

**EVALUATION OF INFECTION PREVENTION AND CONTROL
PRACTICES AT THE HEMODIALYSIS UNIT IN MOI TEACHING AND
REFERRAL HOSPITAL- ELDORET.**

BY

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DECLARATION

Student Declaration

I declare that this research proposal is my original work and has not been presented in any other university or institution for the award of the degree or any academic credit. Views expressed herein are my own unless otherwise stated and in such a case, the reference has been cited.

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DEDICATION

I dedicate this proposal to my family and friends. To my father, Professor Joseph Rasowo, thanks for putting me through school and instilling in me the virtue of hard work. To my beloved mother, Elizabeth Rasowo, thanks for your constant prayers and encouragement. To my siblings Victor, Anne, Brenda and Barbara thanks for the emotional support. To my friends' thanks for cheering me on throughout this journey.

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LIST OF ABBREVIATION

CDC	Centre for Disease Control
ESRD	End Stage Renal Disease
HBM	Health Belief Model
HCP	Health Care Providers
IPC	Infection Prevention and control
IREC	Institutional Research and Ethics Committee
KNH	Kenyatta National Hospital
MTRH	Moi Teaching and Referral Hospital
NHIF	National Health Insurance Fund
WHO	World Health Organization

OPERATIONAL DEFINATION OF TERMS

Infection prevention and control. Infection prevention and control is defined as a practical scientific approach designed to prevent harm caused by infection to patients, healthcare workers and the community.

Hemodialysis is a life-saving procedure where a dialysis machine and a special filter called a dialyzer are used to filter waste and water from the blood and correct electrolyte imbalances for a period of 2-4 hours.

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EVALUATION OF INFECTION PREVENTION AND CONTROL PRACTICES AT THE HEMODIALYSIS UNIT IN MOI TEACHING AND REFERRAL HOSPITAL.

ABSTRACT

Background: Catheter-associated bloodstream infection is the second leading cause of morbidity and mortality in dialysis patients. In Kenya, the expansion of hemodialysis services over the past decade has been paralleled by rising infection rates, underscoring the need for strengthened infection prevention and control (IPC) measures. Adherence to IPC guidelines is critical in minimizing infection transmission. This study evaluates the current IPC practices in the hemodialysis unit (HD) at Moi Teaching and Referral Hospital (MTRH).

Main objective: To evaluate the infection prevention and control practices at the hemodialysis unit of MTRH.

Specific objectives: (1) To describe IPC measures practiced by healthcare workers at the HD unit in MTRH. (2) To assess the level of compliance to MTRH and center for disease control (CDC) IPC guidelines in the HD unit. (3) To explore individual and system level factors influencing compliance to IPC guidelines at the HD unit in MTRH.

Methods: A convergent parallel mixed-methods study was conducted in the HD unit at MTRH. The study had 3 components: (1) Questionnaires to describe IPC measures (2) Observations using MTRH and CDC IPC checklists to evaluate healthcare workers' adherence to IPC guidelines; (3) in-depth interviews with key informants to identify system and individual level factors influencing IPC implementation. Descriptive statistics, such as means and medians, summarized continuous variables while frequency distributions described categorical data. Compliance was measured using proportions. Qualitative data were coded into themes aligned with the six domains of the Health Belief Model (HBM).

Results: Biodata: 75% were female. Majority, 69.4% were nurses, with the remaining cadres evenly distributed and 87.5% had nephrology training. On IPC measures practiced by healthcare workers (HCWs): 100% participants reported the availability of hand hygiene supplies, 75% had training on proper personal protective equipment selection, 91.7% acknowledged availability of environmental cleaning policies and 81.2% reported that they applied antibiotic ointment on HD catheter exit sites with every dressing change. Compliance with IPC guidelines was varied: 88% compliant to hand hygiene guidelines, 100% noncompliant to both catheter connection/disconnection and exit site care guidelines. Systemic factors influencing compliance were inadequate staff numbers, few trainings on IPC and availability of consumables, individual level factors included staff attitude and insufficient knowledge in IPC.

Conclusion: HCWs had insufficient knowledge of the recommended guidelines for effective IPC practices. The overall compliance to IPC among healthcare providers in the HD unit of MTRH was suboptimal. Systemic level factors like inadequate staff, insufficient training on IPC and availability of consumables influenced compliance. Additionally, individual level factors like staff attitude also contributed to compliance levels.

Recommendations: The hospital management to organize educational programs to keep staff updated on IPC best practices including hands-on training sessions to bridge gap between knowledge and practice. The management to ensure constant availability of supplies for IPC and deploy sufficient numbers of HCW to the HD unit to improve compliance. HCWs to be more proactive at individual level in championing IPC.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Renal insufficiency is a serious medical condition that occurs when the kidneys lose their ability to effectively filter waste products and excess fluid from the blood stream. It can be classified into two broad categories: acute renal insufficiency which develops suddenly over hours to days and chronic renal insufficiency which progresses gradually over months to years (NKF, 2015). The burden of chronic kidney disease is steadily increasing worldwide, affecting more than 10% of the global population i.e. approximately 800 million people. In sub-Saharan Africa, the estimated prevalence of chronic kidney disease stages 1-5 is 15.8% with more advanced stages (stage 3-5) affecting 4.6% of the population (NKF, 2015). In Kenya, the prevalence of chronic kidney disease is a growing concern, with approximately 4 million people currently living with chronic kidney disease. Projections suggest that by 2030 this number could rise to 4.8 million (Kenya Renal Association, 2019). Without timely intervention, chronic kidney disease progresses to end stage renal disease (ESRD) necessitating renal replacement therapy in the form of dialysis or kidney transplant.

Dialysis is a life-saving procedure that serves as an artificial replacement for kidney function by removing toxins, waste products and excess fluid from the body. There are three primary types of dialysis: hemodialysis (HD), peritoneal dialysis (PD) and continuous renal replacement therapy (CRRT) (NKF, 2015). Hemodialysis, the most commonly used modality, relies on a dialysis machine and a special filter called a dialyzer to filter waste and water from the blood and correct electrolyte imbalances for a period of 2-4 hours. Continuous renal replacement therapy, in contrast, is a

prolonged form of dialysis designed for critically ill patients, running for 24 hours or longer to provide stable and precise fluid and electrolyte management. It is indicated in critically ill patients due to its accurate volume control, acid-base and electrolyte correction and achievement of hemodynamic stability(Saunders & Sanghavi, 2022). The aim of dialysis is to improve your quality of life by making feel better and live longer. Peritoneal dialysis unlike hemodialysis which use an external machine to filter blood, peritoneal dialysis uses the patient's peritoneal membrane as a natural filter to remove waste products, excess fluid and toxins from the blood stream.

The need for hemodialysis continues to expand in Kenya. Hemodialysis was first introduced in Kenya in the year 1978 at Kenyatta National Hospital, the largest referral hospital in the country. Until 2002, KNH remained the only public hospital offering dialysis services in the country. However, with the growing burden of CKD, the number of dialysis centers has expanded significantly. According to the Kenya renal association, there are 51 dialysis units in public hospitals, 81 in the private health facilities and 11 in faith based hospitals as of 2019(*Kenya Renal Association*, 2019).As of the year 2018,2400 patients were receiving dialysis daily in both private and public hospitals. The National Health Insurance Fund (NHIF), established in 1966 with a mandate to provide health insurance for Kenyans, has played a pivotal role in increasing access to dialysis, particularly after introducing coverage for dialysis costs in 2017. Currently NHIF beneficiaries are entitled to two dialysis sessions per week(*NHIF*, 2022) significantly alleviating the financial burden on patients and their families.

Despite the lifesaving benefits of hemodialysis, it is associated with numerous complications, with infections being one of the most critical concerns. Patients undergoing dialysis are particularly vulnerable to infections due to their compromised

immune systems, frequent vascular access procedures and prolonged exposure to medical devices. These complications include infection, anemia, amyloidosis, stroke, musculoskeletal and cardiovascular system morbidities. Infectious complications is the second leading cause of mortality in ESRD patients after cardiovascular disease(Habas et al., 2021).

In Kenya, the expansion of hemodialysis services over the past decade has been paralleled by rising infection rates, underscoring the need for strengthened infection prevention and control (IPC) measures This study will focus on assessing the infection prevention and control measures in dialysis units because infectious complications occur from preventable causes and can be easily addressed by following set guidelines.

A major source of infections in hemodialysis patients is catheter related blood stream infections which arise due to vascular access via central venous catheters and are responsible for significant morbidity and mortality. (Ali et al., 2019). These infections are classified as exit site infection, tunnel infections, and catheter-related bacteremia with the latter being the most severe. CRBSI are particularly dangerous because they can lead to sepsis, multi-organ failure and even death. Studies indicate that catheter associated bloodstream infections is the second cause of mortality among end stage renal disease patients after cardiovascular disease((Landry & Braden, 2014). Given that these infections are often preventable, implementing robust infection prevention and control measures is paramount in reducing patient morbidity and mortality.

To curb and limit the morbidity and mortality from infectious complications of dialysis catheter use IPC measures need to be strengthened and enhanced. To this end there are several international infection prevention and control guidelines for dialysis patient. They include the Kidney Disease Outcome Quality Initiative, the European

Best Practice Guidelines and Centre for Disease infection prevention and control guidelines. The Centre for Disease Prevention and Control guidelines and recommendations for infection prevention and control in dialysis patients is considered the gold standard since it has been proven to be effective in reduction of catheter associated bloodstream infection across different facilities regardless of the setting. The CDC guidelines and recommendations range from dialysis checklist, audit tools and infection control observation charts. The infection control assessment tools are meant to reduce the rate of catheter associated bloodstream infections and as a result reduce the associated mortality and morbidity(CDC, 2016).

A systemic review conducted in USA found that implementation of the CDC core intervention for catheter care was associated with 20-50% reduction in bloodstream infection rates and hospitalization due to sepsis (Fisher et al., 2020).

In Kenya, infection prevention and control remain a priority in health care facilities. guidelines for healthcare services. The Kenya national infection prevention and control guidelines highlight that hospital acquired infections account for 10-25% of hospital admissions. However, despite these national guidelines, several critical gaps still persist. Many components of IPC are not fully implemented, largely due to inadequate funding, weak collaboration and insufficient surveillance. Notably, the national guidelines lack a dedicated section addressing IPC in the dialysis units, underscoring the need for more targeted infection control measures(*Kenya National Infection Prevention and Control Policy for Health Care Services*, 2021).

At Moi Teaching and Referral Hospital, infection prevention and control guidelines are in place to safeguard patient health. The hospitals IPC policy for hemodialysis unit emphasizes on key strategies such as safe and adequate water supply, immunization

of staff against hepatitis B, hand hygiene, use of PPEs, cleaning and disinfection of surfaces and tracking the occurrence of infection. However, the policy lacks comprehensive protocols for critical infection prevention aspects such as catheter connection and disconnection, exit site care, injectable medication preparation and administration and arteriovenous fistula and graft cannulation and decannulation (Moi Teaching and Referral Hospital:(2021) Infection Prevention and Control Guidelines for Health Care Service., 2020).

Infection prevention and control play a major role in curbing infection transmission. The net effect of this will be a drop in infection associated morbidity and mortality among hemodialysis patients. This study therefore, aims to describe infection prevention and control measures practiced by health care workers at the hemodialysis unit in MTRH, to assess the level of compliance to MTRH and CDC IPC guidelines by health care workers at the hemodialysis unit in MTRH and to explore individual and system level factors influencing compliance to IPC by health care workers at the hemodialysis unit in MTRH. This will be done through interviewer administered questionnaires, direct observations and in-depth interviews. It is envisaged that the findings of this study will help increase awareness and encourage implementation of recommended IPC practices in the hemodialysis unit.

1.2 Problem statement

Dialysis catheter-associated blood stream infections is a prominent cause of morbidity and mortality among patients with end stage renal disease. It is a serious and costly burden to both the patient and the health-care system. Despite this, application of infection prevention and control at the hemodialysis unit in our set up has not been evaluated/documentated. A study on hemodialysis catheter-related infection: rates, risk factors and pathogens done in Algeria found an incidence of 16.6 per 1000 catheter days and 10.8 per 1000 catheter days for catheter related infection and catheter related bloodstream infection respectively(Sahli et al., 2017).

Hemodialysis is currently widely available in Kenya and is even covered under the social health insurance fund for registered members. This has helped save lives but at the same time these patients have been predisposed to hospital acquired infections as they are highly susceptible. These infections can be classified as exit site infections, tunnel infection, bloodstream infections and metastatic infections like infective endocarditis, osteomyelitis, septic arthritis, spinal abscess etc. A systemic review titled central venous catheter in dialysis: the good, the bad, the ugly, the rate of catheter related bacteremia was 3.8-6.6 episodes/1000 days in patients with acute non-cuffed catheters and 1.6-5.5 episodes/1000 days in patients with tunneled catheters (Nabil J. Haddad, Sheri Van Cleef, 2012).

Catheter-related bloodstream infections do not only pose a serious risk to patient health, but also impose substantial economic burdens on patients and healthcare systems. For instance, in a study of patients undergoing hemodialysis, mean cost per hospitalization due to catheter-related bacteremia was found to be US \$23,451(Ramanathan et al., 2007). In more general hospital settings, CRBSI has been

associated with a marked increase in total hospital costs: a matched-case control study from China reported a median additional cost attributable to CRBSI of US \$3,528.6 per episode(Cai et al., 2018). In intensive care units, some reports have documented even higher incremental costs — one older study estimated that CRBSI added approximately US \$11,971 to hospital costs (after adjustment for illness severity and other confounders)(Warren et al., 2006). These figures reflect only direct medical costs (hospital bed, investigations, procedures, drugs), but do not account for indirect costs such as lost productivity, prolonged illness, or long-term morbidity, which likely amplify the burden further. As such, CRBSI represents a significant financial hazard reinforcing the urgency of rigorous infection prevention and control practices, especially in resource-constrained settings like our hemodialysis unit at MTRH.

In addition, these infections result in high mortality rates. Studies conducted in the United States of America have shown that infection is second to cardiovascular disease as a leading cause of death in patients with end stage renal disease undergoing dialysis with septicemia accounting for more than 75% of these infectious deaths(Sarnak & Jaber, 2000). According to a systematic review done between 1999-2012 patients dialyzed through catheters are 2–3 times more likely to be hospitalized for infection and to die of septic complications than dialysis patients with grafts or fistulas. Hemodialysis catheter associated bloodstream infection are one of the most common causes of fatal healthcare-associated infections among hemodialysis patients, with a mortality rate of 12%–25%(Boyce, 2012).

The center for disease control and prevention has evidence-based guidelines and recommendations that have been shown to reduce catheter related and associated infections among dialysis patients. These guidelines are considered the gold standard since they have been proven to be effective in reduction of catheter associated

bloodstream infections across different facilities regardless of the setting. In Kenya, there is the national IPC guidelines for healthcare services that were adapted from the World Health Organization guidelines. The national guidelines do not have a section specifically tailored for the dialysis units. In MTRH there is an infection prevention and control policy document. The section for the hemodialysis unit covers some but not all aspects of infection prevention and control covered in the CDC document. There is need to understand what the health care workers think about the international guidelines and whether they are applicable in our set-up.

This study is designed to determine whether healthcare workers comply to the MTRH guidelines for infection prevention and control as the primary guideline and CDC as the secondary guideline.

1.3 Significance

This study will help identify the reasons behind the catheter associated/related bloodstream infections that we are currently experiencing among the hemodialysis population and provide information on infection prevention and control to the healthcare workers. It will also inform the training needs where necessary and help in ensuring adherence to the IPC guidelines thus reduce the catheter related infection rates.

Additionally, the study will also help the policy makers in the hospital identify areas in infection prevention and control that need to be addressed via training and new policy implementation. Such interventions will be informed by gaps established when assessing the IPC measures practiced by nurses. The aim of the interventions to any identified gap will be to improve infection control in the hemodialysis unit.

Furthermore, the findings of this study will be useful in giving insights on level of compliance to IPC guidelines and identify gaps that need to be addressed in future. Additionally, the study findings will help improve the quality of care the hemodialysis patients receive by minimizing infection transmission during routine care in the hospital.

1.4 Research Questions

1. What are the infection prevention and control measures practiced by healthcare workers at the hemodialysis unit in MTRH?
2. What is the level of compliance to the MTRH and CDC infection prevention and control guidelines in the hemodialysis unit?
3. What are the individual and system factors influencing compliance to infection prevention and control guideline in the hemodialysis unit?

1.5 Objectives

1.5.1 Main objective

To evaluate the infection prevention and control measures practiced at the hemodialysis unit in MTRH.

1.5.2 Specific Objectives

1. To describe infection prevention and control measures practiced by healthcare workers at the hemodialysis unit in MTRH.
2. To assess the level of compliance to MTRH and CDC infection prevention and control guideline in the hemodialysis unit in MTRH.
3. To explore individual and system level factors influencing compliance to IPC guidelines at the hemodialysis unit in MTRH.

CHAPTER TWO

2.0 Literature Review

Chronic kidney disease (CKD) is a significant global health concern, categorized as a non-communicable disease (NCD). NCDs are responsible for approximately 71% of global mortality, with CKD playing a pivotal role in this burden (WHO, 2021). Although historically, infectious diseases have been the primary cause of morbidity and mortality in Africa, recent epidemiological shifts indicate that chronic illnesses such as CKD are rapidly emerging as leading contributors to disease burden (Matsha & Erasmus, 2019). This transition underscores the necessity for improved screening, early diagnosis, and intervention strategies to curb the rising prevalence and associated complications of CKD. The treatment of choice for end stage renal disease is kidney transplant but because of lack of available organs, most patients rely on dialysis as a life-sustaining measure (Millson, 2022).

The proliferation of hemodialysis centers nationwide has significantly improved survival rates among patients with end-stage renal disease (ESRD). However, this increase has been accompanied by several challenges, primarily the high incidence of infections. Among dialysis patients, infections represent the second most common cause of morbidity and mortality, following cardiovascular diseases. These infections often stem from prolonged use of vascular access devices, inadequate infection prevention practices, and immunosuppression associated with CKD. Addressing these issues requires a multifaceted approach that includes stringent infection control protocols, patient education, and enhanced healthcare infrastructure.

2.1 Epidemiology

Chronic kidney disease is a growing public health concern in Kenya with an estimated four million individuals currently affected. Projections indicate that this number will rise to approximately 4.8 million by the year 2030. Among those with chronic kidney disease, around ten thousand individuals have progressed to end-stage renal disease, the most advanced stage of kidney disease that necessitates renal replacement therapy such as dialysis or kidney transplant. About ten percent of these individuals are on dialysis (Kenya Renal Association, 2019).

A population-based study conducted in rural East Africa utilized serum-based creatinine estimated glomerular filtration rate of $<60\text{ml/min/1.73m}^2$ or proteinuria (urine dipstick >1) to determine the prevalence of chronic kidney disease in the community. The findings revealed notable regional variations in CKD prevalence. In Western Kenya the prevalence was 3.7% whereas in Eastern Uganda it was considerably higher at 12.5%. Meanwhile, in South-western Uganda the prevalence stood at 3.9% (Muiru et al., 2020).

According to the Kenya Renal Registry, hypertensive renal disease and diabetic nephropathy are the leading causes of kidney diseases among patients receiving renal replacement therapy. Despite the increasing burden of kidney disease, there is a lack of formal studies to determine the incidence and prevalence of end-stage kidney disease /stage 5 chronic kidney disease in the country. Informal estimates suggest that fewer than half of the patients requiring renal replacement therapy have accessed to it, further underscoring the need for improved health care policies and resource distribution. Data from the Kenya renal association indicate that the approximate number of patients on dialysis increased from 2400 in 2018 to 5670 in 2021. This rise in demand has been met with a corresponding increase in the number of dialysis centers

across the country to a total of 214 dialysis facilities. These are distributed across different health sectors, 54 in public hospitals, 143 in private facilities and 17 in faith-based hospitals across the country. (*Kenya Renal Association*, 2019).

