmacist were described as “important, and beneficial to

the team". These were categorized under rationalizing the use of medications, monitoring patients and providing patient education and counselling, apart from issuing out medication, managing and ensuring stock availability.

4.3.2.1. Promote rational drug use

Rational drug use in simplest terms means prescribing right drug, in adequate doses for the sufficient duration against the patient diagnosis at the lowest cost possible (Ambwani & Mathur, 2006). Participants had different opinions related to the clinical roles' pharmacists could contribute to the team. This includes ensuring safe use of medications through advising on proper dosage adjustments, preventing the use of contraindicated medications, reviewing the prescriptions and advising on medication selection, taking into consideration the route, duration and the dose:

Participants from the renal MDT and pharmacists mentioned reviewing of the prescription as the fundamental role pharmacists should carry out in the multidisciplinary team:

"Pharmacists can help review medication that's already prescribed....." (Rtm 10)

"Most patients that we see are bombarded with a lot of medications, so if we were to come in, I think we would reduce the polypharmacy that the patients are going through, we can reduce the unnecessary treatment that the patients are taking and see what best the patients can take" (P 5)

Alongside prescription reviews, pharmacists and members of the renal MDT stated that pharmacists should be assisting at the prescribing stage by providing feedback to nephrologists regarding medication appropriateness, availability and on substitution:

"Pharmacists can work hand in hand with doctors when prescribing....." (Rtm 16), to "..... check if the doctor prescribed the correct medication and guide them to say don't give this, give that....." (Rtm 2). "If we were involved from the onset in diagnosis, maybe before diagnosis or any activity just before diagnosis for us to have an input as to what kind of drugs should the patient be on in terms of contraindications in terms of drug-drug interactions" (P 7).

Majority of the participants reported that pharmacists should advise on contraindicated drugs and review dosage adjustments. These were reported by almost every participant from both the pharmacy and the renal MDT, as an essential activity for pharmacists to carry out in the MDT:

“Some of the medications are not excreted during renal failure, so we need a pharmacist advise on that and advise on giving proper dosages and about contraindicated drugs.....” (Rtm 16), so “..... we should make sure that the medications they are taking are not actually contraindicated or interacting with other medications.....” (P 14).

Pharmacists stated that they can also play a role in the monitoring of the patients, which was merely mentioned by participants from the renal MDT. It was only discovered from the renal MDT, through probing that monitoring of patients was currently joined between the nurses and the doctors.

“I think a pharmacist can be there full time to check the progress of the patients.....” (P 11) as currently monitoring of patients is joined between the nurses and the doctors (Rtm 10).

4.3.2.2. Patient education/counselling:

Patient education was mentioned by almost every participant as an integral activity to be played by pharmacists during patient care: *“pharmacists can be useful if they have a relationship with the patients to make sure that our patients understand the medication because often there is not enough time to educate patients in a clinical consultation, for patients to understand why they have so many drugs” (Rr 10) and “..... to counsel them especially for example, about the side effects of the drugs” (P 14), “..... drug interactions.....” (P 5) and on “..... fluid limitations” (P 7).*

Alongside education, compliance was referred to by few participants from the renal MDT as an area to be improved and played by pharmacists. *“I think they will contribute as to how best can we manage these patients, how best can they adhere to treatment because we know there are medications for hypertension, hypercholesteraemia medication... for example” (Rtm 1)*

4.3.3 Perceived barriers to participation of pharmacists in the renal MDT

Participants identified several barriers to the participation of pharmacists in the renal MDT, which were categorized as lack of human resource, attitude of pharmacists, pharmacists' education and training needs, communication barriers and lack of recognition to clinical pharmacy services. Participants had varying insights to the barriers limiting the role and participation of pharmacists in the MDT:

4.3.3.1. Human resource as a barrier to participation of pharmacists in the rMDT

Majority of the participants mentioned shortage of pharmacy staff as a major barrier to the participation of pharmacists during renal care. *"I think the main main issue here is shortage of personnel, sometimes when we go to the pharmacy to ask for something, you can que for long and it proves that they are not enough". (Rtm 2).*

"Personnel could be the most limiting factor because this is a tertiary institution and we get to attend a number of files and the minute one pharmacist is out, a gap is opened" (P 5).

However, it was also noted from one pharmacist that, personnel could not be a barrier:

"I do not think it is a barrier because as we speak today, we would have a situation where we have 1:4 ratio, one pharmacist working with 4 post basic pharmacist assistants in the dispensary and would function because then the pharmacist will work with phase one of dispensing and just monitor two and three "(P 9).

4.3.3.2. Attitude of pharmacists

Negative attitude of pharmacists to providing clinical services was also perceived to be a major barrier as reported by pharmacist participants who did not feel like it's their role to play:

"I think there is a negative attitude with or from pharmacists. I don't know if it's their mind or what, but they just come in from universities and limit their role to the pharmacy as if they have reached their goal" (P 14).

In this study, some pharmacists felt that clinical roles were more of the nurses' scope of practice, which was also supported by a member of the MDT:

Again, isn't it more of the sister's duty to do the clinical part and we just look at the medicine side, where we give them medications and check on the expired and the short-dated and all that" (P 3).

"Isn't it that when patients have side effects, they will come to nurses and say we have got this and this and that and that's when the nurses will inform the doctor to say a patient is presenting with this and then if it is treatment related that's when the doctor will change the medications" (Rtm 17).

When some pharmacists indicated that clinical pharmaceutical services required specialization in clinical pharmacy, some felt that the undergraduate training was enough for all pharmacists to provide clinical services. So essentially there were conflicting views among the pharmacists:

"Not all pharmacists are clinical pharmacists, so pharmacists may not have adequate skills to be involved in daily clinical activities" (P3).

"Even with a BPharm, clinical roles can be expected because therapy which is the core basis is done during undergraduate and one needs to read more on the section they are put on" (P 14).

4.3.3.3. Attitude of the health care providers

It was reported from few pharmacists that other health care professionals are not trained to be accommodative to a pharmacist role inside MDTs, while some reported an unpleasant attitude from physicians who saw themselves as chief providers in the team and felt threatened about their scope:

"Our pharmacists are not trained to expose themselves to ward issues and other health care workers are also not trained to acknowledge or to accommodate pharmacist role inside the ward....." (P5) and "Sometimes the doctors feel like you want to take their job when you ask too much about what they are doing so there are things that they won't tell you. So, they feel we have to know to a certain point." (P 11)

Moreover, from members of the renal MDT, it was discovered from few participants that it might not be feasible to involve a pharmacist in the team and that they did not see a need to strategize on how to involve a pharmacist in the team, as the team is working well without a pharmacist.

“From a pharmacist point of view for them to come and like work here, I don’t know if it will be possible or feasible.” (Rtm 17) and “we are fine working without them at the moment. The way we are working at present I am not complaining” (Rtm 16)

4.3.3.4. Pharmacists’ education and training needs

Participants spontaneously mentioned pharmacist education and training needs to be a barrier to their participation in the renal MDT. Majority of the participants cited poor undergraduate training on clinical activities and lack of motivation to continuing professional development:

Poor undergraduate training on clinical activities

Pharmacists indicated that they had vague understanding on clinical matters, which was a resultant of the undergraduate training they got. *“One could be confidence, our training during undergraduate did not give us more confidence to tackle clinical activities. And currently the students don’t even understand clinical work, so when you come you expect a pharmacist to be in procurement, distribution and dispensing. The training we got made us generalists, it doesn’t make us specialists in any form.” (P 9).*

Alongside training it was also discovered from majority of the participants that pharmacists lack clinical knowledge and skills: *“I don’t think pharmacists are skilled enough to take part in nursing renal failure patients more especially that this is new to the hospital and this can be a challenge” (Rtm 2) because, “if you lack skills, you are scared that if I go there they would ask me questions I have no clue about” (P 11).*

Lack of motivation to continuing professional development

Lack of motivation for continuing professional development was mentioned nearly by all pharmacist in the study, however was not cited as a barrier by the renal MDT. *“The other thing is that most of us are not doing post graduate studies to continue*

with professional development to get to know what is current, so there are new things happening every day that we are not aware of” (P 9). “We do have the information, but we need to go back to the books and read so I think the culture of reading is not there.” (P 14).

4.3.3.5. Communication barriers

Participants stated that pharmacy was not invited from establishment of the MDT, to provide pharmaceutical care services in the team. As such there is poor communication or collaboration between pharmacists and members of the renal multidisciplinary team. Most participants reported that collaboration with members of the team occurred when clarification was required from prescribers and during ordering.

“Lack of communication could be another thing and we have never invited pharmacists to come work with us in terms of managing the patients in this unit” (Rtm 2).