One of the major complications associated with hemodialysis is catheter related infections which are classified into three main types: exit site infection, tunnel infections and catheter related blood stream infections with the latter being the most severe. Several risk factors contribute to the development of catheter related blood stream infection (CRBSI) including patient, catheter and operator-related factors. Patient-related factors that increase risk of blood stream infection include increasing severity of illness, granulocytopenia, compromised integrity of the skin, and presence of distant infection. The type of catheter used also plays a role in the likelihood of blood stream infection with the risk of blood stream infection increasing as the number of catheter lumen rises. The use of antiseptic or antimicrobial coating of catheters has been shown to reduce risk of CRBSI. Furthermore, the risk of blood stream infection varies based on the anatomical site of catheter insertion. Non-tunneled catheters placed in the groin carry the highest risk, intermediate for neck insertion, and lowest for chest or upper extremity insertion. Additionally, breaches in aseptic technique during catheter insertion and maintenance, along with frequent catheter access further increases the likelihood of blood stream infection (Shah et al., 2013).

A systemic review on the prevention and management of catheter related infection among hemodialysis patients found that the incidence of catheter related infections ranges between 0.6 and 6.5 episodes per 1000 catheter days. The majority of catheter related bacteremia isolates were gram-positive organisms (52–84%). Among these, *Staphylococcus aureus* was the predominant causative agent accounting for between

21 and 43% in most cases. Furthermore, methicillin-resistant *S. aureus* (MRSA) was reported in approximately 12–38% of infections complicating treatment due to antibiotic resistance. Several risk factors have been associated with the development of catheter related bacteremia, including poor patient hygiene, previous catheter related bacteremia, recent hospitalization, longer duration of catheter use, inadequate dialysis, hypoalbuminemia, *S. aureus* nasal carriage, diabetes mellitus, immunocompromised status, atherosclerosis, and hypertension. In severe cases, CRBSI lead to metastatic infectious complications in 3–44% of episodes. These complications included: endocarditis, osteomyelitis, thrombophlebitis, septic arthritis, spinal epidural abscess, and large atrial thrombi (Lok & Mokrzycki, 2011).

A retrospective cross-sectional study investigating catheter-related blood stream infections and its associated risk factors among hemodialysis patients documented one hundred thirty-five (38.2%) catheter related blood stream infections with an incidence rate of 7.74 episodes per 1000 catheter days. Unlike other studies, this study identified gram-negatives (57.6%) as the causative agent. Several independent risk factors were identified including, previous central venous catheter infection, high white blood cell count, urban residence, and low hemoglobin level were independently associated with catheter-related blood stream infections. These findings highlight the multifactorial nature of CRBSI and need for targeted interventions to mitigate infection rates (Weldetensae et al., 2023).

A retrospective cohort study conducted in the Philippines examined the epidemiology and microbiology of central venous catheter related blood stream infections among hemodialysis patients. The study reported an incidence rate of 6.72 episodes per 1000 catheter days, with a relapse rate of 5.08%, a reinfection rate of 15.74%, and a mortality rate of 6.09%. Identified risk factors included autoimmune disease, dialysis

frequency of more than three times per week, use of central venous catheter for either blood transfusion or intravenous medications, renal hypoperfusion, drug-induced nephropathy, and hypertensive kidney disease. Based on these findings, the researchers emphasized the importance stringent measures and interventions to prevent the propagation of identified pathogens, such as a review of sterile technique and adequate hygiene practices, continued surveillance, and expedited placement and utilization of long-term access for patients on maintenance hemodialysis(Pasilan et al., 2024).

A prospective multicenter study investigating catheter related blood stream infections in tunneled hemodialysis catheters documented a total of 130 tunneled hemodialysis catheter insertion in 123 patients. There were 34 879 catheter-days. The study identified twelve catheter related blood stream infections in 11 patients with a CRBSI rate of 0.34/1000 catheter-days. The majority of the infections (91.7%) was caused by gram-positive cocci. Patients with a history of vascular disease as the underlying cause of renal disease and those with previous tunneled hemodialysis catheter were found to be at a higher risk for CRBSI. Infection resolution was achieved in 83.3% of the cases while the overall mortality rate was 14.6%. In two instances (2/11) death occurred within 30 days after CRBSI onset(Martín-Peña et al., 2012). These findings underscore the importance of proactive infection prevention measures and careful patient monitoring to improve the outcome in hemodialysis patients.

2.2 Pathogenesis of catheter related infections

Catheter related blood stream infections arise from a complex interplay of multiple factors that contribute to their pathogenesis. The development of CRBSI is influenced by both intrinsic and extrinsic factors which can be categorized into four primary

pathogenic pathways. These pathways include (1) colonization of the catheter tip and surrounding cutaneous tract by microorganism originating from patients' skin flora; (2) contamination of catheter lumen due to improper handling or breaches in aseptic techniques; (3) hematogenous seeding of the catheter from another infected site; and (4) introduction of microorganisms through contaminated infusate solutions. Each of these mechanisms play a role in the establishment and progression of infection, ultimately leading to systemic involvement if not promptly addressed. Several risk factors predispose patients to CRBSI, making certain populations more vulnerable to these infections. These factors include underlying comorbid conditions such as diabetes mellitus and peripheral atherosclerosis both of which compromise host defense mechanisms. Technical aspects of catheter insertion such as insertion technique, site of catheter insertion, duration of catheter use and purpose of catheterization also influence infection risk. Additional risk factors include contamination of dialysate or dialysis equipment, inadequate water treatment, dialyzer re-use, older age, administration of higher cumulative doses of intravenous iron, increased use of recombinant human erythropoietin , lower hemoglobin level, lower serum albumin level and recent hospitalization or surgery(Gahlot et al., 2014).

There are two main routes by which microorganisms gain entry into the blood stream to cause catheter related blood stream infection: an extraluminal route and an intraluminal route. The extraluminal route is the most relevant during early phase after catheter insertion and is largely driven by migration of skin flora. When a catheter is inserted, skin microorganisms come into direct contact with the external surface of the catheter. Before the exit site undergoes complete healing and reendothelialization, these microorganisms can migrate along the subcutaneous tract towards the catheter tip. Once the catheter tip is colonized, hematogenous spread may

occur, particularly when normal flow dynamics are disrupted during dialysis. This can lead to establishment of blood stream infection. On the other hand, intraluminal route is a persistent risk factor throughout the entire lifespan of the catheter. This pathway is primarily linked to the contamination of catheter hubs, caps or injection ports due to direct contact with contaminated hands, clothing or medical equipment. Health care workers handling the central venous catheters and patient themselves can inadvertently introduce infections while handling catheter ports. Once the microorganism gain access to the catheter lumen, they adhere to the internal surface forming biofilm that protects the bacteria from the host immune responses and antimicrobial treatment. This biofilm formation enhances the risk of persistent or recurrent infections often necessitating catheter removal and antibiotic therapy(Lok & Mokrzycki, 2011).

The pathogenesis of CRBSI varies depending on the type of catheter used. Non-tunneled catheters are more prone to extra-luminal colonization where microorganisms primarily originate from the skin and migrate down to the catheter tip. Less commonly, hematogenous spread from another infected site or intraluminal colonization can lead to spread of infection. In contrast, tunneled central venous catheters which are commonly used in long-term hemodialysis, are more frequently associated with intraluminal contamination. Here, pathogens primarily enter through the catheter hub, leading to biofilm formation and persistent colonization(CDC, 2015).

The spectrum of microorganisms responsible for CRBSI varies depending on catheter type, patient comorbidities and health care settings. Coagulase-negative staphylococci, particularly *Staphylococcus epidermidis* are the most commonly isolated pathogens in both peripheral and central venous catheter infections. This is

largely due to their ability to form biofilms which provide protection against antibiotics and immune system clearance. *Staphylococcus aureus* is another major pathogen associated with catheter infections particularly in patients with frequent hospitalizations, diabetes or chronic illnesses. Additionally, gram negative bacteria such as *Enterobacteriaceae* species (*Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter* spp.) were frequently implicated in peripheral catheter infections. These pathogens pose a serious challenge due to their increasing antibiotic resistance and their ability to cause severe systemic infections (Ruiz-Giardin et al., 2019).

2.3 Hemodialysis and its complications

Hemodialysis is a critical life-saving procedure that serves as an artificial replacement for lost kidney function in patients where a dialysis with renal insufficiency. This process involves the use of a dialysis machine and a special filter known as dialyzer that performs the essential function of removing metabolic waste products, excess fluids and toxins from the body (NKF, 2015). Hemodialysis is typically done multiple times a week using central venous catheters. CVCs can either be temporary (non-tunneled) or permanent (tunneled). A tunneled catheter is inserted through a small incision in the skin and then tunneled under the tissue to reach a vein. Tunneled catheters are intended for long-term use (weeks to months) as they are less prone to infection due to their subcutaneous placement. In contrast, non-tunneled catheters are inserted directly into a large vein without subcutaneous tunneling. Non-tunneled catheters are designed for short-term use typically ranging from a few days to a few weeks and carry significantly higher risk of infection due to their direct external access to the blood stream.

Beyond catheters, another form of vascular access is the arteriovenous fistula or graft. An arteriovenous fistula is created surgically by connecting an artery directly to a vein, leading to gradual enlargement of the vein over time making it more suitable for repeated needle insertions during dialysis. The AV fistula is widely considered the gold standard for hemodialysis access since it is created from the patient's own blood vessel, reducing the risk of complications such as infection and thrombosis. On the other hand, an AV graft is a synthetic tube implanted to connect an artery and vein. While AV grafts can be used sooner than fistulas following placement, they carry a higher risk of infection and clot formation making them a less preferred alternative.

Infections related to vascular access remain one of the most pressing complications in hemodialysis patients. Infection is a leading cause of hospitalization and the second-leading cause of mortality among patients on hemodialysis. The frequent need to access the blood stream several times per week during dialysis sessions inherently increase the risk of blood stream infections. Additionally, indirect factors related to chronic renal insufficiency such as malnutrition and uremia as well as comorbid conditions like diabetes mellitus make these patients more susceptible to infection. The type of vascular access used significantly influences the risk of infection varies with central venous catheters carrying a risk that is seven times higher than an arteriovenous fistula. The risk of infection remains high both in inpatient and outpatient setting, underscoring the importance of infection prevention and control (Millson, 2022).

A retrospective study conducted on catheter related infections in chronic hemodialysis patients aimed to assess both the clinical impact and economic burden of these infections. The study recruited 75 admitted catheter dependent hemodialysis patients and followed them over a period of 15 months. The findings revealed that 51% of

patients developed bacteremia with an overall infection incidence rate of 5.79 per 1000 catheter days. Moreover, metastatic complications were observed in 21% of the patients with bacteremia and these complications were associated with significantly higher mortality rates. From an economic perspective, health care costs were notably higher in patients with complicated bacteremia with medical expenses being 47% greater in those who experienced severe infections. Furthermore, patients who initiated dialysis using catheters compared to those transitioning from catheter-based access to AV fistula incurred 45% higher medical costs. Based on these findings the study recommended prioritizing the early placement of arteriovenous fistula to reduce both healthcare costs and infection rates(Ştefan et al., 2013).

A study conducted in Kenyatta National Hospital provided further insight into hemodialysis initiation practices and catheter-related complications. According to the study, almost three out of every four patients were initiated on dialysis as an emergency procedure with approximately 80% of them relying on acute(non-tunneled) catheters placed in either the jugular/subclavian vein. Despite non-tunneled catheters being intended for short term use, the study found that after three months 40% of the patients still had their original acute catheters in place. This prolonged use heightened the risk of complications including vascular thrombosis and infections. Additionally, approximately 40% of the patients had transitioned to tunneled catheters after three months. Catheters were found to be associated with high rates of complication including vascular thrombosis and infections (Kabinga et al., 2019).

Dialysis catheter-associated blood stream infections remain a prominent cause of morbidity and mortality among patients with end stage renal disease. These infections pose a significant burden on both the patient and the health care system due to increased hospitalization rates, prolonged treatment durations and the associated

financial costs. A study on hemodialysis catheter related infections among patients on maintenance hemodialysis at KNH found that the most common reason for catheter replacement with the first six months of insertion was catheter-related infection. Notably, thirty-five percent of the patients reported antibiotic use in the first month due to catheter related infection. The study identified exit site infections as the most prevalent type with a reported incidence of 58% followed by tunnel infection which had a prevalence of 14%(Ngigi, 2005).

A retrospective cohort analysis investigating dialysis catheter related bloodstream infection among patients receiving hemodialysis exclusively on an emergency basis included 329 participants. The study population was predominantly Hispanic (90%) with 60% having diabetes, and the average age of 51 years. Over the study period, a total of 101 catheter related bloodstream infections (CRBSIs) were documented, translating to an infection rate of 0.84 infections per 1000 catheter-days. The study identified cirrhosis and prolonged hemodialysis duration as key factors associated with increased risk of CRBSI. Additionally, seventeen cases of CRBSIs were recurrent; with gram-positive bacterial infections being the strongest predictor of recurrence. The study emphasized the importance of adherence to infection prevention guidelines. CRBSI was associated with prolonged hospitalization , a composite complication rate of 8%, and a 4% mortality rate(Zhang et al., 2019).

Another prospective study assessed hemodialysis catheter related infections rates, risk factors and common pathogens. Over the study period, 34 central venous catheter-related infections were recorded, representing an infection incidence of 16.6 per 1000 catheter days. Among these infections, 12 cases were classified as local infection with an infection rate of 5.8 per 1000 catheter days while 22 cases were catheter-related blood stream infection with an infection rate of 10.8 per 1000 catheter days. Local

infection was tested for 125 catheters. Among 30 blood cultures done in suspected catheter-related blood stream infection patients, eight were negative. Notably, deficiencies in hand hygiene and improper skin disinfection prior to catheter insertion were implicated in 58.8% and 88.8% of CVC-related infection respectively(Sahli et al., 2017).

In Ghana, a study on prevalence of catheter related blood stream infection (CRBSI) in found an overall CRBSI prevalence of 34.2% (52/152). Among these cases, 53.9% were classified as possible CRBSI while 11.5% met the criteria for definite CRBSI. Analysis of positive cultures revealed that 62% were obtained from catheter sites with the remaining cultures originating from peripheral blood samples. The study also found that gram-negative bacteria accounted for 53% of the positive cultures while the remainder were gram positive bacterial infections(Opoku-Asare et al., 2023).

2.4 Standard and transmission-based precautions.

Standard precautions are the foundational infection prevention measures designed to reduce the risk of transmission infectious pathogens in health care settings. These precautions apply universally to all patients, regardless of their practices their diagnosis or presumed infection status, ensuring baseline protection against all potential pathogens. The key components of standard precautions involve included strict adherence to hand hygiene protocols, appropriate use of personal protective equipment such as gloves, gowns and face shields, proper respiratory hygiene, appropriate patient placement based on infection risks, meticulous handling and processing of textile and laundry and adherence to safe injection practices. Each of these practices play a crucial role in reducing the likelihood of pathogen transmission in health care setting particularly in settings such as dialysis units where patients are

highly vulnerable to infections due to frequent vascular access procedures and immunosuppression (Millson, 2022).

In addition to standard precautions, transmission-based precautions are implemented in cases where patients are known or suspected to be infected with pathogens that require additional protective measures to prevent their spread. These precautions are categorized based on the mode of transmission: contact precautions for infections spread through direct or indirect physical contact, droplet precautions for respiratory pathogens transmitted via large respiratory droplets and airborne precautions for infections that spread through aerosolized particles. In hemodialysis units where patients undergo frequent invasive procedures, the risk of transmission through direct contact, contaminated surfaces and airborne particles is particularly high, necessitating strict adherence to these preventive measures (Millson, 2022).

Infection prevention and control within dialysis units is one of the most crucial aspects of patient safety and overall quality of care. Due to the nature of dialysis, patients with end stage renal disease are at an increased risk of developing various infections including bloodstream infections, localized infections of vascular access sites, blood-borne infections such as hepatitis B and C and airborne respiratory infections. The necessity of repeated vascular access creates multiple opportunities for pathogens to enter to enter the blood stream, leading to potentially life-threatening complications. A significant factor contributing to health care associated infections is contaminated health care workers hands. Studies have shown that improper hand hygiene remains one of the most common modes for pathogen transmission with health care facilities (Ayman Karkar,2018).

One of the primary concerns in hemodialysis units is prevention of catheter related bacteremia which are among the leading causes of morbidity and mortality in dialysis patients. Core prophylactic measures to prevent catheter related bacteremia begin with the routine CVC care performed diligently by the health care workers during each dialysis session. Both the patient and the health care worker should adhere to universal precautions including proper hand hygiene, use of sterile gloves and disinfection protocols before handling catheters. The Kidney Disease Outcomes Quality Initiative (KDQI) guidelines emphasize the importance of wearing a mask during catheter manipulation and using appropriate antiseptic solutions for cleaning catheter sites. Recommended solutions include 2% chlorhexidine combined with alcohol, 70% alcohol alone or 10% povidone iodine solution. The use of these antiseptics has been shown to reduce the risk of catheter site infections and subsequent bloodstream infections (Lok & Mokrzycki, 2011).

Several studies have highlighted the importance of the use of standardized protocols in reducing catheter related infections. A study in North-Western Nigeria assessed the knowledge and practices of infection control among health care workers, revealing that 87.9% of respondents correctly identified hand washing as the most effective method to prevent health care associated infections. However, adherence to hand hygiene was significantly higher among nurses at 76% compared to doctors (52%) emphasizing the need for continuous training and reinforcement of infection prevention practices. The study also found gaps in compliance indicating that while health care workers were aware of the best practices, practical adherence remained a challenge (Iliyasu et al., 2016).

Another study in Northern Nigeria evaluated infection control and practice of standard precautions among healthcare workers. The findings showed that while

77.9% of the respondents correctly described universal precaution, actual compliance with infection measures varied. For example, 70.1% of workers reported always wearing gloves before handling patients or patients' care products but only 12.6% washed their hands before wearing the gloves and just 10.7% washed their hands after removal of gloves. Moreover, 72.4% of participants reported changing between patients. One of the most frequently cited barrier to compliance was the unavailability of personal protective equipment (Amoran & Onwube, 2013).

Quality improvement initiatives have demonstrated substantial success in reducing infection rates in hemodialysis setting. A comprehensive study conducted across seventeen outpatient hemodialysis units in the United State of America found that a combination of targeted IPC interventions led to a 54% reduction in access related blood stream infections. The interventions included the use of chlorhexidine use for catheter exit-site care, regular staff training, hand hygiene reinforcement, competency assessment focused on catheter care and aseptic technique and frequent feedback on adherence and infection rates. This study underscored the importance of continuous education and structured infection control programs in achieving long term improvements in patient safety (Patel et al., 2013).

Similarly, a study conducted in Gaza, Palestine, assessed the compliance of health care workers with infection control precautions in hemodialysis units. The findings revealed that while 79.2% of health care providers had adequate knowledge of IPC measures, only 56% consistently practiced proper hand hygiene. Additionally, 87% used personal protective equipment appropriately but only 36% adhered to safe waste disposal practices. The study concluded that inadequate enforcement of infection prevention policies and lack of hospital management support contributed to the suboptimal adherence among health care workers. It recommended the development

of specific IPC guidelines tailored for dialysis units, alongside continuous training programs to improve compliance (Tabash et al., 2018).

A cross-sectional study conducted in Abba city, Saudi Arabia further reinforce these findings by evaluating knowledge, attitude and practices of nurses regarding infection control in the dialysis units. Using observational checklists and structured questionnaires, the study found notable gaps in IPC compliance particularly in hand hygiene (15-18%), simultaneous care of both infected and non-infected patients (24.7%) and recapping of needles after use (25.6%). The study highlighted the direct correlation between nurses attitude towards IPC and their adherence levels, suggesting that training programs should focus not only on knowledge dissemination but also on fostering positive attitudes towards infection prevention (Al Qahtani & Almetrek, 2017).

A systematic review analyzing infection control compliance in hemodialysis facilities found that suboptimal adherence to prevention practices was a key factor in infection acquisition. The review concluded that achieving 100% compliance with recommended infection prevention control guidelines is essential to prevent infections in dialysis units. Among the recommended strategies to improve adherence were active engagement of medical directors and nephrologists as champions of infection control practices and the engagement of the patients and their families in infection prevention efforts. By incorporating patients into IPC initiatives, health care facilities can foster a culture of safety and shared responsibility for infection prevention (Vijayan & Boyce, 2018).

Another study examined dialysis catheter management practices across selected hemodialysis units in Australia and New Zealand revealing significant variations in

catheter insertion and maintenance protocols. In 60% of the surveyed units, catheters were inserted by physician or physician trainees and prophylactic antibiotics were used with tunneled catheters in 21% of the units. Notably, catheter associated-bacteremia was reported in 100% of the dialysis units in New Zealand and 84% of those in Australia. The study attributed the variations in the IPC practices to reasonable differences in local conditions, costs and product availability. While some dialysis units adhered to the use of guideline recommended prophylactic measures, implementation was not universal. However, the implementation of catheter associated infection reduction strategy resulted in reduction by 12% of the catheter associated bacteremia over a 12month period in New Zealand, reinforcing the importance of standardized, evidence-based infection control protocols in dialysis units (B. Smyth, 2019).

Despite the availability of robust IPC guidelines, adherence remains inconsistent across different health care settings. A study conducted in Quebec; Canada assessed infection control practices in hemodialysis units related to preventing vascular access blood stream infections. The survey was based on CDC and the National Kidney Disease Outcome Quality Initiative guidelines and found that while Ninety-four percent of the center's where central venous catheters were inserted had a written insertion protocol, compliance with practice guidelines was good except for full body draping during insertion (79%) and ointment use at the insertion site (3%). Additionally, while most centers followed the recommended catheter maintenance protocols, skin disinfection compliance remained suboptimal at 67%. The study concluded that improving standardization of care in line with established guidelines is necessary to enhance infection prevention in hemodialysis settings (Trépanier et al., 2014).

Similarly, a multicenter cross-sectional study carried out in Shiraz, Iran on improving infection prevention methods in hemodialysis units found that negligence in various aspects of infection prevention and control contributed to infections experienced by the unit. The study emphasized the importance comprehensive staff education and training programs, establishing effective surveillance systems and enforcing regulations in the hospital as some of the ways to curb infection transmission. The study recommended the development of structured training programs to enhance awareness and adherence among health care workers, as well as continuous monitoring to ensure compliance with infection prevention protocols(Askarian et al., 2014).

A prospective three phase observational study on hand hygiene during dialysis treatment found that increasing the frequency of hand rubs was associated with a significant improvement in overall hand hygiene adherence. The study demonstrated that a more than 100% increase in hand hygiene compliance could be achieved by optimizing hand hygiene protocols and reinforcing standard operating procedures. These findings highlight the critical role of structured interventions such as frequent reminders, visual cues and staff training in improving compliance with IPC measures(Scheithauer et al., 2012).

A study assessing the knowledge, attitude and practices of nurses regarding infection prevention and control in El-Hawwary renal dialysis center in Benghazi city, Libya found significant gaps in adherence to infection prevention measures. The study reported that between 18 to 24% of nurses failed to comply with recommended handwashing practices, reflecting a deficiency in knowledge and awareness of protocols. The study recommended that the ministry of health take proactive measures

to educate health care workers about hospital acquired infection prevention through academic courses, awareness campaigns and conferences. Additionally, implementation of strict infection control policies was suggested as a means of improving compliance and reducing infection risks in dialysis units (Mukhtad et al., 2019).

A cross-sectional descriptive study was conducted in Kenyatta National Hospital on the level of compliance to proposed hemodialysis treatment standards by nurses in the hemodialysis unit. The study found that ninety-two percent of the respondents had received nephrology training and there was a significant association between nephrology training and compliance levels to IPC treatment standards. Most of the respondents had moderate compliance. There was no significant association between the years of experience working in the dialysis unit and compliance to proposed treatment standards. However, overall compliance remained moderate with notable deficiencies in pre-dialysis and post dialysis patient assessments which directly impacted on quality of care. The study recommended conducting regular audits of compliance with IPC standards and providing appropriate feedback to health care workers to enhance adherence and improve patient outcomes (Kereu et al., 2017).

A cross-sectional study conducted in MTRH in Kenya examined short term complications associated with vascular access in hemodialysis patients. The study found that 4.7% of the patients developed infectious complications related to catheter use. The most commonly isolated bacterial organism from blood and catheter tip cultures included coagulase negative staphylococcus species, staphylococcus epidermidis and Escherichia coli. These findings underscore the persistent risk of blood stream infections in dialysis patients and highlight the importance of strict infection prevention measures, including appropriate catheter handling, skin antisepsis

and routine microbial surveillance to identify and manage infections promptly (Momanyi, 2021).

A passive surveillance report at MTRH based on doctor-reported cases recruited 16 patients with CRABSI. Among them, 50% (8) developed infective endocarditis as a complication with a mortality rate of 12.5% (unpublished data).

2.5 Health Belief Model (HBM)

The Health Belief Model is a psychological theoretical framework used to predict and explain health behaviors by examining individuals beliefs and perceptions about health conditions (Rosenstock et al., 1988) . It was originally developed in the 1950s by a group of social scientists at the United States public health service to understand why people failed to participate in free tuberculosis screening programs. Over the decades, the model has been refined with significant updates in the 1980s to incorporate self-efficacy as a key determinant in behavior change (Glanz, K., Rimer, B.K. and Lewis, F.M., 2002). The model is based on the premise that an individual's willingness to engage in health promoting behavior is primarily affected by their perceptions of health risks and benefits.

HBM was why individuals do not adopt disease prevention strategies despite available health campaigns and resources. It has since been widely applied to various health behaviors, including infection prevention and control practices in hospital settings (Hayden, 2013). HBM is a well-validated model that has been applied in infection prevention and control in the hospital setting (Cox et al., 2015). The model posits that people are largely rational in their decision making regarding health and will take actions they believe are in their best interest (Janz & M. H. Becker, 1984). The constructs of the model have been extensively used in health promotion

campaigns worldwide and encourage individuals to adopt preventive measures such as vaccinations, hand hygiene compliance and medication adherence (*Glanz, K., Rimer, B.K. and Lewis, F.M., 2002*).

In this study, the HBM was applied to assess individual and system level factors influencing health care workers compliance with IPC guidelines in the hemodialysis unit. Compliance with these guidelines is crucial in preventing health care associated infections particularly among immunocompromised dialysis patients. Understanding how health care workers perceive their susceptibility to infections, the severity of non-compliance, the benefits of IPC measures and the barriers to adherence will be valuable insights into improving infection control strategies.

There are six main constructs of health belief model: perceived severity, perceived susceptibility, perceived benefit, perceived barriers, cues to action and self-efficacy.

Perceived susceptibility.

Perceived susceptibility refers to an individual's assessment of their personal risk of contracting disease. The higher their perceived susceptibility, the more likely an individual is to engage in preventive behavior (*Glanz, K., Rimer, B.K. and Lewis, F.M., 2002*). For example, a health care worker who believes they are at a high risk of contracting a hospital acquired infection due to poor hand hygiene is likely to comply with handwashing protocols. However, studies have shown that many health care workers underestimate their susceptibility to infections leading to poor adherence to IPC measures (*Heid et al., 2015*).

A study on antimicrobial stewardship in the United States revealed that although patients recognized antibiotic resistance as a serious public health concern, they perceived themselves to be low risk of personal harm. This misperception was largely

influenced by trust in physicians and lack of understanding of resistance mechanisms (Heid et al., 2015). This finding underscores the importance of addressing perceived susceptibility in health care setting to improve compliance with IPC measures.

Perceived severity.

Perceived severity refers to an individual's beliefs about the seriousness of a disease and its potential consequences. This assessment includes both medical implications such as morbidity and mortality and social consequences such as financial burden or loss of work productivity (Glanz, K., Rimer, B.K. and Lewis, F.M., 2002). In context of IPC compliance, if health care workers perceived hospital acquired infections as a severe threat to patient safety and their own health, they were more likely to adhere to infection control protocols.

Perceived severity can be influenced by personal experiences, professional training or witnessing negative health outcomes due to non-compliance. For instance, a study found that when health care workers observed colleagues or patients suffering from infections due to lapses in hygiene protocols, their perception of severity increased leading to improved compliance (Huis et al., 2012).

Perceived benefits.

Perceived benefits refer to an individual's belief in the efficacy of a health behavior in reducing disease risk. If an individual perceives a certain action as beneficial in preventing illness, they are more likely to engage in it (Glanz, K., Rimer, B.K. and Lewis, F.M., 2002). In an IPC setting, health care workers who believe that hand hygiene effectively reduces the transmission of infections are more likely to comply with hand washing protocols.

Several studies have highlighted the role of perceived benefits in promoting behavior change. For example, health care workers who understand that wearing personal protective equipment minimizes their exposure to pathogens are more likely to use it consistently. Educational interventions have been shown to significantly improve adherence (Cox et al., 2015).

Perceived barriers

Perceived barriers are the obstacles individuals believe prevent them from adopting a health behavior. These barriers can be physical e.g. lack of resources, psychological e.g. fear of side effects, financial or social (Glanz, K., Rimer, B.K. and Lewis, F.M., 2002). Among health care workers, common barriers to IPC compliance include time constraints, lack of proper hand hygiene facilities and perceived low risk of infection.

Perceived barriers are often the most influential determinant of behavior change. Research has shown that reducing barriers such as by making hand sanitizers more accessible or ensuring adequate PPE supplies leads to improved compliance (Huis et al., 2012). Addressing these barriers through workplace interventions including staff training and institutional support is critical to ensuring adherence to IPC guidelines.

Cues to action

Cues to action are triggers that motivate an individual to engage in health behaviors. These can be external e.g. reminders from supervisors, media campaigns or internal e.g. experiencing symptoms of illness (Janz & M. H. Becker, 1984). In hospital settings, cues to action may include mandatory IPC training, visual reminders e.g. posters on hand hygiene or leadership encouragement to practice IPC.

Studies have shown that frequent reminders and real time feedback from supervisors can enhance IPC compliance. In a systemic review, interventions incorporating cues

to action such as hospital wide infection control campaigns and active monitoring of hand hygiene were associated with higher compliance rates(Huis et al., 2012).

Self-efficacy

Self-efficacy refers to an individual's confidence in their ability to successfully perform a health-related behavior. It was added to the health belief model in the 1980s to account the role of personal confidence in behavior change(Janz & M. H. Becker, 1984). Health care workers who feel competent in executing IPC measures such as proper donning and doffing of PPE are more likely to adhere to them.

Training programs that enhance self-efficacy have been effective in improving compliance. For instance, simulation-based training and peer mentorship programs have been shown to significantly boost confidence in performing infection control procedures leading to sustained behavioral change(Cox et al., 2015).

The HBM provides a useful framework for understanding and addressing IPC compliance among health care providers. By assessing how individuals perceive susceptibility, severity, benefits and barriers, interventions can be tailored improve compliance to IPC protocols. Strategies such as targeted education, removing structural barriers, providing frequent reminders and enhancing self-efficacy through training can significantly improve IPC compliance.

In context of this study, HBM was used to examine factors influencing health care workers with IPC guidelines in the dialysis unit. Understanding their perceptions and barriers to compliance provided insights into improving infection control strategies, ultimately improving patient safety.

2.6 Theoretical framework of health belief model (HBM)

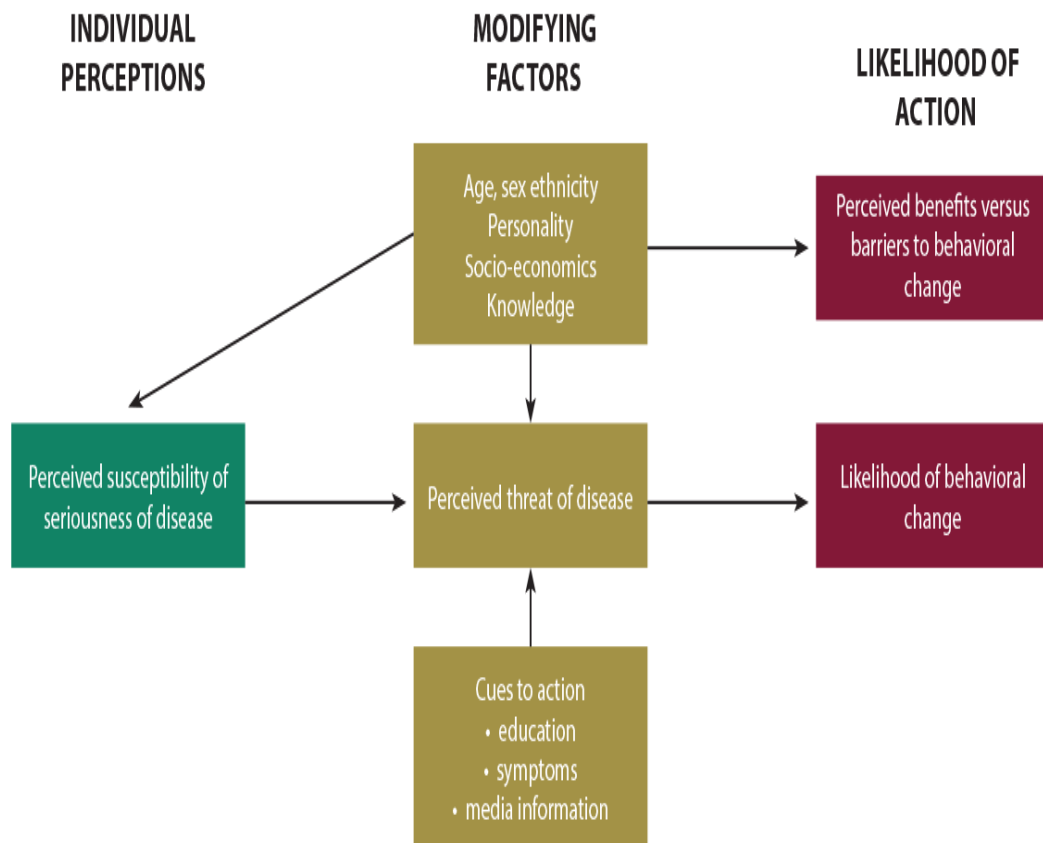


Figure 1: Theoretical framework of health belief model (HBM)

CHAPTER THREE

3.0 Methodology

3.1 Study design

This was a facility based convergent parallel mixed-method study conducted among health care providers stationed in the hemodialysis unit in Moi Teaching and Referral Hospital. It combined elements of quantitative and qualitative research in order to answer the research questions. Below is a breakdown of study design per objective:

Objective 1- Quantitative. Data was collected using an interviewer administered questionnaire.

Objective 2- Quantitative. Data was collected using IPC observational checklists.

Objective 3- Qualitative. Data was collected through in-depth interviews.

3.2 Study area

The study was carried out in the hemodialysis unit in MTRH. The hospital is located within Eldoret town, Uasin Gishu County, 350 kilometers North West of Nairobi, Kenya. The map coordinates for MTRH are 0.5117° N ,35.2805°E. Uasin Gishu County is mainly an agricultural region with both small-scale and large-scale farming. It has a mixed urban, peri-urban and rural population.

MTRH is ranked as a level six health facility by the Ministry of Health. It serves as a teaching hospital to the Moi University School of Medicine, Dentistry, Nursing and Public Health. Other institution like the Kenya Medical Training College (KMTC) and University of Eastern Africa Baraton etc. also utilize MTRH as a training facility. It is the second largest referral hospital in Kenya and serves as the main referral hospital for the Western part of Kenya and North rift. It has a catchment population of approximately 1.3 million people.

The hospital is an 800-bed capacity tertiary hospital. Services provided range from primary care to specialist and sub-specialist care. The hemodialysis unit is located in the Chandaria Cancer and Chronic Diseases Centre on the second floor. The unit is divided into three rooms, a pediatric dialysis room, an isolation room for the hepatitis B positive patients and a third room for hepatitis B negative patients. The unit has thirty dialysis machines with three of the machines designated for hepatitis B positive patients. A different room is designated for Hep B positive patients. The unit attends to an average of 45 patients per day. The staff in the renal unit include: three nephrologists, three medical officers, thirty-three nurses, one nutritionist, one psychological counsellor, one social worker, two patient attendant, two cleaners, one health records officer and one unit secretary. The unit operates 24 hours per day with an average of seven nurses per shift.

3.3 Study period

The study was conducted over a six-month period between March 2023 to August 2023. During the first three months, observations using IPC checklists were made. The remaining three months interviewer administered questionnaires and in-depth interviews were done.

3.4 Target population

The target population was all health care providers in the hemodialysis unit with patient contact i.e. consultant nephrologists, nurses, medical officers, clinical officers, patient attendants and cleaners.

3.5 Study population

Health care providers who gave a written informed consent to participate in the study.

3.6 Eligibility criteria

3.6.1 Inclusion criteria

Health care providers stationed in the MTRH hemodialysis unit during the study period who gave an informed written consent regardless of how long they had been stationed in the unit.

3.6.2 Exclusion criteria

1. Health care providers who were on annual and maternity leave during data collection time.
2. Health care providers who did not respond to questions due to illness.
3. Health care providers who did not consent to participate in the study.

3.7 Sample size and sampling procedure

A census was conducted among all health care providers stationed in the hemodialysis unit with direct contact with patients. They included: thirty-three registered nurses, three medical officers, three nephrologists, two clinical officers, two cleaners and two patient attendants.

3.8 Data collection methods

Objective 1: To describe infection prevention and control measures practiced by health care workers at the hemodialysis unit in MTRH.

Data was collected through the use of interviewer administered structured questionnaires. The questionnaire was adopted from the CDC infection control assessment tool that is considered the gold standard and is applicable in any health care setting.

The questionnaire consisted of the following parts:

The first part had demographic data for the health care provider including age, gender, professional cadre and years of experience. The second part was on infection control training, competency and audits. The third part was on personal protective equipment, the fourth part was on environmental cleaning, the fifth part was on hand hygiene, the sixth and seventh part were on catheter and other vascular access care and injection safety respectively.

Objective 2: To assess the level of compliance to MTRH and CDC infection prevention and control guideline in the hemodialysis unit.

Data was collected using both the MTRH and CDC observation tools. The CDC observational checklists are user friendly and are approved for use in all health care settings for assessing compliance to infection prevention and control by health care workers in the dialysis units (CDC, 2016).

The observations were done by my research assistant. She was a registered clinical officer doing a higher diploma in nephrology. She received a one-week training on how to make observations using the checklists. She made observations of health care providers during routine patient care and documented in the appropriate column whether the IPC measure was performed or missed. An observation was done for a minimum of ten minutes and a maximum of thirty minutes per person being observed.

The tool provided for documentation of the cadre, the setting, the time and the date the observation was being made.

In this study compliance with IPC measures was on an all or none basis i.e. an individual was considered compliant when he or she performed all IPC actions indicated during the time allocated to observe him or her.

Objective 3: To explore individual and system level factors influencing compliance to IPC guidelines at the hemodialysis unit in MTRH.

In-depth interviews were conducted. The sample size for the interviewees included: the unit manager, two consultants, four nurses and two clinical officers. The selection was based on seniority and years of experience in the renal unit. The principal investigator used an interview guide to conduct the interviews. The interview guide contained open ended questions.

Piloting of survey tool (questionnaire)

Before the main study the questionnaire was validated in the pilot phase in three different stages. These included translation/back translation with face and content validity. Cognitive interviews comprising of three focus group discussions involving three nurses, two clinical officers and two medical officers were carried out for face validity where comprehension of the question stems was assessed. Cognitive interview results informed revisions to the survey tool thereafter. Additionally, one nephrologist assessed the survey tool content to assess if the items were representative of the IPC measures being practiced.