“Unfortunately, at present our intervention as pharmacists is just from the pharmacy department and from the files we get, isn’t it that when we are intervening we start with the prescriber and make queries based on the patient’s condition regarding the doses and we will discuss with the prescriber and reach a consensus and from there the doctor will change”. (P 8)

4.3.3.6. Lack of recognition to clinical pharmacy services

Pharmacists coherently reported lack of recognition to pharmacy services by both the hospital and their governing bodies:

“I don’t know if it’s an issue of awareness, whether a pharmacist is recognized as part of a team player in the health care context of South Africa and in dealing with patients. It is one profession that is just put at the back sit and a pharmacist is not recognized as someone who could actually give an input in terms of patient care or patient management.” (P 7)

Pharmacists also mentioned that their post graduate studies are not recognized by the South African Pharmacy Council because even with their post graduate degrees

they are still not registered under their specialty. *“Again, we are not recognized by our council and now we are waiting for them to recognize and approve that we register as specialists (P 14).”*

Pharmacist mentioned that the hospital structure does not support multidisciplinary team practices. *“Firstly, I can say the structure of the hospital. You might find that the time you expect doctors to do ward rounds is not the time for another provider.” (P 6), so “management limitation is another thing” (P 9)*

4.3.4 Recommendation/Strategies to incorporate pharmacists into the MDT

After the participants identified the barriers to the implementation of pharmacy services in rMDT, they further recommended or suggested the following, to improve on the role of pharmacists during renal patient care. The suggestions made were categorized under general organizational enablers, pharmacist-specific enablers and MDT/pharmacist collaboration

4.3.4.1. General organizational enablers

Approaching management: Participants immediately mentioned approaching the hospital management as a strategy to incorporate pharmacists in the team. *“I think the first thing would be to discuss with the management including the head of pharmacy releasing someone from pharmacy to the unit” (Rtm 10) and to ensure “that the whole hospital is set in such a way that it allows health care professionals to come together and work within multidisciplinary team structures.” (P 6)*

Alongside approaching management, participants expressed an urgent need for a reliable standard operating procedure to guide and standardize the implantation of pharmacy services in the renal unit. *“We can also do this by having meetings with different sections and say let’s have this and this is what we can contribute and develop norms, standards and objectives.” (P 9)*

Creation of a job description was recommended by few participants, so that it could be clear the scope of practice of a pharmacist and other members of the MDT. To effectively work together with pharmacists *“I will draw up between myself and the head of pharmacy a job description and a job routine so that it is clear the role of a pharmacist in the renal multidisciplinary team (Rtm 10)” and “know what the next*

person can bring, the benefits I will get from a pharmacist or a nurse instead of just using them as if they are assistants for example.” (P 5)

4.3.4.2. Pharmacist specific enablers

These were highlighted by participants to override all barriers to the participation of pharmacists in the team. This includes encouraging training or education, creating employment and changing of pharmacist attitude towards participating in the renal MDT.

Fostering pharmacists' education: All participants agreed that fostering pharmacists' education would improve on their skills and knowledge. Educational interventions were recommended in the form of seminars, workshops or training courses. *“Workshops, we should have short courses where we attend for our continuous learning and learn more on the renal unit (P 11), or “in-service training” (Rtm 13)*

Creation of employment: Nearly all participants advocated for the need to employ more pharmacy staff. *“For now, in the pharmacy we are relying on pharmacist assistants, so I would still advocate for the department to keep on training pharmacist assistants so that the pharmacists can go out there and be hands on with regard to looking into the patient's needs, while the assistants take care of other issues in the pharmacy” (P 6)*

Change of pharmacist attitude: Participants agreed a change of pharmacist's attitudes towards clinical services could enhance their participation during renal care: *“If pharmacists can have a different mentality and say I did not come here just to dispense I have more other things to do and incorporate it in their work it would be possible, because it is not easy to make people do what they are not willing to do”. (P 14).*

4.4 DISCUSSION

The present study explored the role of pharmacists during renal care at Polokwane hospital and developed strategies based on their participation in the renal multidisciplinary health care team. Pharmacists are specialists in pharmacotherapy, with a unique qualification that renders them exceptionally fit to become team

players in the renal multidisciplinary team. Conversely, in this present study, pharmacists had no clinical role in the renal multidisciplinary team and during renal patient care.

The roles of pharmacists as revealed from the current study are just limited within stock management, which includes ordering, checking emergency trolleys, checking for room and fridge temperature, checking expired and short-dated medications and controlling scheduled medications. This is in line with the results obtained from a related study where it was reported that majority of pharmacists were involved in the pharmaceutical stock management such as ward stock inventory and performing traditional tasks such as compounding of parenteral nutrition therapy and dispensing of medication (Sello & Dambisya, 2014; Katoue & Al-Taweel, 2016). However, direct pharmacist intervention during patient care has been attributed to improved therapeutic and safety outcomes in diseases such as diabetes, dyslipidaemia, arterial hypertension, obesity and asthma to name a few, as compared to conventional approach (Tan, Stewart, Elliott & George, 2014; George, Molina, Cheah, Chan & Lim, 2010).

Some participants from the renal MDT could not identify roles to pharmacists within the renal MDT. This difficulty in identifying roles to pharmacists might be related to the lack of historical collaboration and lack of knowledge of the pharmacist's responsibilities by members of the renal MDT, as well as low expectancy to the contributions of pharmacists to the team. In fact, it has been reported that the level of acceptance of pharmacy services is directly proportional to the frequency of interaction/contact with other health care professionals, which then render other health care providers more comfortable and aware of pharmacist's role (Salgado, *et al.*, 2012; Al-Arifi, 2012).

The views of pharmacists and the renal MDT towards the future provision of clinical pharmacy services within the renal MDT did not vary. Majority of participants reported a variety of pharmacy services that could be of benefit to the MDT and patients. These were categorized under ensuring rational use of medication, patient education and patient monitoring. It is vital to promote rational use of drugs in patients with CKD. This is because management of CKD is complex and puts patients at an increased risk of drug related problems, increased risk of

complications from the use of nephrotoxic drugs and inappropriate drug dosing (Wagner, Tata & Fink, 2015). In ensuring rational drug use, it was reported that pharmacists should review prescriptions, assist at the prescribing stage, prevent the use of nephrotoxic and contraindicated drugs and to oversee dosage adjustments. In a study conducted by Hassan, *et al.* (2009), collaboration of a pharmacist with physicians during rounds, reduced dosages prescribed that were higher than those recommended by treatment guidelines and reduced the number of contraindicated medications prescribed to 176 (27.5%) ($p < 0.001$).

Close monitoring of patients with CKD is required. Pharmacists' participation in patient monitoring has been advocated to reducing costs, addressing DRP and ultimately, improving patient's outcome (McNeely, 2017). Patient education and counselling were highlighted to reinforce patient adherence to medication and understanding of medication, drug interactions and side effects. In a qualitative study on the role of pharmacists in parenteral nutrition therapy, roles attributed to pharmacists included providing patient education and patient monitoring which is in line with this study (Katoue & Al-Taweel, 2016). Moreover, in a study conducted by Salgado, *et al.* (2012), on the role of pharmacists in outpatient dialysis centres, pharmacists reported to providing services such as medication reconciliation, medication review, patient education, promotion of compliance and involvement in protocol development. Therefore, there is a room to improve on renal patient care in Polokwane hospital by involving pharmacists in the provision of clinical services to the patients.

Although majority of participants in this study showed preference to working with a pharmacist in the renal MDT, the results revealed shortage of staff, pharmacists lack of clinical skills, lack of communication and attitude of pharmacists as the major barriers that limits the participation of pharmacists in the renal MDT. In addition, the study revealed barriers such as attitude of other health care providers and lack of recognition to pharmacy services by pharmacy regulatory authorities, the hospital and the Limpopo department of health. These findings are correlated because if the hospital does not have enough staffing, staff members will be overworked and have limited time to engage in professional development activities. The results in this study are compatible to those found by Ghazal, Hassan, Ghaleb, Ahdab & Saliem (2014) as they reported lack of time, insufficient staffing and lack of motivation or

vision on professional development to be the main barriers to the implementation of pharmaceutical care.

The discrepant attitude of other healthcare providers to the role of pharmacist within the MDT and patient care could be related to lack of communication/coordination and lack of trust in the abilities of a pharmacist (Katoue, Awad, Schwinghammer, & Kombian, 2014). Interestingly, pharmacists believe that their roles are side-lined by physicians, while in contrast, physicians report very positive insights about having a pharmacist within the MDT. One pharmacist participant highlighted that *“if a doctor can know this are the benefits I will get from a pharmacist or a nurse instead of just using them as if they are their assistants, for example”, the exercise would be fruitful (R 5)*. This is in line with the results from a study conducted in Kuwait, on the role of pharmacists on parenteral nutrition therapy, as physicians were reported to assuming total responsibility over all therapeutic decisions in collaborative teams (Katoue & Al-Taweel, 2016)

Poor attitude of pharmacists to participating in MDTs may be explained by the lack of confidence and fear of new responsibilities among some pharmacists, which could have adversely affected their perception. The results found are compatible to those found by Lemay, Waheedi, Al-Taweel, Bayoud & Moreau (2018), where pharmacists felt that participating in patient care was their own initiative, rather than part of their scope or mandated professional responsibilities. Moreover, in a study conducted by Rosenthal, Austin, & Tsuyuki (2010), it was found that the pharmacy culture was resistant to change, meaning pharmacists do not want to transition from the traditional role of dispensing to providing direct patient care.