3. 9 Study procedure

A research assistant who was a registered clinical officer doing higher diploma in nephrology and was stationed in the hemodialysis unit was recruited and trained for one week by the principal investigator on the study objectives, procedure, use of the CDC and MTRH observation checklists as well as the ethical considerations. The research assistant was stationed in the hemodialysis unit during the duration of the study and therefore collected data actively as a participant observer. This was so as not to raise suspicion and influence the behavior of the healthcare workers. Blank

consent was pinned on the notice board and it informed the health care providers that their infection prevention and control measures were being observed. Neither the timing, date nor who was making the observations was indicated in the blank consent.

The observations were made between 8.00am and 9.00pm on Monday to Friday so as not to raise suspicion among the study participants.

The observation part of the study was conducted first. The research assistant observed health care providers during routine patient care and documented in the appropriate column whether the IPC measure was performed or missed. Each study participant was observed nine times during the study. A participant was observed three times during each shift and on three different shifts. Observations were done at the beginning of the shift, mid shift and at the end of the shift. An observation session was done for a minimum of 10 minutes and a maximum of 30 minutes.

The observation part of the study was conducted first. The timing of the observations was not announced and observations were made at predetermined times only known to the research team so as to reduce Hawthorne's effect. A debriefing was done later during consenting for the questionnaire in which they were informed that they had been observed at an earlier date. The research assistant used the duty roster provided by the unit manager to identify who they were observing. The observations were recorded in the appropriate columns of the CDC observation tool as either performed or missed.

Specific identifiers were assigned to the observed health care provider which were then linked to their respective questionnaires.

The second part of the study was an interviewer administered questionnaire based on the CDC and MTRH infection prevention and control guidelines. A debriefing session

was carried out to inform the participants that they had been observed at an earlier date when consent was being sort for the second part of the study.

The third part of the study was the in-depth interviews. Key informants for this portion of the study were the unit manager, two consultants, four nurses and four clinical officers who were chosen on the basis of their seniority and years of experience. An open-ended interview guide was developed and used for this part of the study.

3. 10 Data management

The data collected using the CDC and MTRH observation tools, interviewer administered questionnaires and in-depth interviews was entered into an electronic database. The database was de-identified and password protected. The password was only available to the principal investigator and later on to the statistician for analysis. The questionnaire was kept in a safe cabinet under a lock after completion of data entry and cleaning and the key was held by the principal investigator.

3.11Data analysis

The data obtained was analyzed per objective:

Objective 1: To describe infection prevention and control measures practiced by healthcare workers at the hemodialysis unit in MTRH.

Collected data was entered into Microsoft excel. Data was analyzed using the computer program SPSS. Descriptive analysis was performed to summarize variables. Data was analyzed according to gender, cadre and nephrology training, to unearth trends IPC practices.

Results were summarized using frequencies, percentages and presented in tables and charts.

Objective 2: To assess the level of compliance to MTRH and CDC infection prevention and control guideline in the hemodialysis unit.

For this study, health care providers were considered compliant or non-compliant on an all or none basis. This meant that for a health care worker to be considered compliant he or she must perform all IPC measures indicated for that IPC procedure e.g. hand washing.

Data obtained from direct observations assessing compliance to IPC guidelines among different professional cadres was analyzed as a percentage and presented in tables.

Objective 3: To explore individual and system level factors influencing compliance to IPC guidelines at the hemodialysis unit in MTRH.

All translated interviews were double-checked for accuracy by the principal investigator. Deductive coding was done using Microsoft excel. Text was coded into hierarchical branching structure in which broad concepts are first identified and then themes and variation within those constructs were marked and labeled. The grounded theory approach was applied whereby theory was derived from the data and new theoretical categories were derived until they were saturated and further insights did not emerge. Coding involved labeling and organizing sections of text based on emerging themes and domains and synthesized using matrices structured by the main themes of the analysis. Results were summarized and presented under the main study domain.

Data for objective one and two was analyzed at a 95% confidence interval and a p value of less than 0.05 was considered statistically significant. The data was presented in form of tables, graphs and charts.

3.12 Ethical considerations

Approval was sought from the Institutional Research and Ethics Committee (IREC). Additionally, permission was sought from the Chief Executive Officer of the Moi Teaching and Referral Hospital. Blank consent was undertaken for the observational part of the study. This was in the form of a notice pinned up in the notice boards of the hemodialysis unit informing health care providers that their IPC measures were being observed as they attended to patients. This was followed by debriefing during the consenting for the questionnaires. Informed written consent was sought from the participants for the second and third part of the study. When a participants declined to consent for the second and third part of the study, then their observations were excluded from analysis.

Data collection forms did not contain the names of the participants but had unique codes. There was no coercion to participate in the study. Confidentiality was maintained throughout the study and the data collected was solely used for achieving research aims. These data were stored safely and will be disposed of after the statutory duration of time.

3.13 Dissemination of results

This will be through a written thesis and an oral school defense convened by the Moi University School of Medicine. The hemodialysis unit staff and the MTRH administration will be given group feedback of the study findings. Furthermore, the results will be published in both local and international peer review journals.

3.14 Expected outcomes

To increase awareness and encourage implementation of recommended infection prevention and control practices in the hemodialysis unit.

CHAPTER FOUR

4.0 RESULTS

Objective1: To describe infection prevention and control measures practiced by healthcare workers at the hemodialysis unit in MTRH.

Infection prevention and control measures are critical in mitigating healthcare-associated infections, particularly in high-risk environments like hemodialysis units. These units serve immunocompromised patients who are vulnerable to bloodstream infections and other complications. In this context, health care providers play a vital role in implementing and sustaining effective IPC measures. This objective aimed to describe the IPC measures practiced by health care providers in the hemodialysis unit at Moi Teaching and Referral Hospital. A detailed understanding of these practices is essential for identifying gaps and improving patient safety in this specialized healthcare setting.

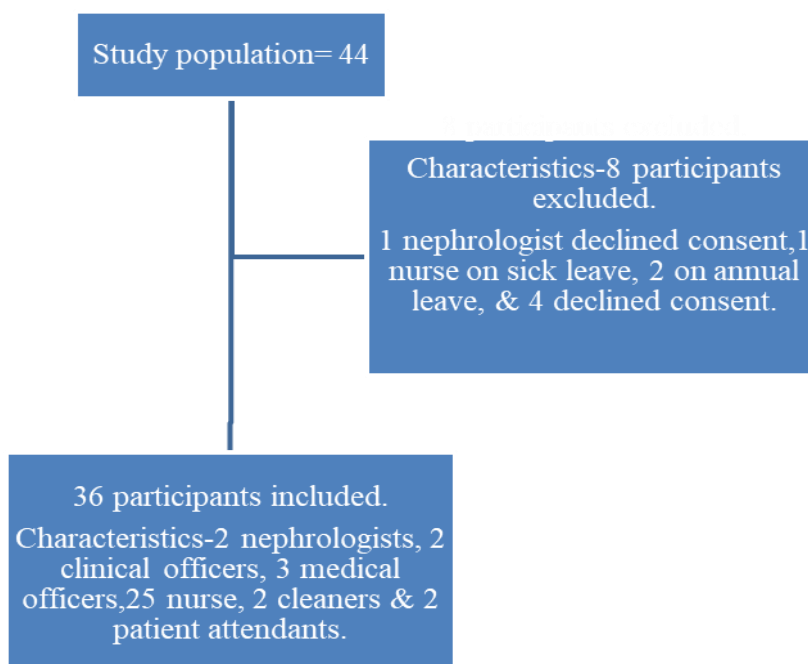


Figure 2: Flow Chart Describing Participant Characteristics

Table 1: Socio Demographic Characteristics of study participants.

Variable	Frequency (%)
Sex	
F	27 (75.0%)
M	9 (25.0%)
CADRE	
CLEANER	2 (5.6%)
CLINICAL OFFICER	2 (5.6%)
MEDICAL OFFICER	3 (8.3%)
NEPHROLOGIST	2 (5.6%)
NURSE	25 (69.4%)
PATIENT ATTENDANT	2 (5.6%)
NEPHROLOGY TRAINING(n=32) *	
NO	4 (12.5%)
YES	28 (87.5%)
YEARS EXPERIENCE IN NEPHROLOGY	
Missing	7
Mean (SD)	8.230 (4.638)
Range	0.670 - 18.000

**N=32 for nephrology training since the patient attendants and cleaners are not expected to have nephrology training.*

This table summarizes the socio-demographic attributes of the study participants. Of the 36 participants, the majority were female (75%), with nurses forming the largest cadre (69.4%). Other cadres were represented almost equally, with cleaners, clinical officers, nephrologists, and patient attendants each accounting for 5.6%, and medical officers at 8.3%. Notably, 87.5% of participants had received nephrology training, with an average of 8.23 years (SD = 4.64) of nephrology experience.

Table 2: Infection Prevention & Control Training, Competency and Audits of Health Care Providers at The Hemodialysis Unit.

Variable	Frequency (%)	MTRH guidelines
Did you receive job specific training in IPC prior to starting work?		
NO	15 (41.7%)	
YES	21 (58.3%)	
Are you trained annually on IPC?		
NO	23 (63.9%)	
YES	13 (36.1%)	
Are you routinely audited on IPC?		
NO	2 (5.6%)	<i>Unit in-charge should regularly review adherence to infection control practice biannually and more frequently if there is significant staff turnover.</i>
YES	34 (94.4%)	
Do you receive feedback after the audits?		
NO	10 (27.8%)	
YES	26 (72.2%)	
Does the HD unit use standard tools while assessing you?		
DON'T KNOW	3 (8.3%)	
NO	4 (11.1%)	
YES	29 (80.6%)	
If yes, which tool does it use?		
DON'T KNOW	9(25%)	<i>Guidelines used in the HD unit are the ones provided by the Kenya renal association in addition to MTRH SOPs.</i>
AHRQ	3 (8.3%)	
CDC	8 (22.2%)	
MTRH	16(44.4%)	

This table highlights the training and audit practices related to infection prevention and control in the hemodialysis unit. While 58.3% of participants reported receiving job-specific IPC training before commencing work, annual IPC training was less common (36.1%). Audits were a routine practice, with 94.4% of participants indicating regular assessments and 72.2% receiving feedback. However, only 44.4% were aware that MTRH guidelines were the standard tool used during audits.

Table 3: Availability of Hand Hygiene Supplies, Training and Monitoring of Hand Hygiene.

Variable	Frequency (%)	MTRH guidelines
Are supplies necessary for hand hygiene available?		
YES	36 (100.0%)	
Are hand hygiene supplies maintained clean & sanitary manner?		<i>Provide soap racks for bar soaps to ensure the bar stays dry, because microorganisms grow and multiply in standing water.</i>
NO	4 (11.1%)	
YES	32 (88.9%)	
Are hand hygiene supplies strategically located?		<i>Hand hygiene facilities should be located as close as possible to the point of contact with patients and dialysis equipment.</i>
YES	36 (100.0%)	
Are your hand hygiene opportunities monitored monthly?		
NO	15 (41.7%)	
YES	21 (58.3%)	

The availability and maintenance of hand hygiene supplies were reported as universal among participants, with 100% confirming their presence and strategic placement. However, only 58.3% indicated regular monitoring of hand hygiene opportunities, despite 88.9% confirming the supplies were maintained in a sanitary condition.

Table 4: Evaluation of Catheter and Other Vascular Access Care (N=32) *

Variable	Frequency (%)	MTRH guidelines
Do you routinely receive training on catheter access?		<i>Recommended that all staff be trained in IPC.</i>
NO	11 (34.4%)	
YES	21 (65.6%)	
Are you observed quarterly during catheter access?		
NO	18 (56.2%)	
YES	14 (43.8%)	
Have you had any competency assessment for vascular access?		<i>Inexperienced staff should be supervised until they are competent.</i>
NO	14 (43.8%)	
YES	18 (56.2%)	
Does the unit use chlorhexidine solution during catheter dressing changes?		
DON'T KNOW	1 (3.1%)	
NO	7 (21.9%)	
YES	24 (75.0%)	
Do you apply antibiotic ointment/povidone iodine on exit sites during dressing changes?		
NO	6 (18.8%)	
YES	26 (81.2%)	
Do you routinely scrub catheter hub after caps are removed before accessing the catheter?		
YES	32 (100.0%)	

**N=32 because the patient attendants (2) and cleaners (2) were not assessed on catheter and vascular access care since it is out of their scope of practice.*

The table explores practices related to vascular access care. Training gaps were evident, with 34.4% of participants lacking training on catheter access. Competency assessments and quarterly observation during catheter use were inconsistent, reported by 56.2% and 43.8%, respectively. Chlorhexidine solution was used in 75% of dressing changes, and 100% adhered to routine scrubbing of catheter hubs.

Table 5: Information Related to Healthcare Personnel Safety

Variable	Frequency (%)	MTRH guidelines
Are there guidelines on post exposure prophylaxis in the unit?		<i>Any work-related injury/exposure to be reported to management to seek specialist care.</i>
DON'T KNOW	4 (11.1%)	
NO	7 (19.4%)	
YES	25 (69.4%)	
Are exposure events tracked?		
DON'T KNOW	7 (19.4%)	
NO	3 (8.3%)	
YES	26 (72.2%)	
Is HBV vaccine offered to all healthcare workers?		<i>Recommended that all staff be vaccinated and know their HBV titre levels.</i>
NO	8 (22.2%)	
YES	28 (77.8%)	
Is influenza vaccine offered to all healthcare workers upon hire, prior to provision of care?		<i>Recommended for the patients not the staff</i>
DON'T KNOW	4 (11.1%)	
NO	28 (77.8%)	
YES	4 (11.1%)	
Are all healthcare workers screened pulmonary tuberculosis upon hire, prior to provision of care?		
DON'T KNOW	4 (11.1%)	
NO	27 (75.0%)	
YES	5 (13.9%)	
Are healthcare workers educated on prompt reporting of illness or job-related injury?		– <i>Any work-related injury/exposure to be reported to management to seek specialist care.</i>
DON'T KNOW	2 (5.6%)	
NO	7 (19.4%)	
YES	27 (75.0%)	

Guidelines for post-exposure prophylaxis and tracking of exposure events were acknowledged by 69.4% and 72.2% of participants, respectively. While 77.8% of participants were vaccinated against hepatitis B, influenza vaccination was low (11.1%). Additionally, 75% of participants were not screened for tuberculosis prior to work, and only 75% were educated on reporting illness or job-related injuries.

Table 6: Information Related to Personnel Protective Equipment

Variable	Frequency (%)	MTRH guidelines
Have you received training on appropriate PPE selection and use?		<i>All staff to be trained in IPC and proper PPE selection.</i>
NO	9 (25.0%)	
YES	27 (75.0%)	
Are supplies/PPE available?		
DON'T KNOW	1 (2.8%)	
NO	4 (11.1%)	
YES	31 (86.1%)	
Are supplies for PPE strategically located near pt care areas?		
NO	12 (33.3%)	
YES	24 (66.7%)	
Do you routinely launder gowns even in the absence of spillage?		<i>Gowns changed between each patient except goggles/face shield unless soiled</i>
NO	12 (33.3%)	
YES	24 (66.7%)	

The table outlines training and availability of PPE. Training in appropriate PPE selection and use was reported by 75% of participants, and 86.1% confirmed the availability of PPE supplies. However, strategic placement of PPE was reported by only 66.7%, with 33.3% not laundering gowns routinely despite no spillage.

Table 7: Disease Surveillance and Reporting at The Hemodialysis Unit. (n=32) *

Variable	Frequency (%)	MTRH guideline
Are there guidelines blood culture sample collection when infection is suspected?		
DON'T KNOW	9 (28.1%)	
NO	7 (21.9%)	
YES	16 (50.0%)	
Are patients routinely screened for HCV (at admission & 6 monthly)?		<i>All pts should be tested for HIV, HBV, HCV during admission or transfer from a different unit and every six months thereafter.</i>
DON'T KNOW	1 (3.1%)	
NO	17 (53.1%)	
YES	14 (43.8%)	

**N=32 because the patient attendants (2) and cleaners (2) were not assessed on disease surveillance since it is out of their scope of practice.*

Half of the participants (50%) were aware of guidelines for blood culture collection when infection was suspected. Screening for hepatitis C virus (HCV) was reported inconsistently, with only 43.8% confirming routine screening.

Table 8: Information Related to Environmental Cleaning.

Variable	Freq (%)	MTRH guidelines
Does the haemodialysis unit have policies environment cleaning?		<i>Guidelines on environmental cleaning are available</i>
DON'T KNOW	2 (5.6%)	
NO	3 (8.3%)	
YES	31 (86.1%)	
Did you receive job training on environmental cleaning?		
NO	15 (41.7%)	
YES	21 (58.3%)	
Does the haemodialysis unit have policies on decontamination blood spills?		<i>Policies on cleaning both major and minor spills are available.</i>
DON'T KNOW	3 (8.3%)	
YES	33 (91.7%)	
Does the haemodialysis unit have policies on cleaning blood glucose monitors between use pts? (n=32) *		<i>Shared reusable medical devices should be cleaned daily or at least when they get visibly soiled.</i>
DON'T KNOW	4 (12.5%)	
NO	9 (28.1%)	
YES	19 (59.4%)	
Does the Haemodialysis unit have policies on cleaning of thermometers between use on pts? (n=32) *		<i>Shared reusable medical devices should be cleaned daily or at least when they get visibly soiled.</i>
DON'T KNOW	2 (6.2%)	
NO	5 (15.6%)	
YES	25 (78.1%)	
Does the haemodialysis unit have policies on cleaning of dialysis clamps between use on pts? (n=32) *		<i>Shared reusable medical devices should be cleaned daily or at least when they get visibly soiled.</i>
DON'T KNOW	5 (15.6%)	
NO	6 (18.8%)	
YES	21 (65.6%)	

**N=32 because the patient attendants (2) and cleaners (2) were not assessed on cleaning of reusable medical devices like blood glucose monitor, thermometer and dialysis clamps since it is out of their scope of practice.*

This table focuses on policies and practices related to environmental cleaning. Most participants (86.1%) acknowledged the existence of cleaning policies, and 91.7% reported policies for decontamination of blood spills. However, policies on cleaning

blood glucose monitors and dialysis clamps were less frequently recognized, with 59.4% and 65.6%, respectively, indicating their presence.

Objective 2: To assess the level of compliance to MTRH and CDC infection prevention and control guideline in the hemodialysis unit.

Adherence to infection prevention and control guidelines is the cornerstone of patient safety, particularly in hemodialysis units where infection risks are elevated due to frequent vascular access and prolonged patient care. Compliance with institutional and international guidelines, such as those provided by MTRH and the Centers for Disease Control and Prevention is essential for ensuring consistent and effective IPC practices. This objective focused on evaluating the compliance levels of health care providers to these guidelines, emphasizing hand hygiene, injectable medication handling, catheter care, and environmental disinfection. The findings highlight adherence trends, identifying areas requiring improvement to improve IPC compliance.

A total of 36 participants were observed during the study. Each participant was observed a total of nine times i.e. 3 observations per shift for a total of 3 shifts. Compliance was defined as adherence to all IPC steps on the checklist. If a participant missed even a single step, they were considered non-compliant. Participant characteristics: 3 medical officers, 2 clinical officers, 25 nurses, 2 patient attendants, 2 cleaners and 2 nephrologists. Nephrologists (2), medical officers (3) and clinical officers (2) were observed on catheter insertion procedures and hand hygiene only since that was the scope of their practice.

Both MTRH and CDC have similar guidelines on hand hygiene and injectable medication preparation. The MTRH guidelines on disinfection specifically narrow down to disinfection of the dialysis bed and machine while the CDC guideline is more general in that it assesses the routine disinfection of the entire dialysis station environment. The other difference is that MTRH has guidelines for dialysis catheter insertion and removal while CDC guidelines don't have one tailored specifically to the dialysis unit but rather general guidelines for CVC insertion.

Table 9: Compliance to CDC checklist per Routine

Variable	Frequency (%)
Overall compliance	33.5%
Hand hygiene	
Noncompliant	4 (11.2%)
Compliant	32 (88.8%)
Catheter connection and disconnection (n=25) *	
Noncompliant	25 (100.0%)
Haemodialysis injectable medication preparation(n=25) *	
Noncompliant	25 (100.0%)
Haemodialysis injectable medication administration(n=25) *	
Noncompliant	25(100.0%)
Catheter exit site care(n=25) *	
Noncompliant	25(100.0%)
Haemodialysis station routine disinfection (n=25) *	
Noncompliant	3 (12%)
Compliant	22 (88%)

**N=25 because the cleaners, patient attendants, medical officers, nephrologists and clinical officers were not observed on catheter connection and disconnection, hemodialysis medication preparation, hemodialysis medication administration, catheter exit site care and hemodialysis station routine disinfection.*

The table shows the level of compliance to CDC infection control guidelines among participants. Hand hygiene compliance was high (88.8%), while compliance for catheter connection and disconnection, injectable medication preparation and

administration, and catheter exit site care was universally low (0%). Routine disinfection of dialysis stations showed an 88% compliance rate.

Table 10: Compliance per routine to MTRH guidelines.

Variable	Frequency (%)
Hand hygiene(n=36)	
Non-compliant	4(11.2%)
Compliant	32(88.8%)
CVC connection(insertion) (n=7*)	
Compliant	7(100%)
CVC disconnection(removal) (n=7*)	
Compliant	6(85.7%)
Non complaint	1(14.3%)
Haemodialysis injectable medication preparation(n=25*)	
Compliant	19(76%)
Non complaint	6 (24%)
Dialysis machine and bed disinfection(n=25*)	
Compliant	25(100%)

N=7 for CVC connection and disconnection because procedure was only performed by medical officers (3), clinical officers (2) and nephrologists (2). HD medication preparation and machine/bed disinfection done by nurses thus N=25.

This table evaluates adherence to MTRH guidelines. Full compliance was noted in CVC insertion (100%) and dialysis machine and bed disinfection (100%). However, 14.3% were non-compliant during CVC removal. Compliance with injectable medication preparation was 76%, while 24% were non-compliant.

3.To explore individual and system level factors influencing compliance to IPC guidelines at the hemodialysis unit in MTRH.

For objective 3, we conducted in-depth interviews with key informants including, the unit in-charge, two nephrologists, two clinical officers and two nurses. An intrapersonal model describing participants perceived barriers and promoters to IPC was used to explore factors influencing compliance to IPC. The factors were assessed under six themes based on the theoretical framework of health belief model namely perceived susceptibility, perceived severity, perceived barriers, perceived benefit, perceived benefits, cues to action and self-efficacy.

Theme 1: Perceived susceptibility.

Perceived susceptibility refers to an individual's belief about their risk of contracting a disease/health condition and it influences whether a person engages in preventive behaviors. Individuals who perceive themselves as highly susceptible are likely to adopt preventive measures. Conversely, those who believe they have low susceptibility may ignore guideline recommendations. In this study, health care providers agreed that hemodialysis patients, due to their immunocompromised state, face a heightened risk of infections compared to the general population. This awareness is crucial because it forms the foundation for motivating healthcare workers to adopt stringent infection prevention practices. Despite this recognition, participants expressed challenges in identifying the precise source of infections, whether from the healthcare setting, the patients' home environment, or during transportation.

“I would also say that we cannot really quantify, even patients who have, because remember these patients come in here for four hours and they go back home. Yeah, so you don't know whether they got an infection in the matatu” (male, nurse)

“Mm-hmm, but you cannot tell because majorly, our patients would show like signs of having that infection. If they are in the ward, you will majorly not know whether it is from us or from the ward. Or, sepsis in our unit you majorly may not know because it could be also patient initiated because some of them, we don't know how they stay at home. So, you cannot pinpoint the source of the infection as such.” (male, clinical officer)

Theme 2: Perceived severity

Perceived severity refers to an individual's belief about the seriousness of a disease and its potential consequences. These consequences are both medical e.g. complications and social e.g. impact on work or family. Health care providers highlighted several outcomes of hospital acquired infections including: prolonged hospital stays, increased financial burden patients and their families, and in extreme cases, mortality. The study specifically identified blood stream infections such as catheter-related septicemia as a significant threat to patient health.

For patients, the implications were profound, as infections can lead to diminished quality of life and reduced survival rates. For healthcare workers, recognizing the gravity of these outcomes emphasized the critical role of their practices in preventing severe complications. This theme underlines the necessity of IPC adherence as a measure to safeguard patient outcomes and reduce the strain on health care systems.

“We have ah...our main important issue is catheters, so we make sure that the patients do not contract any infection on the catheters, because when they get the

infection it affects them, their bloodstream so they become infected. They suffer from catheter related infections. So, if it not well taken care of, the patient is bound to get infection...infections. Yeah. And infections...the septicemia, they are very dangerous to the patient. Yes.” (female, nurse)

Theme 3: Perceived barriers

Perceived barriers refer to an individual’s assessment of the obstacles that may prevent them from adopting the recommended health behavior. These barriers can be systemic e.g. physical space, financial or individual e.g. psychological. If the barriers outweigh the perceived benefits, individuals are less likely to take action. This study identified several barriers to implementing IPC, including inadequate staffing, which leads to overwhelming workloads and compromises adherence to IPC steps. Another barrier was the presence of numerous trainee students who had minimal supervision was another challenge, as it often resulted in lapses in IPC compliance. Additionally, irregular or infrequent staff training sessions further compounded these issues. Finally, healthcare workers noted the difficulty in controlling infection risks for patients once they leave the unit or interact with other health care settings.

For patients, these perceived barriers resulted in higher infection risks, compromising their treatment outcomes and overall safety. For healthcare workers, these challenges created stress and reduce the likelihood of consistently following IPC guidelines. Addressing these barriers requires systemic solutions such as increasing staff numbers, providing regular and accessible training, and enhancing supervision of trainees to ensure adherence to IPC protocols.

i. Inadequate staff

Participants reported inadequate staff numbers that made it difficult to adhere to IPC guidelines while continuing to attend to other clinical responsibilities. Healthcare providers noted that current routine clinic procedures such as taking vitals and attending to other duties for were already quite engaging and time consuming.

“They have already overworked. And you can imagine now somebody working on a very strict schedule like that for three consecutive days. What would you expect? Like for example, there are 25 machines here. There are only two nurses at night. Patients come here at 4 am. How do you expect those people to connect those machines, those patients...To 25 machines, on time and do an effective one.” (male, clinical officer)

“You are trying to catch up with the workload that you have. You can imagine you want to fix like eight patients, eh...washing hands in between each and every patient might be a bit challenging. You would want to jump to the next one before you even...” (female, clinical officer)

“And again, another challenge is the number of patients. The ratio of patients to the staff, it is quite huge. So, there is a challenge of taking care of so many patients. So, of course you are overwhelmed now with a lot of work, you are likely to miss out some steps when your taking care of that patient.” (female, nurse)

“We have shortage of staff and some of us could be having these maybe colds, you know cold is also a way of...you can infect the patient. So, sometimes if it is not very serious, you are supposed to come to work. And by that you know it is easy to even infect others.” (male, nurse)

“That contributes also because of the numbers, because again now coupled with few numbers of staff, a huge number of patients, so the issue of burn out also comes in. Some staff burn out at some point and they might drop the guard in terms of ah...” (male, nurse)

“Yeah shortage. By the way shortage alone, [laughs] can also make it is a difficult, because people, maybe somebody will see I don't need to go and wash hands there I just continue, you know after whatever I know in a IPC, when you are dealing with gloves, when you remove your gloves you are supposed to wash hands or sanitize and put on another gloves if you are changing. But now if you are so busy and the shortage, you might just remove gloves and...” (female, nurse)

ii. High number of trainee students.

A high number of trainee students in the hemodialysis unit can pose a significant barrier to IPC due to various reasons. First, trainees may have limited experience and knowledge in IPC guidelines thus increasing the risk of breaches in aseptic techniques. Additionally, an overcrowded clinical environment with many trainee students leads to congestion in patient care areas making it difficult to maintain proper spacing and adhere to IPC. MTRH is a training center for many colleges/universities. At any given time, the hemodialysis unit hosts a large number of students, including both undergraduate to postgraduate trainees. This results in a high ratio of student to supervisors thus resulting in some students working without supervision. This can be a factor for the number of infections experienced in the hemodialysis unit since most of the students are not conversant with IPC guidelines.

“Yeah, it presents eh...a challenge because ah...of course we teach them and there is a time that when you are too busy, they may also take part now in taking care of a patient. So, when you don't have now that direct supervision over them, they might mess somewhere and maybe you will not realize at that day. Because if you were enough and you are given maybe three students taking care of six patients you are able to monitor but now you see when we are taking care of more than ten patients, it is very difficult to people to be all over at the same time.” (female, nurse)

“We have few nurses or we sometimes have students working alone at some point with minimal supervision sometimes, so those are some of the challenges now which can actually make issues to not work well in terms of infection control.” (female, nurse)

“Yeah. Because now when the students come, some of them don't know how to handle aseptic techniques. They keep on contaminating everything and you know we need to really follow the procedures well so that we avoid the...we minimize as much as possible the rate of infection.” (male, nurse)

“There are students' population from I don't know Baraton, I don't know from ah...MTC and Moi Referral Hospital and then from Indiana! So, there is a crowd! Of providers! With all their microbes. Yes? The patients are at risk.” (male, nephrologist)

“Sometimes there could be there are new people coming in, there are many students in the unit, so those are some of the now issues that can actually make infection to go up and then also add that now to the issue of staff shortage.” (female, nurse)

“So, you realize like in a situation where students are, in such a situation those are the major gaps. You know when somebody is still on training, they are not as perfect as you yourself would want them to be. Like even, in handling of catheters when the students are there, you would always...in one way or the other there will be haps.” (female, clinical officer)

“when you have many students who are coming in, they are new, they are working in a different environment, they have not been here before, some of them may not be very conversant with these measures or they may not actually know in terms of...[Interruption] So, maybe they may not know...despite the fact that they are informed what to do, but you find that there might be gaps in terms of how they implement.” (female, nurse)

III. Inadequate staff trainings

Inadequate staff training is a major barrier to effective infection prevention and control in health care setting. Without proper training, health care providers may lack the knowledge and skills necessary to consistently implement IPC measures, increasing the risk of health care associated infections. The health care providers reported that there were a number of trainings for the staff although they were not frequent and IPC was rarely the main topic of discussion. They also reported that the timing of the trainings was haphazard either done impromptu by the IPC department when making their rounds or organized during working hours thus making those on shift duty to miss out.

“One major area also in terms of training, in terms of people participating in workshops and all that. And I think the last time a workshop was attended by any of us in the unit probably is 2021, that is two years down the line and it

was not really about the IPC as a whole, it was just something that was being introduced in terms of IPC.” (male, nurse)

“You see even when these guys who are champions of infection control in the hospital. When they are coming...when they come today, we are three in the unit. This is a unit with 30 staffs, so how do they capture these other staffs? So they come and maybe have a talk with five or ten staffs, so how about the rest?” (female, nurse)

“I did not go because eh...you know now when it happens during working hours, we are majorly supposed to be here working for the patients. Though that is part of what you are supposed to know but if it happens during working hours, it is hard for you to avail yourself.” (female, clinical officer)

“No. Here no. That is maybe a gap that I can say there is gap. Yeah. Because things keep on changing, we also renal conferences, people go for that, but for IPC, I have never heard of that.” (female, nurse)

“One major area also in terms of training, in terms of people participating in workshops and all that. And I think the last time a workshop was attended by any of us in the unit probably is 2021, that is two years down the line” (male, nurse)

iv. Uncontrolled patient management outside the hemodialysis unit.

Uncontrolled patient management outside the hemodialysis unit poses a significant barrier. Patients who receive care in multiple hospital units may not encounter the same strict IPC measures as in the dialysis unit, leading to inconsistencies in infection control practices. Additionally, dialysis patients often have frequent hospital visits

where they come in contact with infected individuals, contaminated surfaces and inadequately disinfected equipment. The health care providers felt that it was difficult to prevent and control infection among their patients once they were outside the hemodialysis unit. They attributed most of the infections experienced in the unit to be either from the wards for the in-patients or from the community for the outpatients.

“Our children for dialysis are mostly in-patients, and they stay in the ward for too long, so they come in and go back to their unit. So you find that in the ward there they are staying with other children or people who have other diseases. Yeah, so we have had issues of infections coming in but not from the unit but from the ward.” (female, nurse)

“I would also say that we cannot really quantify, even patients who have, because remember these patients come in here for four hours and they go back home. Yeah, so you don't know whether they got an infection in the matatu” (male, nurse)

“You see these patients once they have these catheters, there is a dressing that is placed on top of the catheter. So, they are advised not to take...to wet that area. But you see quite a number of them will come with wet dressings. So, whenever that area is wet, especially for the patients who have got temporary catheter, it goes direct to a vein.” (female, nurse)

“Yeah, and then when they open, once you open something, you keep on touching, so by touching with dirty hands, they can get infected, so it is very hard, I can say that is also a gap because it is very hard also to control such because now the patients don't understand the risk of getting infection very much.” (female, nurse)

Theme 4: Cues to action

Cues to action are triggers that prompt health care workers to adhere to IPC practices. These cues can be internal e.g. perceived risk or external e.g. reminders. When effectively implemented they enhance IPC compliance by reinforcing the importance of infection control. Health care providers reported multiple cues to action in this study, such as wall posters illustrating handwashing techniques, WhatsApp messages from the IPC team, occasional training sessions, and Continuous Medical Education (CME) discussions. These reminders served as crucial reinforcements, especially in high-stress environments, to ensure compliance with IPC measures.

For patients, cues to action indirectly enhanced their safety by promoting consistent adherence to best practices among health care workers. For health care workers, these prompts provided ongoing education and reinforcement of guidelines, addressing knowledge gaps and mitigating the risk of oversight. Creating a culture where cues to action are integrated seamlessly into daily workflows can significantly enhance IPC compliance.

“We also have charts on the walls that guide us on how to wash hands, when to wash hands, the procedure for hand-washing.” (male, nurse)

“Hand-wash is quite emphasized on the IPCs, they have put even the instructions on the sinks. So, it is a constant reminder what is expected for the purpose of infection control.” (male, nurse)

“We also have our own members who have gone for trainings outside in different areas and we have CMEs usually. Yeah, Continuous Medical Education, that we try to help each other, yeah, to catch up. You know training, learning is a continuous exercise.” (male, nephrologist)

“I have said we have somebody who leads the infection prevention and she comes regularly to check on us then if she finds something somewhere is faulty, or she finds we are not following, she will constantly remind us. She will also maybe give us a CME” (male, nurse)

“People are constantly reminded even through the WhatsApp groups especially when we get a number of infections occurring in the unit.” (female, nurse)

“Sometimes we have the charts on the walls guiding us on how to wash hands. Waste segregation, the black bucket paper is for food remains, the red one is highly contagious maybe with blood, the yellow one is for issues like...things that are not contaminated maybe papers.” (male, nurse)

“We also get eh...reminders from those concerned, the infection prevention team, they at times come and remind us on the...those guidelines.” (female, clinical officer)

“They are reminders, like when you go to the [laughs] the hand-washing place, there are those posters, we have posters for waste disposal, we have posters, those will keep on reminding you how to wash hands, even the steps of washing hands, yeah, they remind you.” (female, nurse)

Theme 5: Self-efficacy

Self-efficacy or the belief in one's ability to effectively perform a task plays a crucial role in compliance to IPC measures among health care providers. When individuals feel confident in their knowledge and skills, they are more likely to adhere to IPC guidelines. Some health care providers expressed strong confidence in their capability to champion IPC initiatives, highlighting their willingness to identify gaps, track problems, and propose solutions to improve compliance. This sense of ownership and responsibility is vital for fostering a proactive approach to infection prevention.

For patients, healthcare workers' confidence in implementing IPC measures translates to higher-quality care and reduced infection risks. For healthcare workers, self-efficacy empowers them to take initiative, advocate for necessary changes, and mentor others, creating a positive ripple effect on IPC adherence. Encouraging self-

efficacy through training and recognition of good practices can further strengthen IPC efforts.

“Yes, definitely because I know...as a manager of the unit, if an issue of IPC is to come up definitely there will be...the gap will be seen from the point of view of the people who are running the unit. What are they doing in terms of ensuring that IPC policy and guidelines are taken care of.” (male, nurse)

“Yeah, if I was given an opportunity, because I really would wish that we would not be having these infections and once they happen, then we do a proper, we look at it deeply. So, and we track where the problem is coming from so that of course we can address it. So, I think I would wish to be an IPC champion in the unit.” (female, nurse)

Theme 6: Perceived benefits

Perceived benefits play a crucial role in influencing health care providers compliance with infection prevention and control. When individuals recognize the advantages of adhering to IPC guidelines, they are more likely to integrate these practices into their routine. Health care providers identified several benefits to adhering to IPC such as: improved patient outcomes, enhanced quality of life for patients, and reduced transmission risks for healthcare workers and their families. Educating patients and their families about IPC requirements was also viewed as a critical strategy for sustaining adherence beyond the healthcare setting.

For patients, these benefits include reduced infection rates, shorter hospital stays, and better overall health outcomes. For healthcare workers, adherence to IPC guidelines minimizes their exposure to infections, ensuring their safety and that of their loved

ones. Recognizing these benefits reinforces the importance of a collective commitment to IPC measures among all stakeholders.

i. Better quality of life.

Regular training sessions by health care workers to the patient and their families on the IPC requirements and emphasizing on the importance to adherence would improve their quality of life.

“And then there has to be some education, health education to the relatives which should be a regular basis when they come. That this is what we expect of you at home if you want this patient to live longer.” (male, nephrologist)

ii. Prevention of infection transmission

Health care workers recognized that infection prevention and control practices such as hand hygiene and proper sterilization prevented health care associated infections hence motivated the staff to follow guidelines ultimately improving patient outcomes and reducing complications. Health care providers also pointed out that adhering to IPC guidelines at work would prevent them from carrying the infections back to their families and infecting them.

“Staff also need to take personal initiative and take issues of IPC seriously because you know also that eh...you can pick infections from here to even to home.” (female, nurse)

“And then another way of preventing infections to the patients, it is by the way we put on maybe gowns or even the whatever...what are they called? The scrubs. So, when you come from home, you change and then when you come out from hospital you also change.” (male, nurse).

CHAPTER FIVE

5.0 DISCUSSION

Health care-associated infections (HAIs) are infections acquired while receiving care in a health care setting. These infections are among the most common adverse events globally, significantly contributing to preventable diseases, deaths, and increased health care costs (Al-Tawfiq & Tambyah, 2014). This study evaluated infection prevention and control practices among health care workers in the Moi Teaching and Referral Hospital dialysis unit. Findings indicated a lack of compliance with institutional and international IPC guidelines, despite their availability. Non-adherence was attributed to both institutional factors, such as inadequate staffing, supply shortages, limited training, and staff burnout, and individual factors, including poor staff attitudes.

5.1 Standard and Transmission-Based Precautions

Standard precautions are fundamental infection prevention measures applied universally to all patients including hand hygiene and the proper use of personal protective equipment. Transmission-based precautions are additional measures implemented for patients with confirmed or suspected infections. Proper use of personal protective equipment (PPE) is critical for both types of precautions.

In this study, 75% of participants reported receiving training on PPE selection and use with 66.7% stating that PPE supplies were conveniently located near patient care areas.

During the observations, it was noted that there was constant supply of gloves and face masks. Gloves were placed near patient care areas. Additionally, disposable gowns were also noted to be available although healthcare providers did not change

them while attending to different patients, rather they only changed them when they got soiled with bodily fluids/blood.

Qualitative insights revealed that health care providers often skipped IPC steps they deemed unnecessary so as to get to other tasks due to the high patient numbers. For instance, health care providers frequently substituted use of sterile gloves for hand hygiene and vice versa.

These findings align with a study in India, where 90% health care providers received PPE-related training and 89% of respondents reported the presence of a PPE policy in their organization (George et al., 2023). Such similarities may reflect comparable participant demographics, with nurses forming the majority in both studies.