Communication between pharmacists and members of the renal MDT existed when clarity is required either from the pharmacy or physician side, regarding a prescription and during ordering and supplies. Communication between pharmacists and members of the renal MDT never involved a patient during care but was only to address mistakes made. If the two departments were to work together, good and effective communication will be required as a skill, to deliver and coordinate care. This is because poor communication can lead to errors that often result in higher expenditures and disruption of treatment (Costa & Lusk, 2017). Again, lack or absence

of communication within MDTs, leads to the provision of fragmented care that relies on individual skills (Youngwerth & Twaddle, 2011).

To be able to overcome the barriers and fulfil the requirements of this role, it was recommended that the practice be standardized. This can be in the form of SOPs and drawing of job descriptions. A standardized procedure for renal care within the MDT would improve patient safety and clinical appropriateness, enhance efficient resource utilization, improve continuity of care and overcome any miscommunications (Katoue & Al-Taweel, 2016; Matowe, AL-Kandery & Bihzad, 2003). It was also reported more often that a job description be drawn. For this to be accomplished, the renal MDT composition should be known, with a clear definition of the roles and responsibilities of each member to allow effective collaboration that will achieve a common set of treatment objectives (Pedersen, Suedmeyer, Liu, Domagk, Forbes *et al.*, 2017). The results in this study are compatible with those found by Fishbane, Hazzan, Halinski, & Mathew, 2014, where protocols and standarization of procedures in late-stage CKD were reported to improving care and outcomes of the patients.

There was an overwhelming agreement among participants on the need to foster pharmacists' education on renal therapy to enhance their role in patient care. As such, participants recommended that workshops and short courses be introduced to equip them with the necessary skills required. The need to foster educational opportunities to the pharmacists as reported by the participants were as a resultant of inadequate undergraduate training and lack of motivation to engage in professional development activities. The role of pharmacists was found to be absent during patient care, so if they did, the practice during the MDT would help overcome this challenge, as it would create a platform for them to acquire knowledge on renal therapy. Furthermore, this would also help improve their confidence, willingness and commitment to the team.

Other reported barriers included shortage of staff, lack of recognition to pharmacy services and discrepant attitude of physicians and pharmacists. This were in line with the results obtained from a study conducted by Matowe, *et al.* (2003) in Kuwait. To overcome the issue of shortage of staff, participants stressed on the need for the hospital to train more pharmacist assistants, to avail pharmacists for other duties. It

was reported that a ratio of 1:4, would work in the dispensary, where we would have one pharmacist working with four pharmacist assistants. This will alienate the workload while providing more time for pharmacists to move their services in the rMDT. To raise recognition to pharmacy services, it was recommended that management be approached so that this team can be recognised and a pharmacist as a team player within the team. Furthermore, recognition to this practice would ensure availability of resources and ultimately improve patient care and outcome.

4.5 SUMMARY

This chapter explained in detail the extent of participation of pharmacists at Polokwane hospital and the barriers to implementation of pharmacy services during renal care. All mentioned barriers are manageable and hence the next chapter outlines the strategies on how to override them. Based on the results of the study, majority of the participants showed preference to having a pharmacist within the team.

CHAPTER 5

DEVELOPMENT OF STRATEGIES TO INCREASE PARTICIPATION OF PHARMACISTS IN THE rMDT

5.1 INTRODUCTION

This chapter explains in detail the strategies developed to increase participation of pharmacists in the renal multidisciplinary health care team. It further outlines the methods or steps used in coming up with the strategies.

5.2 STRATEGY DEVELOPMENT METHOD

Strategies in this study were developed based on the recommendations provided by participants from the actual study, literature and the researcher's insights and views. Before the strategies could be developed, the researcher had to identify the problem, of which in this study are the barriers limiting participation of pharmacists within the renal MDT. On developing the strategies for the problem identified, the researcher followed Nagy & Fawcett five steps (Figure 5.1) of strategic planning. The steps include developing a vision and mission statement, objectives, developing strategies and action plan (Nagy & Fawcett, 2003).

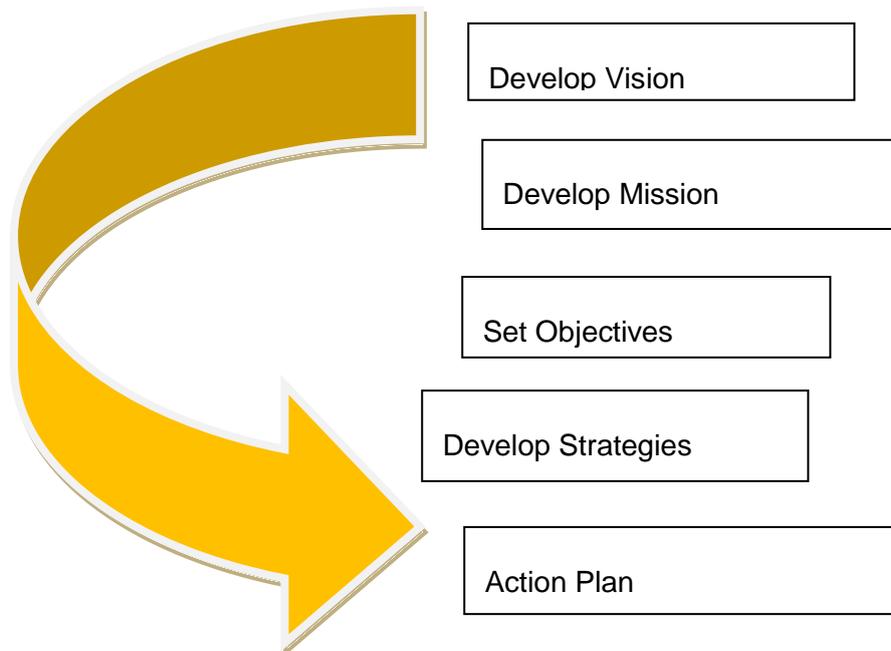


Figure 5.1 Nagy & Fawcett five steps of strategic planning

5.2.1 Developing a vision and mission statement

The mission statement follows from the vision. In this study, developing a vision statement will help the renal MDT to declare its goals in working with pharmacists

To establish integrated renal health care at Polokwane hospital.

A mission statement will help state the basic reason of establishing and incorporating pharmacists in the renal MDT.

To restore function, enhance pharmacotherapy and renal health; and optimize performance through a collaborative approach to healthcare

5.2.2 Objectives

The purpose of setting objectives in this study was to convert the statements of strategic vision and mission into results and outcomes. The objectives helped in establishing the roles of the members of the renal MDT and set out differences during the strategic development stage between healthcare professionals as they set a standard for the team.

- To incorporate pharmacists in the renal MDT
- To encourage team-based care that also focus on pharmacy services
- To improve renal care for patients with CKD

5.2.3 Strategies

Figure 5.1 shows the developed strategies to increase participation of pharmacists in the renal MDT. A strategy is a framework that guides the choices that determine the nature and direction of an organization (Mintzberg, 1987). In this study, the strategies developed simply took into consideration the existing barriers to participation of pharmacists in the team and tried to rectify them. Moreover, the strategies broadly answered the vision, mission and objectives of the study.