Despite PPE availability, barriers to its proper use, such as discomfort, communication challenges, time constraints, and allergies to PPE materials, have been widely documented. Addressing these barriers is critical to improving compliance to proper PPE use (Cordeiro et al., 2022).

Additionally, a qualitative study on perceived barriers to infection prevention and control found that heavy workloads often prevented nurses from adhering to IPC guidelines as they prioritized task completion over strict adherence to protocols. (Travers et al., 2015).

5.2 Hand Hygiene

Hand hygiene is a cornerstone of infection prevention and is recognized as the most effective measure for reducing infection transmission in health care settings (CDC, 2016). Adherence to hand hygiene guidelines protects both patients and health care providers, ultimately reducing morbidity, mortality, and health care costs.

In this study, all participants (100%) reported that hand hygiene supplies were readily available and strategically positioned near patient care areas. Observations revealed an 88% compliance rate with CDC and MTRH hand hygiene guidelines. Non-compliance was primarily due to substitution of hand hygiene with clean glove use. Instances of hand hygiene supply shortages were rare (1-3 times/year).

Qualitative interviews identified systemic factors such as presence of only one sink in the hemodialysis unit and occasional hand hygiene supply shortage as key barriers to compliance. Additionally, individual factors such as staff attitude influenced compliance with some health care providers choosing whether or not to follow the guidelines regardless of the availability of the hand hygiene supplies.

Contrastingly, a Nigerian study reported varying adherence to hand hygiene practices among health care providers, with nurses consistently performing better than doctors (Iliyasu et al., 2016). The differences in findings may stem from methodological variations, such as the failure of this study to differentiate results by professional cadres or assess specific "moments" of hand hygiene.

Another Nigerian study reported low compliance with hand hygiene before and after glove use, with only 2.6% of participants washing hands before wearing gloves (Amoran & Onwube, 2013). This discrepancy may reflect differences in study population size, settings, and the scope of hand hygiene assessment.

5.3 Screening and Immunization

Screening and immunization are essential for protecting both health care providers and patients. Regular screening helps identify asymptomatic carriers of infectious diseases, while vaccination provides protection against preventable illnesses like hepatitis B virus and influenza.

In this study, 77% of participants had received the hepatitis B virus vaccine, while only 4% had received the influenza vaccine, and 5% had been screened for pulmonary tuberculosis.

Qualitative insights revealed that health care workers were required to receive hepatitis B virus vaccination prior to commencing work at the hemodialysis unit but they had to cover the cost for vaccination themselves. Moreover, no verification process ensured that all the required doses were completed. Additionally, no formal guidelines existed for routine screening of tuberculosis among health care providers. The low influenza vaccination rate could be attributed to the MTRH guidelines that prioritized patient vaccination over staff immunization.

A study in Ethiopia found that while 62% of health care providers were knowledgeable about hepatitis B virus vaccination, only 5.4% had completed the full three-dose vaccination series (Abeje & Azage, 2015). The discrepancy between this study and the current study may stem from differences in methodology, as the current study assessed whether participants had received any hepatitis B virus vaccination rather than confirming completion of the full dose.

Similarly, an Italian study reported that 91.2% of health care providers were aware of influenza and its modes of transmission yet only 16.7% of the health care providers were vaccinated. Barriers to vaccination included fear of adverse effects , low

awareness of the severity of influenza, and beliefs that the health care provider was not at risk for influenza and that the vaccine had a low efficacy (Albano et al., 2014). These findings align with the present study, emphasizing the need for awareness campaigns to improve influenza vaccination rates among health care providers.

5.4 Cleaning and Disinfection

Effective cleaning and disinfection are fundamental in breaking the chain of infection. Contaminated surfaces, including high-touch areas and dialysis equipment, can serve as reservoirs for pathogens, posing a significant risk in dialysis settings. In this study, 86.1% of participants confirmed the presence of policies for environmental cleaning, while 91.7% reported policies for decontaminating blood spills.

Observations showed an 88% compliance rate with CDC IPC guidelines for cleaning and disinfection of dialysis station. However, gaps were identified particularly in glove changing practices between cleaning steps. Additionally, health care providers were also required by the guidelines to apply disinfectant on the beds and allow it to air dry but due to the high patient numbers, they wiped them down instead to save on time.

High compliance rates in this study were attributed to the presence of clear guidelines defining cleaning responsibilities and an efficient waste disposal system. The units' floor was also cleaned on a 4 hourly basis.

These findings are supported a Middle Eastern that showed routine cleaning and disinfection of dialysis machines and stations and use of separate hemodialysis machines reduced hepatitis C transmission risks among patients undergoing dialysis

(Saxena et al., 2003). The presence of dialysis machine and station cleaning guidelines in MTRH is a step in the right direction towards achieving international standards.

5.5 Bloodstream Infections

Dialysis patients are at a heightened risk for blood stream infections due to frequent vascular access. Proper care of catheter access sites, including disinfecting hubs and using chlorhexidine gluconate for skin antisepsis, is critical in minimizing infection risk.

In this study, all participants (100%) reported routinely scrubbing catheter hubs before access, 81.2% applied antibiotic ointment at exit sites, and 75% used chlorhexidine for skin cleaning during dressing changes. However, direct observations revealed a gap between knowledge and practice. None of the participants consistently applied antibiotic ointment at the catheter exit site during each dressing change as recommended by the CDC guidelines.

Qualitative interviews revealed MTRHs hemodialysis unit only applied antibiotic ointment on exit site i.e. mupirocin when infection was suspected. The reason given for this was that mupirocin was expensive thus it was not cost effective to apply it on exit sites with every catheter change.

A meta-analysis by James et al found that application of antibiotic ointment on exit site during dressing change reduced infection rates (James et al., 2008).

Similarly, a North Carolina study demonstrated substantial reductions in catheter-related bloodstream infections with the use of chlorhexidine-alcohol solutions (Cooney et al., 2019).

These findings highlight the importance of maintaining rigorous aseptic techniques while accessing hemodialysis catheters to mitigate infection risks in dialysis patients.

5.6 Study Limitations

A significant limitation of this study was the potential for bias introduced by the Hawthorne effect, where participants may have modified their infection prevention and control behaviors due to awareness of being observed. To minimize this bias, three key strategies were implemented.

First, observations were conducted at random and unannounced times, reducing the likelihood that participants could anticipate and alter their behavior accordingly. Second, the research assistant was embedded within the hemodialysis unit as a regular staff member throughout the study period. This approach facilitated naturalistic observations, as the research assistant's presence became familiar to the health care providers decreasing the perception of being monitored by an outsider and mitigating behavioral changes driven by observation. Third, a blank consent process was employed for the observational part of the study. Participants were unaware of specific details such as timing, date or the observer's identity further reducing the risk of conscious behavioral modifications.

These measures collectively helped to minimize observer related influences on participants behavior, enhancing the reliability and validity of the study findings. While complete elimination of Hawthorne effect is challenging, integrating these strategies ensured that collected data more accurately reflected the routine infection prevention and control strategies within the hemodialysis unit.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATION

6.1 CONCLUSION

Health care workers in the hemodialysis unit demonstrated varying levels of adherence to infection prevention and control measures. While some essential practices such as basic hand hygiene and glove use were observed, there were notable gaps in key areas like adherence to aseptic techniques during vascular access, exit site care and environmental cleaning. The inconsistencies in infection prevention and control practices indicate that while health care workers were aware of some guidelines, there remained significant challenges in translating knowledge to consistent best practice. These deficiencies highlight the need for targeted educational interventions to bridge gap between knowledge and actual implementation of protocol.

Overall compliance with infection prevention and control (IPC) guidelines outlined by MTRH was good; however, adherence to the more detailed CDC guidelines remained suboptimal. The assessment revealed notable deficiencies in exit-site care, vascular access procedures, consistent use of appropriate personal protective equipment, and routine disinfection of dialysis stations. These gaps not only highlight inconsistencies in implementation but also point to a broader discrepancy between local institutional guidelines and international standards. This misalignment suggests areas where local policies may require strengthening or harmonization to meet global best practices. Furthermore, the findings indicate that despite the existence of IPC policies within the hospital, their application in daily practice remains uneven—likely due to resource limitations, gaps in staff training, and competing clinical demands. Enhancing compliance will therefore require a structured approach involving regular monitoring,

targeted refresher training, and reliable access to essential IPC resources to support effective and consistent infection control.

Several factors influenced IPC compliance, categorized into individual and system level factors. At individual level, staff knowledge gaps and attitudes towards IPC played a significant role in determining adherence. Some health care providers exhibited limited understanding of specific IPC guidelines which may have contributed to improper or inconsistent application of these practices. Additionally, attitudes towards IPC including perceptions of risk and the perceived burden of compliance influenced how diligently protocols were followed. At the system level, barriers such as inadequate staffing and limited opportunities for IPC specific trainings hindered compliance. Without adequate personnel, health care providers were often faced with increased workloads, reducing the time available to adhere to strict IPC measures. The lack of routine and structured IPC training further exacerbated these challenges as staff members may not have been adequately updated on best practices and guidelines.

6.2 Recommendations

To enhance infection prevention and control practices in the hemodialysis unit, the hospital management should prioritize continuous medical education and training for health care providers. Regular continuous medical education sessions, workshops and hands-on training on IPC protocols should be implemented to bridge the gap between knowledge and practice and to reinforce best practices.

It is crucial for the hospital management to ensure consistent availability of essential IPC supplies. Compliance with IPC guidelines is significantly hindered when

healthcare workers lack access to and deploy sufficient numbers of HCWs to the HD unit to improve compliance.

Health care providers themselves must take a more proactive role in championing IPC practices within their unit. To foster a culture of infection prevention, designated IPC champions should be identified among staff to serve as role models, mentors and advocates for adherence to guidelines.

A comprehensive approach that combines staff education, resource allocation and staff engagement will be essential in strengthening IPC compliance in the hemodialysis unit. By addressing both individual and system level barriers, the hospital can create a safe environment for patients and health care providers while reducing the risk of infections associated with dialysis care.

I recommend that infection prevention and control (IPC) be formally integrated into both undergraduate and postgraduate medical and nursing curricula as part of national training policy. Embedding IPC education early and reinforcing it throughout advanced training will equip healthcare workers with the competencies required to safely manage high-risk environments such as dialysis units. This policy-level incorporation will help standardize knowledge, strengthen clinical practice, and support long-term improvement in IPC compliance across healthcare facilities.

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APPENDICES

Appendix 1: Pilot Phase Consent Form

Title of the study: Evaluation of infection prevention and control (IPC) practices at the hemodialysis unit in Moi Teaching and Referral Hospital (MTRH).

You are invited to participate in a research study conducted by Catherine Rasowo, from Moi University. The purpose of this study is to validate a questionnaire survey tool to establish baseline infection prevention and control practices by staff stationed at the hemodialysis unit and to determine their perceptions towards the IPC guidelines. The findings of this phase of the study will be useful in refining the study tools to ensure their content is clear, understandable and culturally appropriate. You will be part of a group of 6 healthcare workers that will be invited for a focus group discussion to assess comprehension of the stem items on the survey tool. This will take place at the conference room at the MTRH hemodialysis unit and should take one to two hours. I would therefore like to invite you to be part of this research. However, before making a decision, feel free to talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain further. If you have questions later, you can ask me or any research assistant in my team.

Risks and discomfort: There are no known risks associated with this research. We shall just engage you in a discussion as well as request you to give your views on the comprehension of the study questionnaire.

Potential benefits: There will be no direct benefit to you, but your involvement will assist us in gaining information on the factors associated with compliance to IPC and also identify the gaps IPC both individual and systemic.

Protection of confidentiality: Information obtained in this research study will not be shared with anyone external to the research team. The questionnaires used to obtain information from you will not contain your name but will instead be coded with a number that is unique to you. Only the researchers will know what your number is and the questionnaire will be kept under lock and key in a cabinet. It will not be shared with or given to anyone except me and the main researcher.

Voluntary Participation: Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or withdraw from this study.

Contact Information: If you have any questions or concern about this study or if any problems arise, please contact the principal investigator, Catherine Rasowo at 0716874636. If you have any questions or concerns about your rights as a research participant, please contact the Moi University Board of Ethics, IREC at 078772677.

I consent that I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participants Signature: _____ Date: _____

NB: A copy of this consent form should be given to you.

Appendix 2: Consent form

Title of the study: Evaluation of infection prevention and control (IPC) practices at the hemodialysis unit in Moi Teaching and Referral Hospital (MTRH).

You are invited to participate in a research study conducted by Catherine Rasowo, from Moi University. The purpose of this study is to establish whether healthcare workers are compliant to infection prevention and control guidelines. This study will also determine the perception of the healthcare workers about perception to IPC measures, assess the level of compliance to IPC guidelines and explore individual and system level factors influencing compliance to guidelines. The findings of this study will be useful in improving awareness and encouraging implementation of recommended IPC measures. Informing, I would therefore like to invite you to be part of this research. However, before making a decision, feel free to talk to anyone you feel comfortable with about the research. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain further. If you have questions later, you can ask me or any research assistant in my team.

Risks and discomfort: There are no known risks associated with this research. We shall just engage you in a discussion as well as request you to fill a questionnaire related to the study.

Potential benefits: There will be no direct benefit to you, but your involvement will assist us in gaining knowledge on the factors associated with compliance to IPC and also identify the gaps IPC both personal and systemic.

Protection of confidentiality: Information obtained in this research study will not be shared with anyone external to the research team. The questionnaires used to obtain information from you will not contain your name but will instead be coded with a number that is unique to you. Only the researchers will know what your number is and the questionnaire will be kept under lock and key in a cabinet. It will not be shared with or given to anyone except me and the main researcher.

Voluntary Participation: Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or withdraw from this study.

Contact Information: If you have any questions or concern about this study or if any problems arise, please contact the principal investigator, Catherine Rasowo at 0716874636. If you have any questions or concerns about your rights as a research participant, please contact the Moi University Board of Ethics, IREC at 078772677.

I consent that I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participants Signature: _____ Date: _____

NB: A copy of this consent form should be given to you.

Appendix 3: Questionnaire BOIDATA

Participant number

Age

Gender Male ☐ Female ☐

Cadre

Nephrology training ☐

Years of experience in the renal unit

FACILITY DEMOGRAPHICS

1. Facility name
2. Date of assessment
3. What services are offered at the facility
 - a) Adult in-center dialysis ☐
 - b) pediatric in-center dialysis ☐
 - c) nocturnal dialysis ☐
 - d) inpatient hemodialysis ☐
4. What is the typical patient census
 - a) 1-25 ☐
 - b) 25-50 ☐
 - c) 51-75 ☐
 - d) 76-100 ☐
 - e) >100 ☐

INFECTION CONTROL POLICIES AND INFRASTRUCTURE

1. What training does the unit in-charge have
 - a) Certified in infection control ☐
 - b) other training in infection control ☐
 - c) none ☐
2. Has the facility participated in the CDC dialysis BSI prevention collaborative
 - a) Yes ☐
 - b) No ☐

3. In the past 2 years has the facility participated in any other intensive program focused on HAI prevention
 - a) Yes ☐
 - b) No ☐
4. Does the facility have systems for early detection of potentially infectious persons at the initial points of patient encounter?
 - a. Yes ☐ b. No ☐
5. Are there signs posted in patient areas within the facility to encourage patients to take an active role in and express concerns about facility infection control practices
 - a. Yes ☐ b. No ☐
6. What is the distance separating adjacent dialysis treatment areas
7. Does the facility have an isolation room for isolation of conditions other than hepatitisB
 - a. Yes ☐ b. No ☐
8. Does the facility use dialysis machine option waste handling ports
 - a. Yes ☐ b. No ☐

INFECTION CONTROL TRAINING, COMPETENCY AND AUDITS

1. Did you receive job-specific training on infection control prevention policies and procedures

Upon hire, prior to provision of care? Yes ☐ No ☐

Annually Yes ☐ No ☐
2. Are you routinely audited on your infection prevention practices

Yes ☐ No ☐

2a).If yes do you get feedback after the audits

Yes ☐ No ☐
3. Does the facility use standardized tools when assessing or educating staff members

CDC ☐ Corporate tools ☐ AHRQ/CMS tool ☐ No ☐

standardized tool

3a . If CDC indicate the tool used

HEALTHCARE PERSONNEL SAFETY

1. Is there a facility post-exposure evaluation and follow-up including prophylaxis as appropriate
 - a. Yes ☐
 - b. No ☐
2. Are exposure events tracked, evaluated and corrective action plans developed to reduce incidences of such events
 - a. Yes ☐
 - b. No ☐
3. Is hepatitis B vaccine offered to all personnel who may be exposed to blood or other body fluids through their job duties
 - a. Yes ☐
 - b. No ☐
4. is influenza vaccine offered to all personnel
 - a. Yes ☐
 - b. No ☐
5. Are all healthcare personnel screened for tuberculosis at baseline
 - a. Yes ☐
 - b. No ☐
6. Are HCP educated on prompt reporting of illness or job related injury to supervisor or occupational health?
 - a. Yes ☐
 - b. No ☐

DISEASE SURVEILLANCE

7. Is there a policy that mandates blood culture collection before antimicrobial administration any time BSI is suspected?
8. Is the routine screening of hemodialysis patients for hepatitis C antibody done at the recommended interval?

Yes (at admission and every six months for susceptible pts) ☐ No ☐

PERSONAL PROTECTIVE EQUIPMENT.

1. Have you received job specific training on proper selection and use of PPE?
 - 1a).upon hire prior to provision of care ☐
 - 1b). Annually ☐
2. Are supplies necessary for adherence to PPE recommendations available and strategically located in or near patient care areas?
 - a. Yes ☐
 - b. No ☐
3. Do you routinely change or launder gowns in the absence of soilage?
 - a. Yes ☐
 - b. No ☐

ENVIRONMENTAL CLEANING.

1. Have you been provided with written policies and procedures for routine cleaning and disinfection of environmental surfaces clearly defining responsible personnel?
a. Yes ☐ b. No ☐
2. Have you received job specific training on environmental cleaning and disinfection upon hire, at least annually and when policies and procedures change?
a. Yes ☐ b. No ☐
3. Does the facility have a policy/procedure for decontamination of blood spills or other body fluids?
a. Yes ☐ b. No ☐
4. Does the facility have policies and procedures to ensure reusable medical devices eg thermometer are cleaned appropriately between patients?
a. Yes ☐ b. No ☐
5. Does the facility have policies and procedures for routinely cleaning and disinfecting the following:
 - a) Dialysis clamps Yes ☐ No ☐
 - b) Blood glucose monitors Yes ☐ No ☐
 - c) Dialysate conductivity/pH meters Yes ☐ No ☐

HAND HYGIENE

1. Are the supplies necessary for adherence to hand hygiene recommendations
 - a. Available a. Yes ☐ b. ☐
 - b. Maintained in a clean and sanitary manner a. Yes ☐ b. No ☐
 - c. Strategically located near dialysis stations? a. Yes ☐ b. No ☐
1. Are your hand hygiene opportunities monitored monthly?
 - a. Yes ☐ b. No ☐

CATHETER AND OTHER VASCULAR ACCESS CARE

1. Do you routinely receive training specific to catheter access care and aseptic technique for handling catheter and vascular access?
a. Yes ☐ b. No ☐
2. Are you observed during vascular access care and catheter accessing practices quarterly?
a. Yes ☐ b. No ☐
3. Have you had competency assessments for vascular access care and catheter accessing practices?
a. Yes ☐ b. No ☐
4. Does the facility use an alcohol based chlorhexidine (>5%) solution as the first line antiseptic agent during dressing changes of catheters
a. Yes ☐ b. No ☐
5. Do you apply an antibiotic ointment or povidone-iodine ointment to catheter exit sites during dressing changes?
a. Yes ☐ b. No ☐
6. Do you routinely scrub catheter hubs with appropriate antiseptic after caps are removed and before accessing the catheter?
a. Yes ☐ b. No ☐

Appendix 4: Topic guide for in-depth interviews with healthcare providers (HCPs)

Target: Healthcare workers in the hemodialysis unit.

INTERVIEW DATE:/...../..... Day/Month/Year

START TIME:

Introduction: Explain study procedures and details to participant, including audio recording, confidentiality, and rights to refuse participation. Obtain informed consent.

Health care provider demographic characteristic

- 1) Age
- 2) Gender
- 3) Cadre
- 4) Years of work experience
- 5) Nephrology training

Individual Beliefs.

Questions measuring perceived susceptibility

- Do you think that you are at risk of getting infected during work?
- What do you think will increase/decrease the risk of getting infected?
- How concerned are you about acquiring infections during work?
 - If concerned, what drives your fears?
 - If not concerned, what allays your fears?

Questions measuring perceived severity.

- Which negative consequences do you expect from poor adherence to IPC?
- Do you think that these consequences can lead to mortality?
- What is your perception about the above consequences?
- How severe do you think the infection will be?

Questions measuring perceived benefits and barriers.

- What is your perception about the IPC guidelines?
- What are your perceptions about the IPC guidelines in place in MTRH?
- What are some of the benefits of using IPC guidelines during patient care?
- What are some of the challenges you are currently facing with implementation of IPC guidelines?

Probe: How do you overcome these barriers?

- Do you believe that adhering to IPC guidelines will curb infection transmission?

Questions measuring perceived self-efficacy.

- Do you feel that you would strive to observe IPC guidelines given all the necessary tools for implementation?
- How would you go about observing the guidelines?
- Given the opportunity, are there any changes you would make to the current IPC guidelines?
- Do you feel that you would be a good IPC champion?

Questions for cues to action.

- Do you have reminders?
- What kind of reminders do you have in place?
- What is your perception about the reminders?
- How often do you see reminders around the hospital or social media?
- What kind of training have you received to equip you with knowledge and understanding of IPC?

Closing: Thank participant for their time. Remind participant about the confidentiality of the interview. Ask if they have any questions about anything that was discussed. Ask if there is anything that wasn't raised that should have been that is important to know in understanding IPC. Provide contact information for any future questions they may have.

END TIME:

Appendix 5: Short procedure for connection disconnection of the CVC 1



An ISO 9001:2015 Certified Hospital



NEPHROLOGY DEPARTMENT

SOP FOR HAEMODIALYSIS CONNECTION OF CVC

1. Perform hand hygiene procedure
 2. Prepare materials required for the procedure. Using aseptic technique, open a sterile proHD CVC set and place on a disinfected table/trolley.
 Pour the disinfectant solution onto sterile gauze or use disinfectant wipes as per country provision.
 3. Pour the disinfectant solution as per the manufactures instructions for the specific catheter brand.
 4. Syringes for flushing the catheter lumens should not be prepared greater than 45 min prior to connection
 5. Perform hand hygiene procedure
 6. Using aseptic techniques, remove the gauzes/pouch lifting the catheter up, and place a sterile drape underneath without touching the old dressing.
 7. Perform hand hygiene procedure
 8. Put on the sterile gloves. Using aseptic technique, wrap the gauze soaked with disinfectant around each catheter lumen, including the catheter lumen clamps (following the manufacturer's recommendations for the contact time).
 9. Ensure arterial and venous catheter lumens are clamped. Lift the catheter up, while placing underneath a new sterile drape. Using aseptic technique remove the gauzes soaked with disinfectant
 10. Remove gloves and perform hand hygiene procedure
 11. Put on new sterile gloves. Working with one catheter lumen at the time and using aseptic technique:
 - Hold the catheter lumen with new sterile gauze.
 - Remove Luer Lock cap from the catheter lumen using a sterile gauze and dispose of it.
 - Immediately attach an empty sterile 5 ml syringe.
 - Clean the threaded part of the catheter with sterile gauze soaked with disinfectant.
 - Ensure the open end of the catheter lumen does not come into contact with any surface.
- Repeat the procedure for second catheter lumen.
12. Open the arterial catheter lumen clamp, withdraw 3-5 ml and close clamp. If unable to aspirate locking solution from the catheter lumen
 13. Ensure arterial and venous catheter lumens are clamped. Working with one catheter lumen at a time using aseptic technique:

14. Remove the syringe filled with 3-5 ml of blood from the catheter lumen.
15. Immediately attach a syringe filled with 0.9% NaCl solution (never less than 10 ml).
16. Open the clamp of the catheter lumen and gently flush it.
17. After flushing close the clamp and leave the syringe connected to the CVC lumen.
18. Repeat the procedure for the venous catheter lumen.
19. Using aseptic techniques connect arterial and venous bloodlines (one after the other) to the correspondent catheter lumen.

SOP FOR HAEMODIALYSIS DISCONNECTION OF CVC

1. Perform hand hygiene procedure
2. Prepare materials required for the procedure. Using aseptic technique, open a sterile proHD CVC set and place on a disinfected table/trolley.
3. Pour the disinfectant solution as per the manufactures instructions for the specific catheter brand.
4. Syringes for flushing the catheter lumens and catheter lock should not be prepared greater than 45 min prior to disconnection
5. Perform hand hygiene procedure
6. Un-wrap the catheter, if required. Remove old gauzes.
Using aseptic technique, lift the catheter up and place a sterile drape underneath. Place dry sterile gauzes under catheter lumens and wrap disinfectant soaked gauzes around each catheter lumen/bloodline connection (following the manufacturer's recommendations for the contact time).
7. Perform hand hygiene procedure
8. Put on sterile gloves. Remove the disinfectant soaked gauzes.
Using sterile gauzes, close the arterial catheter lumen and the arterial bloodline clamps and disconnect the arterial bloodline from the catheter lumen.
Using aseptic technique, connect the 0.9% NaCl solution syringe (never less than 10 ml syringe) to the arterial catheter lumen, flush it and close the clamp. Leave the syringe connected.
9. Perform blood reinfusion
10. Remove gloves and perform hand hygiene
11. Put on new sterile gloves and using sterile gauze, close the venous catheter lumen and the venous bloodline clamps and disconnect the venous bloodline from the catheter lumen. Aseptically connect the 0.9% NaCl solution syringe (never less than 10 ml syringe) to the venous catheter lumen, flush it and close the clamp. Leave the syringe connected.
12. Working with one catheter lumen at the time, remove the syringe, connect locking solution syringe (according to the physician's prescription and lumen volume) and administer as per manufacturer's instruction. Close the lumen clamp.
13. Wipe the lumen of the catheter with dry sterile gauze.
Remove the syringe and promptly close the catheter with sterile cap securely. Do not touch the inside of the caps.
14. Repeat the steps for the second catheter lumen.

APPENDIX 6: IPC_QT05_24102023

Interviewer: Welcome today is 19th of October 2023. So, ah...I think we get started by knowing you a little more ah...and in this case because we are recording anonymously, I just want you to describe who you are without your name and what you do in this unit.

Respondent: Okay.

Interviewer: [laughs] Yes.

Respondent: I am the clinician in the renal unit. I basically see my...make decisions for our patients in terms of prescribing drugs, catheter insertions, catheter removal. [pause] That is basically what I do around here and clerkship and do ward rounds.

Interviewer: And ward rounds?

Respondent: Yeah.

Interviewer: Okay. Are there any other things you handle like ah...other than handling the patient?

Respondent: In terms of?

Interviewer: Any other duties maybe administrative or...

Respondent: No.

Interviewer: Oh, so you deal mostly with the patients?

Respondent: Yes.

Interviewer: Okay. Our interest in this study is to look at the infection prevention measures at...especially here at the renal unit. Something which I think you have interacted with a bit. So if you look at your unit what are some of the specific measures that are in place for infection prevention?

Respondent: At the unit we are provided for with sanitizers, we are provided for with gowns, we are provided for with sterile packs for insertion purposes and we have been provided for with sterile packs for connection and disconnection of patients during dialysis.

Interviewer: Mm-hmm. Okay when you connect them to the machine and disconnect them from the machine?

Respondent: Yes, yes. There is a sterile pack for the same.

Interviewer: Okay. So all that is provided by the hospital?

Respondent: Yes. All that is provided by the hospital.

Interviewer: Okay. And the one thing I am interested to know is, if you look at the measures that are there for infection prevention, are they mostly staff driven or are they enforced...hospital enforced?

Respondent: I would say both, because there are others people acquire through training and they want to enforce it and there are others that come to be enforced by those who like the, the...once in a while, the infection control team would walk around and say this is the standard we want you to do things. But there are also other aspects where it is staff driven, after having had gone through some training.

Interviewer: Some training?

Respondent: Yes.

Interviewer: So, for the part where the infection prevention control unit enforces, how often are they here to like enforce some of those...

Respondent: Ahh...something that is sparsely, sparse, they don't come more regularly. But actually I can say as unit, we are doing much better.

Interviewer: You are doing much better, so most of it is the staff who are regulating...

Respondent: Staff driven, yeah.

Interviewer: Okay. So, for them if you say not so regular, like in a month how many times would you say they come?

Respondent: Maybe once or twice.

Interviewer: Once or twice in a month?

Respondent: Yes.

Interviewer: Okay and with already the practices that you have for infection prevention, have you identified any gaps for instance?

Respondent: Once in a while, we run short of sanitizers. Those are a given. Once in a while we run short of antiseptic, povidone, spirit, but not all the time. Even those sterile packs once in a while they are out of stock.

Interviewer: Okay. So sometimes you get stock outs?

Respondent: Stock outs.

Interviewer: For some of the commodities you need?

Respondent: Yes.

Interviewer: And other than the commodities part, are there other gaps that you would say you may have identified in the course of...

Respondent: Aha, having been in the unit for some time and being the major people around, gaps come in because of training purposes. So you realize like in a situation where students are, in such a situation those are the major gaps.

Interviewer: Okay. What do you mean where students are?

Respondent: You know when somebody is still on training, they are not as perfect as you yourself would want them to be.

Interviewer: Aha, okay.

Respondent: In one way or the other, there could have been [pause] mishaps on the same. Like even, in handling of catheters when the students are there, you would always...in one way or the other there will be haps. But actually we try.

Interviewer: Mm-hmm. So you closely have to monitor them?

Respondent: You have to monitor them. Sometimes it is not 100% because of the students...the like, like, like the day like today, there are only four nurses and there have 25 machines. We may not be up to 100%.

Interviewer: Mm-hmm. Yeah, so that pressure may...

Respondent: Mm-hmm.

Interviewer: Okay. Alright and ah...so with what is happening in the unit, okay, having the...with the measures that you have highlighted, how do you feel...do you feel that patients or even you, may be at risk of acquiring any infections here in the unit?

Respondent: Yes or no. Both. Both. Because at times eh...like for example when you go to pediatrics unit, the chances that there are cross-infections is very high. Because each parent...each child has two parents and the room is so small. Cross-infections, nosocomial is almost all the time given. In the other side...on the contrary, on the other room is rarely because we control entry of non-clinical...non-staff...

Interviewer: And non-patients?

Respondent: And non-patients.

Interviewer: That is the main unit which is the other side?

Respondent: The main unit. The other side is hard to control because the children want to be with their parents.

Interviewer: Mm-hmm. Ooh, so are you saying...are you implying that the parents...the presence of parents or other people who are not patients is itself a risk?

Respondent: Yes. And I still believe so. In fact I have always tell our nurses, let us restrict entry to children who are...who do not need their parents 100%.

Interviewer: Mm-hmm. Why do you think that is a risk? Maybe just to explain a little bit.

Respondent: Okay you see, these are children, all of them have been on long term dialysis. Which they make them immunocompromised in one way or the other. Now, coming in contact with people from unknown regions, that poses a risk automatically. Or from another ward, you know that this is a service point. So this is a child who comes to do their...this is a service point like an X-ray, they are coming to do their dialysis and go to their respective wards. And therefore with their mingling, there are three machines in that room and you can find every other child has several relatives. So it poses a risk on its own.

Interviewer: So the relatives would also bring infections?

Respondent: Bring infections and can even pick from the next child.

Interviewer: Okay. Okay. I get you now. How high do you...would you rate the risk to be? Especially here if...now that you have separated the main unit and the pediatric unit.

Respondent: I would set here to be as low as two or one out of ten. This other side. The other side will go up to four.

Interviewer: Four? Four out of ten?

Respondent: Yes. Yes.

Interviewer: Chances...because of the outsiders?

Respondent: Yes.

Interviewer: Have there been any incidences where you have had real cases of people who have acquired infections maybe here at the unit?

Respondent: Mm-hmm, but you cannot tell because majorly, our patients would show like signs of having that infection. If they are in the ward, you will majorly not know whether it is from us or from the ward. Or, sepsis in our unit you majorly may not know because it could be also patient initiated because some of them we don't know how they stay at home. So you cannot pinpoint the source of the infection as such.

Interviewer: Okay. So its not...

Respondent: Then again you realize we don't do cultures. You know when you don't do cultures eh...when you do cultures you will get to know where could have been the source of this. But in this case we never done cultures that give us a feedback. All the cultures we have done we have never had feedbacks. So now you cannot know whether it is hospital acquired or community acquired.

Interviewer: Okay. Or community acquired?

Respondent: Yes.

Interviewer: Okay. That is when they go out there...

Respondent: Because you see, this is a service point, it is like someone coming to see you and go. You cannot know where they pick it from. You see?

Interviewer: Mm-hmm. So that remains a challenge? [laughs]

Respondent: It remains a challenge and it is a big area that me and my colleagues will never get to know where are our short comings.

Interviewer: Mm-hmm. But if...given the fact that now they are...they possibly could have acquired from here in as much as the unit is more sterile than out there, and also they could acquire it from out there, do you still have had cases of ah...

Respondent: The possibility is there. The possibility is there that we could have been the cause of the sepsis for the patients. But now you cannot quantify.

Interviewer: No. What I am actually asking is, have you dealt with cases where there was sepsis or there was any infection acquired, either from whichever place.

Respondent: No. Not directly where I think it is...we are being the source. But infections that we deal around with we always think [pause] it could be associated with the procedures that we do around.

Interviewer: Okay. The infections you handle here?

Respondent: Yes.

Interviewer: Okay. That could include...is it sepsis or?

Respondent: Septic catheter, septicemia for the patients, because you see, there are patients who are having their body exposed to us twice a week. So we are in contact majorly with them than even...and if somebody mishandles the equipments used, then at that time is where we are majorly likely to be the cause.

Interviewer: To be the cause?

Respondent: Yes.

Interviewer: Yeah. You...I want to take you back a bit to your work at the unit. The one thing we did not establish is how long you have been [laughs] in the unit.

Respondent: Three years.

Interviewer: Oh, three years. So, I want to also highlight the area of guidelines. I know that for infection prevention and control there normally some guidelines that are used. Do you have any in the unit?

Respondent: We don't.

Interviewer: Huh?

Respondent: We don't have.

Interviewer: You don't have guidelines?

Respondent: Majorly the guidelines that we have is for hand-washing. But on how to handle procedures, we don't have SOPs.

Interviewer: Mm-hmm. Okay. Oh you don't have SOPs for handling procedures?

Respondent: Yes. But it is majorly due to training, we follow what we know by training.

Interviewer: By training.

Respondent: But as a unit we don't.

Interviewer: So the ones that are existing are mostly the hand-washing ones?

Respondent: Yes.

Interviewer: And which ones? Or just the hand-washing?

Respondent: And sanitization purely, but there are no other manuals to say, for this procedure do this, for that procedure do that.

Interviewer: Oh okay. So those ones are lacking? And for the ones that exist for hand-washing and sanitizing, how are they used? Like are they placed in a place...

Respondent: Yeah like for sanitization eh...each and every other table...these machines have corresponding tables, so each and everyone of those tables have a sanitizer. They should have a sanitizer. Of which sometimes we run short of them. Our sitting places have sanitizers, so we always try...we always [13:12] ourselves that we sanitize after every other examination.

Interviewer: Mm-hmm. Okay.

Respondent: Or after every other procedure.

Interviewer: Okay. So, and the guidelines concerning use of sanitizers and hand-washing, are they on the table where the sanitizer is or where are they located?

Respondent: We don't have. We don't have. We don't have those guidelines.

Interviewer: Okay. They are not posted anywhere?

Respondent: No.

Interviewer: Okay. So what the providers largely rely on is what you have trained?

Respondent: Trained on before, school or elsewhere. But we don't have guidelines in the units currently.

Interviewer: Okay. I want you to tell me a little more about the trainings. So in the short time that you have been here, have you guys undergone, you and your colleagues, undergone any training on infection prevention and control? Either here or elsewhere? [laughs]

Respondent: No.

Interviewer: Not yet? Mm-hmm. And do you know of your colleagues, if...

Respondent: I don't know of any.

Interviewer: If they have had any training?

Respondent: I don't know if they have had any training.

Interviewer: Okay. So the one you have is...

Respondent: There was one that was supposed to have been taken through, that one is...it is a wrong one...that one was patient safety. That one was a different one.

Interviewer: Oh, you have done one on patient safety? Or it did not happen?

Respondent: I did not go because eh...you know now when it happens during working hours, we are majorly supposed to be here working for the patients. Though that is part of what you are supposed to know but if it happens during working hours it is hard for you to avail yourself. And you can see now like, now you wanted me to go and do this with you in another room and I told you I am not supposed to leave this place.

Interviewer: To leave here.

Respondent: Because I am the only one, you know? It cannot be like when they need me I am far.

Interviewer: You are far?

Respondent: Yeah.

Interviewer: Okay so you didn't attend that one on the patient safety. So the one you largely rely on, is it the one you got during your formal training?

Respondent: Yes in formal training.

Interviewer: Your medical training?

Respondent: Yes medical training.

Interviewer: Okay. I want to understand if...if there are...if there have not been guidelines, how do you explain that? Like why are there no guidelines?

Normally, for an effective infection prevention, there should be some guidelines.

Where do you think the gap is?

Respondent: That one I cannot tell, but what I know is that the guidelines that are there is for the hand-washing. The rest of the things they aren't...

Interviewer: They aren't there?

Respondent: Mm-hmm.

Interviewer: And you can't guess why?[laughs]

Respondent: I cant guess.

Interviewer:[laughs] Why they are not there? And if then they are not there, do you think the risk is big that they are not there or do you think they would make any difference if they were there?

Respondent: [pause] In my own assessment...

Interviewer: Yes.

Respondent: As a person I would have wished that they were there. Because when...they will assist us put in place the new people coming to the unit. Put us on check who have been in the unit for some time. You would realize that out of the...for example the seven steps, I have been missing one or two steps, so you pull up your socks towards meeting those objectives.

Interviewer: Those aha...

Respondent: But now since they are not there, the risks are high.

Interviewer: Any steps are...[laughs]

Respondent: Yeah. So like for example, if there are not there, there are no steps that are being followed. Then it will mean, they are either not being done all together.

Interviewer: Mm-hmm. Not being done, so it is up to the person who is...

Respondent: Who is doing it.

Interviewer: To either do or not?

Respondent: To do or not.

Interviewer: Okay. And what would that mean in your capacity? What would that mean for patients like in terms of the risks. Is it higher now that the guidelines are not there or what would you say about that?

Respondent: [pause] For our case here, I would say, people are trying, but without those guidelines the risk could have been increased but people are trying here because at least you can imagine how [17:47] we are visited we cannot get what we are getting

here. The institution has provided us with a lot that we cannot...that we use in as much as it may not have been used perfectly but we use them.

Interviewer: But you use them?

Respondent: Yes.

Interviewer: So at least that lowers the risk?

Respondent: That lowers the risk because these are things that are provided for.

Interviewer: Mm-hmm. And ah...though you have said that there are no risks but ah...there are no guidelines but do you ever have any kind of reminders in using...adhering to maybe IPC guidelines if...okay guidelines that are not there though? [laughs]

Respondent: You see as from the word go I said there are no guidelines on those things, so there would be no way I could say again that there are reminders of those guidelines. You see, as long as there are no guidelines there will be no...

Interviewer: There will be no reminders.

Respondent: Yes.