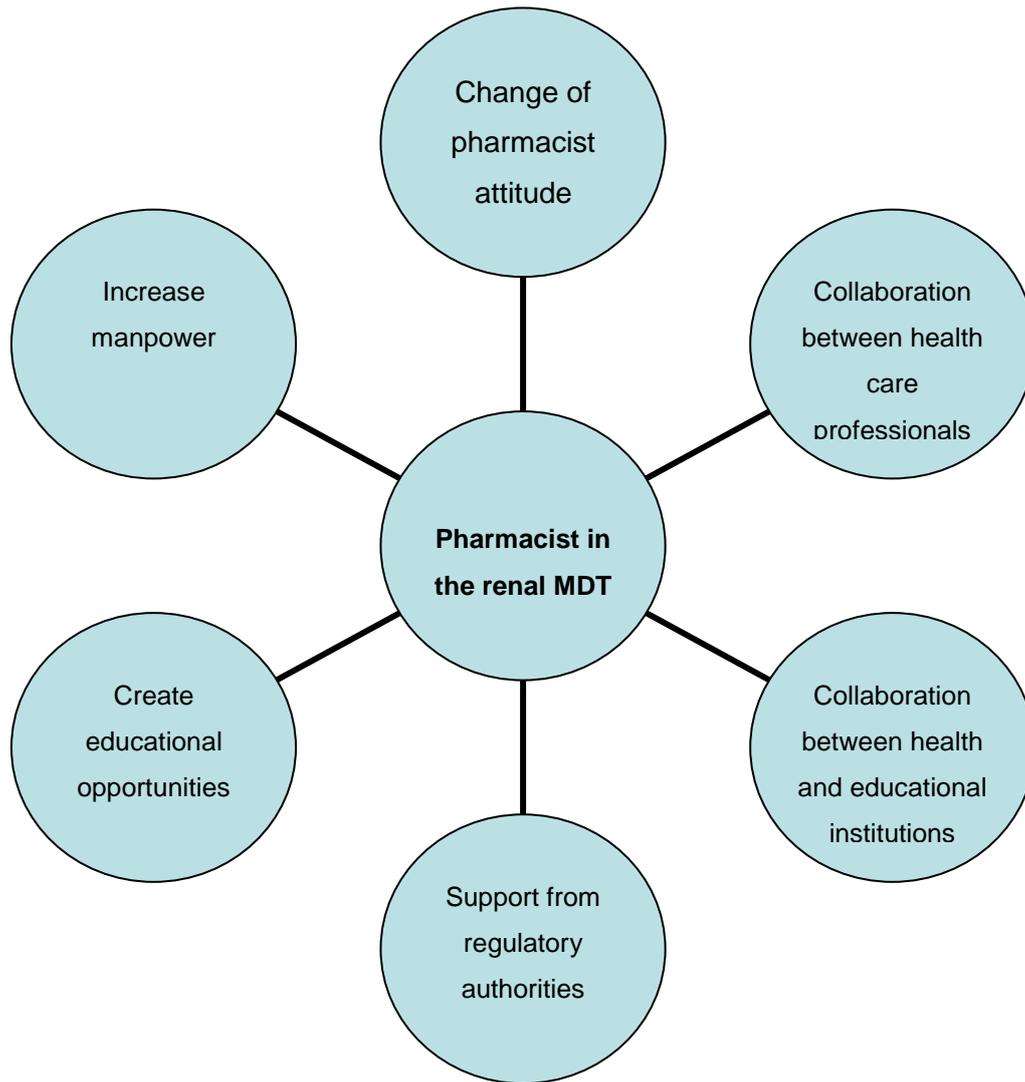


figure 5.2 Developed strategies to increase participation of pharmacists in the renal MDT.

5.2.3.1. Increase manpower: train more pharmacists and task shift other pharmacists to renal care

Pharmacist participation within the renal MDT will be possible when adequate time is available for the provision of clinical services. So, more pharmacist assistants should be trained and employed, to relieve pharmacists from routine tasks such as dispensing; to working into and participating within the renal MDT. The study advocates for hiring of pharmacist assistants as they are suitably qualified to manage routine pharmacy activities under supervision of pharmacists. Hiring more pharmacist assistants will not only provide time for pharmacists to go and engage in clinical activities but would also alleviate the workload the pharmacists are bearing

(Suleiman, *et al.*, 2016). In a related study, recommendations for incorporating pharmacists in wards to provide direct clinical services to patients has resulted in a significant transfer of responsibility to pharmacy technicians (Boughen, Sutton, Fenn, Wright, 2017).

5.2.3.2. Improved partnership between healthcare providers

Healthcare professionals including pharmacists, doctors, nurses, dieticians and others, should collaborate to integrate and share the scientific knowledge available, as suggested by the World Health Organization (World Health Organization, 2010). Pharmaceutical care practice requires good interprofessional working relationship between healthcare professionals. This can be achieved through improved communication and coordination and trust in the abilities of the other health care professionals (Morley & Cashell, 2017).

Collaboration in an MDT can be improved by:

- Eradicating isolation between health care professionals: Healthcare professionals should try interacting and be interested and aware of the scope and activities of other health care professionals.
- Building trust and respect: Respecting one's contribution and not generalize on one's activities based on past experiences.
- Drawing policies: drawing policies will outline the objectives of the collaboration, outline on job description and set standards for the operation of the MDT including how to handle and resolve conflicts.
- Ensuring shared decision-making and routine team meetings: This will enable providers to decide on common goals and patient management plans.
- Improving communication: communication involves timely exchange of information between healthcare providers. Through proper communications, decisions can be made to directly impact the patient, thus providing better patient care. To improve communication, health care professionals should be educated on effective communication and respect and electronic resources be available for exchange of communication.

- Avoiding competitiveness: MDT members should ensure that they do not work to compete towards each other or to prove a point to one health care professional as this will affect improvement of the patient. Competing will not only affect progress of the team and the patient but would also create a negative atmosphere which will lead to conflicts that will hinder delivery of services.

5.2.3.3. Support from pharmacy regulatory authorities and government (environmental factor)

Change cannot occur without support from pharmacy professional council (SAPC) and the government (hospital), with a commitment to review and amend policies or legislations to encourage participation of pharmacists into the renal MDT or any MDT. More often the hospital sees pharmacy as an isolated profession where patients obtain medication. One reason could be that the health care context of South Africa does not support or facilitate the MDT approach within hospitals. With the practice being uncommon in public hospitals, every discipline works in isolation, hence the management has no idea what and how a pharmacist can benefit the team.

This further goes into the internship and the community service programme in South Africa. The setting exposes the upcoming pharmacists to just dispensing and receiving, with no role in the MDT that is directly concerned with the patients. In South Africa, a ward pharmacist only manages the stock in the ward and has no role in direct patient care. Thus, the management of the hospital needs to be approached so that they can review the programme of MDT and weigh the benefits of having a pharmacist in the team. Pharmacists also need to know that management supports teamwork and believes in sharing the responsibility for health-care service delivery among team members. The researcher can present at the hospital level the outcome of having a pharmacist as a team player, in the renal MDT and also the research findings. This is because health care interventions can no longer be based on opinion or individual experience alone but needs to be supported by scientific evidence built from good research (Ghazal, *et al.*, 2014).

Interventions from SAPC

- Start acknowledging specialist pharmacists and register them as such

- Amend the scope of practice of pharmacists, to encourage participation of pharmacists within MDTs.

Interventions from the hospital and DoH

- Create posts for a ward pharmacist who will be directly involved in patient care and actively participate in MDTs.
- Staff participating in collaborative practice need clear governance models, structured protocols and shared operating procedures.
- The hospital should also ensure that the working environment is conducive to collaborative practice. To achieve this, the hospital can ensure that there is effective space design in the hospital that also provide adequate space for facilitating effective communication within the multidisciplinary team.

5.2.3.4. Create educational opportunities for pharmacists

Pharmacists will need to be competent and adequately skilled and trained to fully integrate into MDTs. A knowledgeable pharmacist will be able to possess both the vision and a voice in the team (Ghazal, *et al.*, 2014). To equip pharmacists clinically, the undergraduate clinical curriculum could be reviewed to include interprofessional education and pharmacists be encouraged to develop themselves professionally through CPDs, including furthering studies and by attending workshops, short courses and conferences (Schindel, *et al.*, 2012; Lemay, *et al.*, 2018).

Improving undergraduate training

One way to enhance collaborative practice among healthcare professionals could be to strengthen clinical knowledge and interprofessional foundation in the Pharmacy curriculum. This can be achieved through providing interprofessional educational programmes to undergraduate healthcare students and by incorporating a larger component of clinical pharmacy (WHO, 2010). For example, all students in the faculty of health care sciences could be trained to work and solve patient cases together. Moreover, assessment can be introduced, for professional competency, team work, support and growth. In that way, the students from each discipline will

learn to appreciate the culture of working together and contributions made by other disciplines during patient care.

In a study conducted by Williams, Brown, McCook, Boyle, Palermo *et al.* (2011) at Monash University in Australia, undergraduate healthcare students grouped in teams from different disciplines conveyed positive perceptions and attitudes towards collaboration, patient-centered practice, interprofessional learning, communication skills, teamwork and conflict management after being introduced to an interdisciplinary workshop training.

According to Maree & van Wyk (2016), interprofessional education will be made effective through commitment from the faculty, departments, staff of education and health institutions. To achieve this, staff educators should share common vision and understanding of the benefits of introducing the programme.

Promote continuous professional development

Programmes for continuous professional development can be introduced in order to prepare pharmacists to be professionally competent, confident and compassionate to maintain high standards of pharmacological renal care expertise (O'Brocta, Abu-Baker, Budukh, Gandhi, Lavigne, *et al.*, 2012). Currently in South Africa, CPDs are not a compulsory for community service pharmacists and all qualified pharmacists. As such, pharmacists do not feel the need or a push to keep abreast with the dynamics in pharmacy, that would then encourage them to participate in MDTs. To overcome this barrier, pharmacists' continuous professional development can be achieved through attendance of in-service training, workshops, seminars, and mentoring of pharmacy students. This will further help pharmacists to achieve the objective of keeping all pharmacists abreast with matters around CKD care.

5.2.3.5. Collaboration between health authorities and educational institutions

The Limpopo DoH and other health departments in South Africa should work in collaboration with the Universities and colleges in the country to address information needs of the pharmacy students and to facilitate the integration of theory and practice (Ghazal, *et al.*, 2014). The university and health institutions can sign a memorandum of understanding and tutors be selected to assess the progress of the

students. The memorandum of understanding will have to outline on ethics, roles the students should be exposed to, measures of discipline and insurance in case a student breach the contract or is at fault.

5.2.3.6. Change of pharmacist attitude

Pharmacists' personality and professionalism is an important matter. As such, willingness plays a huge role in team playing. If pharmacists are willing to participate in the MDT, so will be their loyalty and commitment to the team. Pharmacists needs to take the initiative to participate in the team, not only to correct doctors or provide clarity but to play their role as pharmacotherapy specialists (Jorgenson; Dalton; Farrell; Tsuyuki & Dolovich, 2013). In so many studies, pharmacists refrain from working within MDTs because they have got no motivation or are not confident enough to do so (Sello & Dambisya, 2014).

Motivation for pharmacists to engage in MDTs can be done through remuneration and the use of incentives for service delivery. According to Wong & Jones (1998), a fee-for-service model for pharmacists was found to improve hypertension and hyperlipidemia in countries such as US, Canada, UK, Australia and New Zealand, pharmacists are being paid for providing medication reviews. This is further supported by World Health Organization 2010, which also recommended for remuneration of health care professionals working in collaboration (WHO, 2010).

In a study conducted by Raymond et al. (2010), a funding model was established for renal clinical pharmacy services at a fixed ratio of pharmacists to patients. In 2009, 10 clinical pharmacists employed rendered 75% renal clinical services to patients and 25% stock management, which motivated the provision of efficient clinical services, which reduced drug-related problems, improved medication safety for renal patients and saved the hospital four dollars from each one dollar spent on compensating pharmacists (due to reduced extra costs associated with treating adverse drug events and DRPs).

5.2.4 Action plan

In this study, an action plan was developed to help the researcher change the vision into reality. This section further outlined how the researcher will share the results and strategies with higher authorities in healthcare.

The targets for change in this study involves members of the renal MDT, the hospital management, pharmacists including the manager, the Limpopo department of health and the director of health care sciences from the University of Limpopo. The study aimed at establishing the role of pharmacists in renal care and develop strategies based on their participation in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province.

From the strategies developed, the researcher will do the following

- The researcher will prepare a presentation
- Publish the research findings
- Set a date for presentation with all the targets mentioned
- present the study results, the vision mission, the strategies developed to the mentioned targets. Presentations will be done at a time at the university, the hospital and the Department of health.
- Present research findings to SAPC and emphasize on the need to recognize specialties in pharmacy and register candidates as such.
- Resources that will be needed for the presentation involves a laptop and a projector. The researcher has a laptop and would use projectors from the department that will be used to project the presentation.

5.3 SUMMARY

The researcher is not aiming at implementing the results at this stage but at raising awareness on the limited role of pharmacists in the renal MDT, implications of having a pharmacist in the team, the barriers limiting pharmacist participation and contribute to literature on how to bring pharmacists in the renal MDT. Therefore, presenting and

publishing the results will just stress on the need for interprofessional relationship and collaboration and draw interest into establishing and increasing participation of pharmacists in the renal multidisciplinary team

This chapter explained in detail the methods and steps followed in developing the strategies. This included identifying the problem, setting objectives, mission and vision, developing strategies and an action plan. The next coming chapter will cover the summary, conclusions and recommendations for the study.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter focuses on the summary of the results obtained, conclusions drawn from the study, limitations of the study identified, and recommendations cited for incorporating pharmacists in the renal multidisciplinary health care team. The recommendations were formulated based on literature review and findings of the study in relation to the research. The aim of the study was to explore the role of pharmacists in renal care and develop strategies based on their participation in the renal multidisciplinary health care team.

6.2 SUMMARY OF RESULTS

The study employed descriptive qualitative study design. Through analysis of the results obtained, four themes emerged namely; 'pharmacist's current scope of practice within the renal MDT', 'potential future roles of pharmacists', 'perceived barriers to participation of pharmacists within the renal MDT' and 'recommendation/Strategies to incorporate pharmacists into the MDT'. Pharmacists from Polokwane hospital do not provide direct renal care services to patients diagnosed with CKD and have no role within the renal MDT. In the renal unit, pharmacists have their roles limited to just managing stock and ordering. Managing of stock includes checking the emergency trolley for expired medications, checking the use of antibiotics, monitoring the room and fridge temperature, checking for short-dated stock and controlling the use of schedule 5 and 6 medications.

Majority of participants showed preference to having a pharmacist within the renal MDT and were able to attribute different roles for pharmacists. Pharmacists are expected to advise patients on contraindicated drugs, help in dosage adjustment and counsel and provide health education about side effects, drug interactions and fluid limitations. Furthermore, participants stated that pharmacists can advise on proper selection of drugs, promote medication adherence and help prescribers and review prescriptions. Pharmacist participants did not have any conflicting opinions with

regard to their role and participation in the MDT. The only role that was distinct from those mentioned by members of the renal MDT, was monitoring patient's progress.

Even though some preference was shown to having a pharmacist in the team, It was noted from some participants that the introduction of pharmacists in the team might not be doable or flexible, while some mentioned that they do not see a need to have a pharmacist now as the team has been working without their contribution. Other barriers that have been discovered from the interviews include lack of communication, attitude of pharmacists, shortage of pharmacists, recognition from the SAPC and poor education and training. Shortage of pharmacists, lack of communication, pharmacists lack of clinical skills and attitude of pharmacists were perceived as the major barriers to participation of pharmacists within the renal MDT.

It was noted from the interviews that the training students get from educational institutions does not prepare them enough to engage in clinical activities related to patients. Thus, majority of pharmacist participants reported lack of clinical skills and knowledge as one barrier to their limited participation within the renal MDT. This could have resulted in their discrepant attitude to participate in the team, as It was also discovered that pharmacists communicated with staff from the renal unit during orders and shortages and also when pharmacists or prescribers needed clarity on something that is prescribed. Pharmacists are also not motivated to develop themselves professionally and as such are at their comfort zone at the dispensary unit.

Based on the identified barriers, participants recommended for training and hiring of more pharmacy personnel including assistants, drawing of a job description, approaching the hospital management, motivating pharmacist to change their attitude and fostering pharmacist education. It was suggested that the hospital management change the structure and environment of the renal unit so that it will allow effective teamwork, and also help in drawing policies, job descriptions and SOP's that will drive and guide operation of the renal MDT.

Majority of participants from the study highlighted that educational barriers could be addressed through the use of seminars, workshops or training courses to at least equip pharmacists with the necessary skills required, which will boost their confidence and engagement in the renal MDT.

6.3 CONCLUSION

There is a growing need for pharmacists to offer direct renal care services within the renal MDT. Identifying perceived barriers limiting participation of pharmacists within the renal MDT and gaining pharmacists perceptions of these barriers was important and critical to encourage the expansion of pharmacist role in the MDT. While pharmaceutical care services are limited at Polokwane hospital, strategies were developed to successfully implement and encourage the participation of pharmacists in the renal MDT. The expansion of the role of a pharmacist within the renal MDT requires improved partnership with physicians, adequate resources, support from the South African Pharmacy Council, the Limpopo department of health and Polokwane hospital, improved collaboration between Polokwane hospital and educational institutions and through the provision of educational opportunities for pharmacists.

6.4 RECOMMENDATIONS

The following recommendations are made based on the results of the study:

- Increase manpower: train more pharmacists and task shift other pharmacists to renal care
- Improve partnership between healthcare providers: This can be achieved by building trust and respect, avoiding competitiveness
- Support from pharmacy regulatory authorities and government (environmental factor): the SAPC should start acknowledging specialist pharmacists and register them as such and the hospital and the DoH create posts and an environment that is user friendly for the renal MDT. They should also ensure that staff participating in collaborative practice has clear governance models, structured protocols and standard operating procedures.
- improve communications- the hospital should ensure that they establish structures that facilitate communications among professionals for example interprofessional communications tools, meetings, etc.
- Create educational opportunities for pharmacists by Improving undergraduate training and creating programmes for continuous professional development. This

can also be achieved through the provision of reference materials in the unit for referrals and continuous learning

- Promote collaboration between health authorities and educational institutions so that students can learn to integrate theory and the practical part of renal system and pharmacotherapy.
- Change of pharmacist attitude by remunerating them for clinical services offered and through incentives.

6.5 LIMITATIONS OF THE STUDY

The study was conducted at Polokwane hospital in Limpopo province, and may require adjustments if was to be done in a different setting and as such the study results cannot be generalized to other hospitals offering renal care in South Africa or other countries. However, the transferability of the study findings to other contexts might be possible if they can be considered appropriate or applicable. Since the study was conducted using health care professionals, it was not always easy to access the participants as some days may be busier for them to partake in the study, even though appointments were made. So, in such cases the researcher would miss or not collect data. Moreover, the researcher could not interview pharmacist participants who did not consent to participate in the study and those pharmacists (8 pharmacists) working on night shift. Since the transcripts were split equally between the researcher and the independent coder, this could have influenced the results

6.6 CLOSURE

In this chapter, concluding summaries and recommendations were made. The aim of the study was to explore the role of pharmacists in renal care and develop strategies based on their participation in the renal multidisciplinary health care team. The study objectives which include to explore the experiences of the renal multidisciplinary team, regarding the role and involvement of pharmacists in the management of patients with CKD; to explore experiences of pharmacists, regarding their role and involvement in the management of patients with CKD; to understand the barriers limiting the involvement of pharmacists in the management of patients with CKD and

to develop strategies that will enhance the participation of pharmacists, in the management of patients with CKD at Polokwane hospital, were met. Limitations to the study were also highlighted which included consent, generalizing the results and availability of the participants. Recommendations were made on incorporating pharmacists into the renal MDT. There is a need for a role of a pharmacist in the renal MDT so that they can provide management opportunities and address all patient related challenges either concerning medications or not (non-pharmacological treatment).

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APPENDICES

Appendix A: Semi-structured interview guide

Research Topic: Development of strategies to increase participation of pharmacists in the renal multidisciplinary health care team Polokwane hospital, Limpopo province

Section A: Demographics

Gender	Male	Female
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Age	20-29	30-39	40-49	50-59	60-69	70+
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Work experience	< 2	2 – 3	4-5	> 5
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Occupation	Specialty (please specify your specialty)
Medical doctor	
Nurse	
Clinical technologist	
Dietitian	
Other (specify)	

Section B: Interview guide questions

Central questions – Bolded

Probing questions- in normal font

1. What do you understand to be the clinical role of a pharmacist within the renal multidisciplinary team during the management of patients with CKD?

1.1 If not, what practices can pharmacists offer during care of patients with CKD, with the multidisciplinary team?

2. What are the current roles of a pharmacist in the renal multidisciplinary team and the unit?

2.1 If there aren't any, what role can they play?

3. What do you think could be the limiting barriers to their participation in the management of patients and within the renal MDT?

3.1 What could be the factors limiting the implementation of pharmacy services in ward rounds?

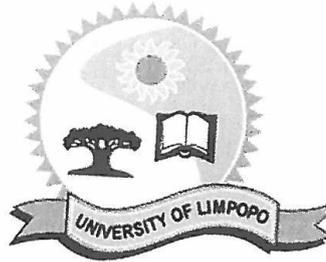
To what extent can pharmacists participate in ward rounds and the MDT activities?

4. What suggestions or solutions do you think should be brought on board to incorporate pharmacist in the renal multidisciplinary team?

4.1 How can the involvement of pharmacists in ward rounds be introduced?

4.2 How can you encourage participation of pharmacists during patient management care and within the renal multidisciplinary team?

Appendix B: Ethical clearance certificate



University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 2212, Fax: (015) 268 2306, Email:noko.monene@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE CLEARANCE CERTIFICATE

MEETING: 31 August 2017
PROJECT NUMBER: TREC/262/2017: PG

PROJECT:

Title: Development of strategies to increase participation of Pharmacists in the Renal Multidisciplinary Health Care Team at Polokwane Hospital, Limpopo Province
Researcher: NB Moloto
Supervisor: Mr TL Manyama
Co-Supervisor: Mr RM Tshitake
School: Health Care Sciences
Degree: Masters in Pharmacy


PROF TAB MASHEGO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: REC-0310111-031

Note:

- i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
- ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Appendix C: Limpopo DoH Permission Letter



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA



DEPARTMENT OF HEALTH AND SOCIAL DEVELOPMENT

Enquiries: Mr MA Poopedi
Manager: Clinical Research
University of Limpopo - School of Medicine
aniaspoopedi@gmail.com

Ref: PMREC24JanUL2018C

Date: 24 January 2018

Protocol Title:

Development of strategies to increase participation of pharmacist in the renal multidisciplinary health care at Pietersburg hospital, Limpopo Province.

Candidate Name : Ms NB Moloto

Department : School of Pharmacy

Assessment Outcome : **Approved with Recommendations to the satisfactory of the Project Supervisors.**

The following needs attention from the candidates:

- **The application form must be completed in full (See Attached Document).**
- **Please Clarify the aim, objectives, study site, sampling method, sample size and inclusion criteria (See Attached Document).**

Kind regards

Dr FLM Hyera

Chair of Research: Polokwane/Mankweng Complex

Head: Public Health Medicine

University of Limpopo - School of Medicine

Appendix D: Participant’s Consent Form

Research title: Development of strategies to increase participation of pharmacists in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province.

SUPERVISOR: Mr MANYAMA T.L.

I..... hereby voluntarily consent to participate in the above-mentioned project. I have been invited to participate in the study. I have had the opportunity to ask additional questions and have been answered satisfactorily. I have been given enough time to decide about participation. I understand that:

1. The study is about exploring the experiences of pharmacists and the renal Multidisciplinary Team (MDT) on the role of pharmacists and their involvement during care of patients diagnosed with chronic kidney disease
2. The Turfloop Research Ethics Committee has approved that individuals may be approached to participate in the study.
3. The research project, i.e. the extent, aims and methods of the research, have been explained to me. Any questions that I may have regarding the research, or related matters, will be answered by the researcher/s.
4. Participation in this research is voluntary and I can withdraw my participation at any stage. I have been assured that the information obtained from me will remain anonymous and confidential and to be solely used for the purpose of this research.

Signature of participant.....

Signature of witness

Signature of investigator

Appendix C: Manuscript

Development of strategies to increase participation of pharmacists in the renal health care team at Polokwane hospital, Limpopo Province, South Africa

Noko B Moloto, BPharm, Tebogo L Manyama (MPharm), and Rendani M Tshitake (MPharm)

University of Limpopo Faculty of Health Sciences, school of health care sciences, Department of Pharmacy

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ABSTRACT

Background

Multidisciplinary team (MDT) approach has emerged as one solution to improving CKD care. Pharmacists can participate in the renal MDT to provide clinical renal services to patients with CKD, to minimize drug related problems and optimize therapy.

Objectives

The study aimed to explore the role of pharmacists in renal care, and develop strategies based on their participation in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province South Africa.

Method

An exploratory descriptive qualitative study using semi-structured interviews was conducted with a purposeful sample of 17 participants. The audiotaped interviews were transcribed exactly as said and analysed using thematic content analysis.

Results

Four themes emerged from the analysis: 'pharmacist's current scope of practice within the renal MDT', 'potential future roles of pharmacists', 'perceived barriers to participation of pharmacists within the renal MDT' and 'recommendation/Strategies to incorporate pharmacists into the MDT'. Results have shown that pharmacists have an absent role within the renal MDT. Pharmacy services suggested included medication reviews, provision of patient education, dosage workouts, patient monitoring and advise on contraindicated drugs. Shortage of staff, pharmacists lack of clinical skills, lack of communication and attitude of pharmacists were perceived as the major barriers to participation of pharmacists within the renal MDT. It was recommended that more pharmacy staff be employed, educational opportunities be provided for pharmacists and the practice be standardized.

Conclusion

The role of pharmacists at Polokwane hospital is confined to just stock management and dispensing. The perceived barriers to their participation during renal care at Polokwane hospital could inform future strategy development, to enhance their participation.

Keywords: pharmacist, multidisciplinary healthcare team, chronic kidney disease, barriers, strategies

Background

Chronic kidney disease (CKD) is a growing health concern and a major cause of morbidity and mortality worldwide (1). Lack of awareness, failure to recognize early signs, and improper management of CKD contribute to CKD burden (2). Patients with CKD and those with ESRD (severe form of CKD) are at an increased risk of being exposed to drug related problems, including adverse drug reactions and drug-drug interactions. The complex nature of the therapy; altered pharmacokinetics of the drugs and reduced renal failure further dispose patients to drug-related problems (3).

The renal multidisciplinary team (rMDT) integrates the care of nephrologists, physicians, nurses, dieticians and pharmacists who provides integrated care to patients with renal disorders (4). When properly implemented, this team meet the health demands of the patients when compared to an individual patient physician care (5). The role of a pharmacist in the renal MDT includes identifying, addressing and preventing drug related problems, providing recommendations on drug selection and treatment plans (6); adjusting doses, preventing use of contraindicated drugs and enhancing patient adherence (7). The inclusion of a pharmacist in the renal MDT further improves quality of life, reduce hospitalization, improve outcomes for anaemia, hypertension and diabetes mellitus for patients with CKD (8).

However, the role of a pharmacist in the rMDT is either limited or absent (9). Factors such as conflicting departmental priorities, workload, resource-related constraints (space, finance, and qualified personnel), system-related constraints, lack of clinical knowledge and discrepant attitudes of pharmacists, doctors and nurses are barriers to pharmaceutical care (10,11). It is against this background that the study aims to

explore the role of pharmacists in renal care and develop strategies based on their participation in the renal multidisciplinary health care team at Polokwane hospital, Limpopo province

MATERIALS AND METHOD

Design and study participants

Due to the exploratory nature of this study, a qualitative research method was employed, with a purposive sample method used to deliberately select participants to reveal the views and experiences that would be most informative to the research questions. The participants were all registered pharmacists and registered members of the renal MDT at Polokwane hospital, which is the only state hospital that offer renal care services in Limpopo province, South Africa.

The interviews

Data was collected via in-depth, face-to-face semi-structured interviews using an interview guide that was developed by the researcher based on literature (Table 1). The interview guide consisted of central questions which were further followed up by probing the participants. The researcher asked the participants open-ended questions to gain insights into their thoughts.

Table 1. Semi-structured interview guide

1. What do you understand to be the clinical role of a pharmacist within the renal multidisciplinary team during the management of patients with CKD?
2. What are the current roles of a pharmacist in the renal multidisciplinary team and the unit?
3. What do you think could be the limiting barriers to their participation in the management of patients and within the renal MDT?
4. What suggestions or solutions do you think should be brought on board to incorporate pharmacist in the renal multidisciplinary team?

Ethical Consideration

A written consent was obtained from participants who were assured of the confidentiality and anonymity of their responses. Ethical approval was obtained from the Limpopo department of health and Turfloop research and Ethics Committee (TREC).

Data analysis

The interviews with the participants were audio-recorded and transcribed exactly as said. Thematic content analysis was used to analyse the interviews' transcripts. Following this method of analysis, the researcher read the transcripts repeatedly, identified emerging topics and categorised the topics as themes and subthemes. Analysis was conducted by the researcher and an independent coder, where at the end results were reconciled for differences and agreed upon. Attempts to guarantee the trustworthiness of the data included the use of an established method of

analysis, the involvement of an independent coder and approval from ethics committees.

RESULTS

Data saturation was achieved at seventeen participants. From these participants, fourteen (82.4%) were females and three (17.6%) males. Nine participants (52.9%) were pharmacists and eight (47.1%) members of the renal multidisciplinary team. The renal MDT comprised of a nephrologist, physician, two dieticians, a transplant coordinator, unit manager and two professional nurses. Participants ranged between the age group 20-59 and majority were in the age group 30-39 and 50-59. Almost all the participants had a working experience of over five years in practice.

Four themes emerged from the interviews. The main themes and subthemes are illustrated in table 2. Respondents from the renal multidisciplinary team are denoted using the symbol Rtm (renal team), while P symbolises pharmacists.

Table 2: The identified themes and sub-themes from the interview transcripts

Themes	Sub-themes
1. Pharmacist's current scope of practice with the renal multidisciplinary team	1.1 Lack of clinical participation in the renal MDT 1.2 Stock management
2. Potential future role of pharmacists	2.1 Promote rational drug use 2.2 Patient education/counselling 2.3 Monitoring of patients
3. Perceived barriers to participation of pharmacists in the renal MDT.	3.1 Lack of human resource 3.2 Attitude of pharmacists 3.3 Attitude of other health care providers 3.4 Pharmacists' education and training needs 3.5 Communication barriers 3.6 Lack of recognition to pharmacy services
4.Recommendation/Strategies to incorporate pharmacists into the MDT	4.1 General organizational enablers 4.2 Pharmacist-specific enablers

1. Pharmacist's current scope of practice with the renal multidisciplinary team

Clinical roles are seldom attributed to pharmacists within the multidisciplinary team.

1.1 Lack of participation of pharmacists within the renal MDT

Majority of participants reported that there is an absent role of pharmacists within the renal MDT. *“Currently we do not have a pharmacist in the renal multidisciplinary team.....” (Rtm 4)*

This was also supported by pharmacists who stated that *“we send pharmacists to wards but not necessarily to deal with the patients...” (P 6).*

Only one pharmacist indicated that she visited patients in the renal unit, until she was moved to another unit: *“I was previously working in the renal unit but now moved to intensive care unit.....” (P 14).*

1.2 Current role of pharmacists in stock management

Majority of renal MDT members spontaneously reported to interacting with pharmacists in the unit during stock management, which was also confirmed by majority of pharmacist: *“The pharmacists in the unit are responsible for assisting in stock ordering and when we need urgent supplies” (Rtm 10)* and *“ensures stock availability” (P 9)*

2. Potential future role of pharmacists

2.1 Promote rational drug use

Participants from the renal MDT and pharmacists mentioned reviewing of the prescription as the fundamental role pharmacists should carry out: *“Pharmacists can help review medication that’s already prescribed” (Rtm 10)* to..... *“reduce the unnecessary treatment that the patients are taking” (P 5)*

Alongside prescription reviews, pharmacists and members of the renal MDT stated that pharmacists should be assisting at the prescribing stage with physicians:

“Pharmacists can work hand in hand with doctors when prescribing” (Rtm 16) and “before diagnosis or any activity just before diagnosis” (P 7).

Almost every participant reported that pharmacists should oversee dosage adjustments and prevent the use of contraindicated drugs: *“We need a pharmacist’s advice on giving proper dosages” ... (Rtm 2) and “..... to make sure that the medications patients are taking are not actually contraindicated or interacting with other medications” (P 14).*

Pharmacists stated that they can also play a role in the monitoring of the patients, which was merely mentioned by participants from the renal MDT: *“I think a pharmacist can be there full time to check the progress of the patients” (P 11).*

2.2 Patient education/counselling:

Patient education was mentioned by almost every participant as an integral activity to be played by pharmacists during patient care: *“pharmacists can make sure that our patients understand the medication’..... (Rr 10)” and “ counsel them especially for example, about the side effects of the drugs” (P 14),” drug interactions” (P 5) and “on fluid limitations” (P 7).*

Alongside education, compliance was referred to by one participant from the renal MDT as an area to be improved and played by pharmacists. *“I think they will contribute as to how best they can adhere to treatment ...” (Rtm 1)*

3. Perceived barriers to participation of pharmacists in the renal MDT

Participants identified several barriers to the participation of pharmacists in the renal MDT, the findings were as follows:

3.1 Human resource related factor

Shortage of pharmacy staff was perceived as a major barrier to the participation of pharmacists during renal care. *“I think the main main issue here is shortage of personnel” (Rtm 2) because “..... the minute one pharmacist is out; a gap is opened” (P 5).*

However, it was also noted from some pharmacists that, personnel could not be a barrier:

“I do not think it is a barrier because as we speak today, we would have a situation where we have one pharmacist working with 4 post basic pharmacist assistants in the dispensary “(P 9).

3.2 Attitude of pharmacists

Some pharmacists reported attitude of pharmacists as a barrier: *“I think there is an attitude with or from pharmacists.... they just come in from universities and limit their role to the pharmacy as if they have reached their goal” (P 14).*

In as much as some pharmacists are not willing to engage in any activities beyond dispensing, some felt that clinical roles were more of the nurses' role: *“..... isn't it more of the sister's duty to do the clinical part and we just look at the medicine side” (P 3).*

Some pharmacists reported clinical roles for pharmacists are for those pharmacists with a speciality in clinical pharmacy while some disagreed: *“Not all pharmacists are clinical pharmacists, so pharmacists may not have adequate skills to be involved in daily clinical activities” (P3).*

Even with a BPharm, clinical roles can be expected because therapy which is the core basis is done during undergraduate and one needs to read more on the section they are put on” (P 14).

3.3 Attitude of the health care providers

It was reported from few pharmacists that other health care professionals are not accommodative:

“Other health care workers are also not trained to acknowledge or to accommodate pharmacist role inside the ward” (P 5) and “sometimes the doctors feel like you want to take their job when you ask too much about what they are doing” (P 11)

Lack of preference to having a pharmacist in the team was also discovered from few members of the renal MDT: *“From a pharmacist point of view for them to come and like work here, I don’t know if it will be possible or feasible.” (Rtm 17) and “we are fine working without them at the moment. The way we are working at present I am not complaining” (Rtm 16)*

3.4 Pharmacists’ education and training needs

Participants spontaneously mentioned pharmacist education and training needs to be a barrier to their participation in the renal MDT:

Poor undergraduate training was mentioned by nearly all pharmacists as a barrier to their lack of participation in the renal MDT: *The training we got made us generalists, it doesn’t make us specialists in any form.” (R 9) so “I don’t think pharmacists are skilled enough to take part in nursing renal failure patients” (Rtm 2).*

Lack of motivation to continuing professional development was mentioned nearly by all pharmacist in the study, however was not cited as a barrier by the renal MDT.

“most of us are not doing post graduate standards to continue with professional development” (R 9).

3.5 Communication barriers

Majority of participants stated that pharmacy services were rendered to patients away from their care areas. As such there is poor communication between pharmacists and members of the multidisciplinary team.

“Lack of communication could be another thing and we have never invited pharmacists to come work with us in terms of managing the patients in this unit” (Rr 2).

From a pharmacist point of view: *“Unfortunately, at present our intervention as pharmacists is just from the pharmacy department and from the files we get” (R 8)*

3.6 Lack of recognition to clinical pharmacy services

Pharmacists coherently reported lack of recognition to pharmacy services by both the hospital and their governing bodies:

“I don’t know if it’s an issue of awareness, whether a pharmacist is recognized as part of a team player in the health care context of South Africa and in dealing with patients (P 7) “Again, we are not recognized by our council (P 14) and you might find that the time you expect doctors to do ward rounds is not the time for another provider.” (P 6), so “management limitation is another thing” (P 9)

4. Recommendation/Strategies to incorporate pharmacists into the MDT

Participants further recommended or suggested the following, to improve on the role of pharmacists during renal patient care.

4.1 General organizational enablers

Approaching management: *“I think the first thing would be to discuss with the management including the head of pharmacy releasing someone from pharmacy to the unit” (Rr 10) and to ensure “that the whole hospital is set in such a way that it allows health care professionals to come together and work within multidisciplinary team structures.” (P 6)*

Alongside approaching management, participants expressed an urgent need for a reliable standard operating procedure and a job description to guide and standardize the implementation of pharmacy services in the renal unit. *“We can also do this by having meetings with different sections and say let’s have this and this is what we can contribute and develop norms, standards and objectives.” (P 9) and draw up between myself and the head of pharmacy a job description and a job routine (Rr 10)” to “know what the next person can bring (R 5).*

4.2 Pharmacist specific enablers

Participant recommended the following to increase participation of pharmacists in the team

All participants agreed that fostering pharmacists’ education would improve on their skills and knowledge. *“Workshops, we should have short courses where we attend for our continuous learning and learn more on the renal unit (P 11), or “in-service training” (Rr 13)*

Nearly all participants advocated for the need to employ more pharmacy staff. *“For now, I would still advocate for the department to keep on training pharmacist assistants (P 6)*

Majority of participants agreed to change of pharmacist attitude *“If pharmacists can have a different mentality and say I did not come here just to dispense I have more*

other things to do and incorporate it in their work it would be possible, because it is not easy to make people do what they are not willing to do". (R 14).

DISCUSSION

Pharmacists from Polokwane hospital have no role in the renal MDT. They have their roles just limited to controlling medications. This is in line with the results obtained from a recent study where majority of pharmacists were found to be more involved in the pharmaceutical product management such as ward stock inventory, compounding and dispensing (12,13). Two participants from the renal MDT could not attribute roles to pharmacists within the renal MDT, which might be related to the lack of historical collaboration and lack of knowledge of the pharmacist's responsibilities by members of the renal MDT (9,14)

The views of pharmacists and the renal MDT towards the future provision of clinical pharmacy services included rationalising drug use, to enable pharmacists to review prescriptions, assist at the prescribing stage, prevent the use of nephrotoxic and contraindicated drugs and to oversee dosage adjustments. Close monitoring of patients with CKD is required as it helps reduce costs, address drug related problems (DRP) and ultimately improves patient's outcome (15). Patient education and counselling were highlighted to reinforce patient adherence to medication and understanding of medication. In a qualitative study on the role of pharmacists in parenteral nutrition therapy, roles attributed to pharmacists included providing patient education and patient monitoring which is in line with this study (13). Therefore, there is a room to improve on renal patient care in Polokwane hospital by involving pharmacists in the provision of clinical services to the patients.

Results revealed Shortage of staff, pharmacists lack of clinical skills, lack of communication and attitude of pharmacists as the major barriers that limit the participation of pharmacists in the renal MDT. These findings are correlated because if the hospital does not have enough staffing, staff members will be overworked and have limited time to engage in professional development activities that will help them acquire more knowledge on therapeutics. The results in this study are compatible to those found by Ghazal and colleagues, as they reported lack of time, insufficient staffing and lack of motivation or vision on professional development to be the main barriers to the implementation of pharmaceutical care into pharmacies (16).

The discrepant attitude of other healthcare providers to the role of pharmacist within the MDT and patient care could be related to lack of communication/coordination and lack of trust in pharmacist abilities (17). Interestingly, pharmacists believe that their roles are side-lined by physicians, while in contrast, physicians report very positive insights about having a pharmacist within the MDT in this study. One participant highlighted that “if a doctor can know this are the benefits I will get from a pharmacist or a nurse instead of just using them as if they are their assistants, for example”, (P 5). This is in line with the results from a study conducted in Kuwait, on the role of pharmacists on parenteral nutrition therapy, as physicians were reported to assuming total responsibility over all therapeutic decisions in collaborative teams (13).

Poor attitude of pharmacists to participating in MDTs may be explained by the lack of confidence and fear of new responsibilities among some pharmacists, which could have adversely affected their perception. In a recent study conducted by Rosenthal and colleagues, it was found that the pharmacy culture was resistant to change, meaning pharmacists do not want to transition from the traditional role of

pharmacists to providing direct patient care (18). Communication between pharmacists and members of the renal MDT existed when clarity is required either from the pharmacy or physician side and during ordering and supplies. Communication and collaboration between health care providers is necessary to deliver and coordinate care. This is because poor communication can lead to errors that often result in higher project expenditures, disruption of treatment, and preventable injuries (19). Again, lack or absence of communication within MDTs, leads to the provision of fragmented care that relies on individual skills (20).

To increase participation of pharmacists in the MDT, it was recommended that the practice be standardized. This can be in the form of SOPs and job descriptions. A standardized procedure for renal care within the MDT would improve patient safety and clinical appropriateness, enhance efficient resource utilization, improve continuity of care and overcome any miscommunications (13). The results in this study are compatible with those found by Wagner and colleagues, where protocols and standardization of procedures in late-stage CKD were reported to improving care and outcomes of the patients (21).

There was an overwhelming agreement among participants on the need to foster pharmacists' education on renal therapy. As such, participants recommended that workshops and short courses be introduced to equip them with the necessary skills required. To overcome the issue of shortage of staff, participants stressed on the need for the hospital to train more pharmacist assistants, which will alienate the workload while providing more time for pharmacists to move their services in the wards. The results were compatible to those found by Suleiman and colleagues, as education and hiring of more staff were found to improve the provision of pharmaceutical care (22). To raise recognition to pharmacy services, it was

recommended that management be approached so that this team can be recognised and a pharmacist as a team player within the team. Furthermore, recognition to this practice would ensure availability of resources and ultimately improve patient care and outcome. This is in line with a study conducted by Sello and Dambisya, as pharmacists advocated for recognition by the South African Pharmacy council (SAPC) in order to be directly involved with patients (12).

LIMITATIONS OF THE RESEARCH

The study was conducted at Polokwane hospital in Limpopo province, and may require adjustments or not have results generalized to other hospitals offering renal care in South Africa and other countries. Even though appointments were made, interviews were conducted based on the availability of the participants.

CONCLUSION

There is a growing need for pharmacists to offer direct renal care services within the renal MDT. Identifying and gaining pharmacists and the MDT perceptions of the barriers was important and critical to encourage the expansion of pharmacist role in the MDT. While pharmaceutical care services are limited at Polokwane hospital, strategies were developed to successfully implement and encourage the participation of pharmacists in the renal MDT, through increased manpower (hiring of pharmacy technicians), improved partnership, adequate resources, support from the South African Pharmacy Council, the Limpopo department of health, Polokwane hospital and educational institutions. Further research is needed to evaluate the impact of the strategies developed.

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The author was fully responsible for all content and editorial decisions and the opinions expressed in the manuscript are those of the author.

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CONFLICT OF INTEREST

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Appendices

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