Interviewer: Okay. So that means that you may not...other than the visits by the IPC unit, you do not have any other kind of reminders to...

Respondent: Yeah. Other than those visits, there are no other reminders, when they walk out those reminders...

Interviewer: Okay. Let us also look at now what could be done for the unit now with the gaps that there are no guidelines and also the fact that sometimes you receive students, those are some of the things you have mentioned that could be gaps in IPC [phone rings] you want to pick?

Respondent: No.

Interviewer: Oh okay. What could you advice, like based on your experience with the unit what would you recommend that should be done to be able to lift to boost or to move higher the level of infection prevention in the unit?

Respondent: In my own opinion, or what my suggestion would have been, there should be SOPs or how to handle given procedures for everyone.

Interviewer: For everyone?

Respondent: For everyone. Like for example, if you are to connect a patient to a machine, there should be an SOP on what to be done. For any other procedure that should be done within renal there should be an SOP.

Interviewer: So there should...

Respondent: There should be guidelines.

Interviewer: Yeah for every procedure, every...

Respondent: Because I wanted to put it that way because I am a clinician, there are different procedures to be done by different people and they are done differently. So I would recommend, there should be guidelines...

Interviewer: Guidelines.

Respondent: For different procedures.

Interviewer: Every procedure to...

Respondent: To have its own guidelines.

Interviewer: Okay. For anyone doing that procedure?

Respondent: For anyone doing that procedure.

Interviewer: Okay.

Respondent: Yes.

Interviewer: I get you now. So there are some gaps which I also want us to look at maybe as we tend towards closing. This one is not very long. So, you highlighted the issue about there being students sometimes. You also mentioned issues that for paed, there are times when they have caregivers who come along with them, who are also increasing the risk of infec...catching infection in the unit. You have also mentioned the issue of work load among staff that sometimes could occasion missing some steps in adhering to safety guidelines or rather infection prevention guidelines. What other factors would you say would make it

challenging for the unit to adhere to infection prevention guidelines or prevention and control guidelines?

Respondent: Those are the major ones, I don't think there is any other one.

Interviewer: Mm-hmm.

Respondent: Because like us in renal eh...almost all other things are being done quite well. It may not be 100% but we are doing it quite well. Like you can see, after visitations, there is somebody cleaning. [pause] You see even when we were walking with you here, you see somebody cleaning.

Interviewer: Yeah, anytime I come here by the way there is always someone mopping. [laughs]

Respondent: Yeah so you know, *mghala muuwe lakini haki yake mpe* (Kiswahili proverb to mean give a person praised if earned and blame if earned).

Interviewer: The rightful...eh, yeah.

Respondent: So this place we are really trying. We are really trying.

Interviewer: Okay. So for the gaps for instance you...for the issue about the caregivers, who you said for paedics it is not possible to get rid of them.

Respondent: It is not possible to control them because eh...you cannot sedate your children. You need them to be crying that way you will know whether they are doing better or they are doing worse. And you see, these are children, children will not want to meet a stranger and be friendly with them immediately.

Interviewer: Immediately.

Respondent: You need to have somebody to stay with them there.

Interviewer: Okay. So for that case, how would you recommend that it is addressed so that the rate...the chances of infections go down?

Respondent: What I would recommend and what I have always been advocating is, there are patients who are stable, who are used to us, whom they have known us as part of their lives, those ones they don't need to be accompanied by anyone.

Interviewer: By anyone.

Respondent: They are only supposed to be accompanied when they are being fed. The rest of the time, the rest of the people must stay away from the room. For these other places, they should give us guidelines. Guidelines that somebody must be able to assess if they are being followed or not.

Interviewer: Okay. For the case of new people like new staff or students, who are on rounds here, what do you recommend that can be done to...

Respondent: That is why I was saying eh...there should be guidelines and there should be...okay...my recommendation would have been, amongst the team, there should be a team leader to always facilitate, make sure that newcomers [pause] and students are taken through the various guidelines that are going to be there for the purposes of infection control. If it is going to be possible, though in a limited resource setting like our African setting some of those things may not be applicable. That it should be the standard way to go. That should have been the best way to go. So that because at the end of the day, everyone else acknowledges that MTRH is a teaching institution.

Interviewer: Mm-hmm. There is no way you can get rid of...

Respondent: There is no way you can get rid of the students. So MTRH being a teaching institution [pause] everyone else must be able to handle the students and therefore they are part and parcel of us, even some of us were students just the other day [25:04]. Yeah. Students are part and parcel of us. There is no way we could talk ill about them and because learning is a process eh...before they become professionals they would mess up here and there.

Interviewer: Here and there? So for their case you recommend guidelines?

Respondent: Guidelines and somebody must always...

Interviewer: Be there?

Respondent: Remind them at the entry to go through the guidelines.

Interviewer: Okay. And for the issue about workload, the other risk factor that you said make it challenging for adherence to IPC guidelines. What would you recommend? I know you may not...[laughs]

Respondent: I may not talk much about that because I will be overstepping but that one now when it reach the management they will know. From there they will have heard us.

Interviewer: Mm-hmm. But okay like, there is the solution you know in as much as you may not be able to implement it as a person...that is what I mean like...

Respondent: Yeah like for example let there be enough staff. You know under-staffing means people are working under duress. By 2 pm like now, somebody will be doing just to finish, not a perfect one.

Interviewer: Mm-hmm. They have already overworked?

Respondent: They have already overworked. And you can imagine now somebody working on a very strict schedule like that for three consecutive days. What would you expect? Like for example, there are 25 machines here. There are only two nurses at night. Patients come here at 4 am. How do you expect those people to connect those machines, those patients...

Interviewer: To machines.

Respondent: To 25 machines, on time and do an effective one. That is why I am giving you the gist, there are only two nurses [27:00]. Our patients start arriving here at 4 am. They are supposed to take the blood pressure, they are supposed to take the weight, they are supposed to connect patients to these machines and sometimes most of them come here when they are very sick, there is no clinician at night, there is no medical officer at night.

Interviewer: It is just the two nurses.

Respondent: There are only the two nurses.

Interviewer: Wow. Okay.

Respondent: And there are 25 machines.

Interviewer: Mm-hmm. So that means...

Respondent: There is a big challenge.

Interviewer: Mm-hmm. That means for you the main thing is to increase the number of staff.

Respondent: Yes. If that will be heard, then we will be good. Because you see, like any other person if you are working under duress you may not do a satisfactory work.

Interviewer: Mm-hmm. Okay. So the duress has to be reduced? [laughs]

Respondent: Yes! Because look at it this way, this is a person who is working, like if you are part of us as clinicians, in emergencies there are no sterility. Now I can tell you that one.

Interviewer: In the?

Respondent: In emergencies there are no sterility. You try first to save life first...

Interviewer: Before you sterilize? [laughs]

Respondent: Then the other things comes later. So even your topic may not apply all the time. The topic we are discussing today may not apply all the time.

Interviewer: When it is emergency...

Respondent: When it is emergency...

Interviewer: It is emergency.

Respondent: There is no sterility. Because at the end of the day, why are you going to sterilize if you are going to loose the person before? Then you would rather do the procedure then follow up the treatment thereafter with antibiotics.

Interviewer: Mm-hmm. Yeah, yeah, I get you. [laughs] I get what you mean.

Respondent: [laughs] So you can imagine these nurses coming here they are brought very sick patients at night, who have had pulmonary edemas, overloads, then, you expect anything. They are only nurses. Two of them in fact.

Interviewer: Just two?

Respondent: Just two people. Handling around 50 people. They come here all of them want a machine. So they are forced to leave it to them to struggle with the machine to

connect whatever they are able to do. So those are the things that may not be able to...It is not within my power to say so but at least we are understaffed.

Interviewer: No, at least as a user, you can recommend then the one involved can know what to do. Because the user has recommended this needs to be done.

Respondent: Can I pick this?

Interviewer: Yeah actually we are done. Okay. So I think we have had a good discussion and I am very, very, grateful...[laughs]

Respondent: You are most welcome.

Interviewer: For fixing me within the schedule. [laughs]

Respondent: [laughs]

Interviewer: Yeah, I really appreciate.

Respondent: You are very welcome.

Interviewer: I don't know if you have any other comment you want to jump into...

Respondent: No, no. We are good and you can implement whatever you have come up with and it is for the good of all of us.

Interviewer: Okay.

Respondent: Yeah.

Interviewer: Thank you.

Respondent: Thank you.

Interviewer: Okay. Welcome today is 24th of October 2023. So, I think ah...we want to get started from just knowing you a little bit.

Respondent: So, my name is [name]. I am head of nephrology, which covers both the children and adults service as administrative and eh...yeah and of course other than clinical, research and also training. Yes, that is our core mandate.

Interviewer: Okay.

Respondent: Yes.

Interviewer: And for the...what are some of your roles that relate to patients directly? Especially renal patients.

Respondent: So, thank you for that question. Basically we deal directly with the patient, we see them in the clinic, we see them in the wards, we see them in the ICU including the theaters. We also see them in the clinic which we run on Mondays for the paediatric clinic. Tuesday we run the transplant...combined transplant clinic for children and adults. Wednesday is adult clinic while Thursday is the Nephrology clinic...the Lupus clinic sorry. Fridays are major ward rounds for us of the entire hospital, so basically we start from shoe for Africa, Nyayo wards, reproductive health surgical wards, emergency, critical care, we review patients. But also on a daily basis, we have three teams, which we have divided among ourselves. Each team is headed by a consultant nephrologist. So one team deals with the clinic and review all the patients in the clinic together with the transplant. The second group is the one dealing with procedures and reviews patients who are on dialysis on a daily basis and the third group deals with patients who need to be consulted in all the entire hospital. We do have also other colleagues, we have registrars, both in internal medicine, paediatrics...child health and paediatrics. We do have also colleagues from reproductive health as well as surgery.

Interviewer: Surgery.

Respondent: They form nephro-urology team. And we do have also clinical officers, who are training on higher diploma in nephrology. We do have also medical officers attached to the department, they are three. They also lead a team, each one of them has a team. And as well as they have the clinical officers, two of them in the same department. So on average we see...in the dialysis unit we dialyze an average of 60 to 80 patients per day. While...we have got three parts; those who have Hepatitis B, the children and also the adults.

Interviewer: The adults.

Respondent: So each one of these groups have their goals. The paediatrics have got two machines, while those with Hepatitis B have got a total of three machines, the

remaining, that is going to be like 24 machines, sometimes 23, belong to the adults...general adults.

Interviewer: Adults. Okay.

Respondent: We do have special machines, we do have what we call eh...we do hemodialysis and hemodiafiltration. Both sides. Maybe you can find there is a big difference and at the moment we are able to hemodialyse...hemodiafiltration, we have 19 machines and we hope to get additional more...15 more machines next month. 6008S from Fresenius medical care [4:30]. The other part of our service consists [interruption] The other part of our service consist of the procedures. We fix the catheter, we remove the catheter we increase fistula or as well as...and also prepare for transplant.

Interviewer: Transplant.

Respondent: Where we do the counselling, it is a whole team. We have got the nutritionists, the counsellors, psychosocial support, nephrologists, urologists and also the corporate clients.

Interviewer: Corporate clients.

Respondent: Corporate office, they also want you. We are unique in the sense that we don't have like a private room. We believe patients learn from each other. So we operate our clinic in an open field.

Interviewer: Open hall.

Respondent: Hall. For the purpose...so that patients can learn from each other. And we are comfortable with that. Okay.

Interviewer: Mm-hmm. Yeah that is a...

Respondent: Research wise, yes we are doing well, we mentor...we do our own research, and also as well as mentor students, supervise students. We hope to plan to start fellowship in pediatric nephrology, adult nephrology and uro-gyno...ah... (Urology and gynecology) very soon. Most likely next year.

Interviewer: Oh, next year?

Respondent: Mm-hmm.

Interviewer: Ah...this study is more of looking at the aspect of infection prevention especially at the renal unit, where dialysis happens and other things. So, could you describe any measures that are enforced at the renal unit to...for infection prevention?

Respondent: Thank you for the question. Infection prevention starts from far. Starts from controlling. So we have what we call [placemab 6:32] whereby the company which...we use the company to bring the machines, install the machines, we just buy the consumables. The consumables are pre-packed with all the package including the gauzes, iodine bidet, troughs and gloves...surgical gloves, mask, everything, gowns for that particular patient. Number two, we do...the housekeeping, they do a good job. First of all, we change the linen daily, we clean every four hours our unit because we are high volume, high traffic place, and of course again we sensitize both the staff and the patients and the relatives on the awareness of that. We do have also protocols on how to put [7:39]. If you enter a procedure room, you will realize what we have put there. It is not just everybody just enter. You have to drape, you have to clean your hands, drape, dry it and the environment is safe.

Interviewer: That is for the surgical part or you have a procedure...

Respondent: No, we have the procedure room there.

Interviewer: Ooh. Okay.

Respondent: And we have a number of...we have been...we must say that we have actually stayed without any infection...much infection as a unit. The only challenge we face is sometimes we get patients from home, in the environment they have infections which are not line related, but maybe something like...something else related. Because some of them come from home others come from the hospital, so that is still a challenge we still have. But I must say we also have washing basins, now we have six, twelve actually in the total in number. We have adequate water, we have soap among others.

Interviewer: Among others.

Respondent: When it comes to the designs of the unit, I must admit when we were designing, we did not have a way of separating those with Hepatitis B from those

without Hepatitis B because of the way the floor was designed. But we are going to put consideration in future to have them separated into two. But so far so good.

Interviewer: So far so good?

Respondent: So far so good.

Interviewer: So it is mainly as you are saying, mainly the consumables are pre-packed like for each patient.

Respondent: Each patient.

Interviewer: Okay. And then you have talked of...

Respondent: And sterilized.

Interviewer: And sterilized?

Respondent: Yes.

Interviewer: And you have talked of in the...there is a bit of cleaning...a lot of cleaning happening.

Respondent: Yes.

Interviewer: Hand-washing and all that.

Respondent: Yes. Mm-hmm.

Interviewer: Are these measures largely hospital driven or they are staff driven or how would you describe them?

Respondent: Actually, you may almost say it is unit driven. Eh...nephrology department driven. We customize to our own needs. Yes. Because I don't think there is even another place which is high traffic like us. So we are quite a high traffic site. Because for every patient, they have three to four relatives accompanying.

Interviewer: Mm-hmm. So it is more of the unit that is emphasizing...

Respondent: And of course again not everybody will enter to the dialysis unit. Some people...most of...it is only the patient and the staff. The rest are excluded outside there.

Interviewer: Mm-hmm. And if you think about it, you are talking about gaps that are there. Like you have talked about the design of the unit. What other gaps would you say are there in terms of...that may be limit the infection prevention efforts that you are putting in place as a unit?

Respondent: Mmm...We have what we call ventilation. Our windows are really big. And then we don't have cubes, it is just a hall.

Interviewer: A hall yeah.

Respondent: For the same purpose. For the patient to learn and also easy ventilation. So there is a cruise through ventilation. Of course we continue to educate and empower our staff on the need, because like if you come as a new staff, we...that is what our training...we take you through. We have high volume of students, both from Moi University, University of Nairobi, COSECSA programs including West Africa and also even middle colleges. So we are high volume. MTC, eh...so we train them and we take them through. Because we believe they are part and parcel of us and they ought to know what to be done to make us a difference. We do believe we are a department with a difference. But you might check yourself. Most people will tell us; are you public? And we tell them yes we are public. Because we believe public hospital deserve to be given the best.

Interviewer: The best.

Respondent: Yes.

Interviewer: Okay. So for the part of the students you emphasize on training them on the infection prevention measures that they should...

Respondent: So we queue...we have the number, we don't allow any number. We strategize such that we are able to accommodate a number to reduce the number of people...population. Yes. But we are many service points eh...so up to now we have not had any challenges. Because if you come a class of 10, we divide you into three. One group down, another group this way. So at the end of the day, we are actually three.

Interviewer: Three. Okay.

Respondent: Yeah.

Interviewer: You talked about the gap in terms of home based care, like for the patients who come from home, and you said others come from other sources like the wards, I think. Tell me a little bit about the challenge you are experiencing with that in terms of infection prevention.

Respondent: You see the community there...a lot of community based infection. Especially particularly they have respiratory infection, hygiene is also a challenge, clean water as well as possible though we also empower our patients on the need to take care of themselves, daily cleaning of the hands, washing the hands most of the time and also even the [13:32]. We also inform them to avoid crowding. Something actually we are the only department that emphasizes the need of COVID vaccination and not just COVID, the entire vaccination program. As soon as we enroll you there, that is one of our mandate to ensure that you have got all the complete vaccine. Because we do believe one day you will be transplanted and you need to be vaccinated. You might not get in that window period. Yeah.

Interviewer: Okay. So it is something that you are trying to address with the patients themselves?

Respondent: Yes. We have patient organization called North-Rift Kidney patients association. I am their patron with almost like 4,000 members, very active and very educative. I learn from them, they also learn from me. If there is anything new in the

world I know...you know I need to share, I will share with them. So they are really well educated. They think they are more doctors. You know this disease, the kidney disease, makes you to go and read and Google. So most of them are really touched and they know the disease. It is not that...they own the process.

Interviewer: Okay.

Respondent: Yeah.

Interviewer: So are you...if you think about risks to patients getting infections maybe at the unit, how would you rate that risk? [Laughs]

Respondent: So the risk eh...is there but maybe low. The risk is low...of getting infections is low. Putting the...based on the measures we have put in place. However, anything is possible. Like COVID came we did not know. So some of the things which we don't know which can happen. But we are trying to map as much as possible the causes of these eh...which can make us not to achieve that prevention as much as possible. So that is something we are addressing.

Interviewer: Mm-hmm. Okay and ah...

Respondent: We do have a risk management in place, surprisingly I am the chairman of the risk management in the hospital. So I also map a lot for the hospital in terms of risk.

Interviewer: Okay. Have you had incidences where you have patients or even staff who have gotten infected within the unit? Have you dealt with those kind of cases?

Respondent: No. Not in renal.

Interviewer: Mm-hmm. Not in renal?

Respondent: We have not had any infection like HIV, Hepatitis B. We are very thorough.

Interviewer: Or any other...maybe if not...

Respondent: COVID yes. Even me I got COVID.

Interviewer: In the unit? [Laughs]

Respondent: [laughs] I don't know where I got it. I got three times. But eh...yes infection you can get anywhere. But we cannot pin point exactly this is from the unit.

Interviewer: Okay.

Respondent: Yeah.

Interviewer: So that is another challenge.

Respondent: Yeah. We cannot pinpoint. But nonetheless we have not got ah...other than COVID we have not got any challenges. We also monitor the samples of the patients monthly for Hepatitis B, Hepatitis A, C. And also blood work to see if there is any infection or not. So we monitor closely. That is why we have the [17:16] very active.

Interviewer: So you have not had...

Respondent: Surprisingly our clinic attendance is usually above 130%.

Interviewer: Ooh?

Respondent: You book 100 patients, they will turn up 130, 150. Yes. It is a very unique. Then if you make it a holiday, then the next day you are in...

Interviewer: Problems.

Respondent: Problems. Because the whole group now, the group of yesterday and today they will be there 100%. So we have learnt something...something I have never seen in my life, something of that nature. But now it happens. Even during those Moi Day, this one for 10th. People just showed up so many the next day.

Interviewer: On Wednesday.

Respondent: Yeah actually we saw 160 patients.

Interviewer: Wow.

Respondent: In the clinic which ah...in fact I left here around 6.

Interviewer: Mm-hmm. This is crazy. Ah...

Respondent: I also ensure the supplies...medical supplies necessary for my team are there. Even the consumables, even the catheters, we don't just pick any catheter in the market. No.

Interviewer: Mm-hmm. There is a standard you have to get?

Respondent: In fact if you ask the CEO we are the almost people who bulldoze things to be done the right way. We reject you. You know like there are some suppliers who will tell you they supply this thing, but when they come the day of supplying, they supply something different. We reject. On the spot. Like permanent catheter, most of them stay for more than 10 to 15 years with no infection.

Interviewer: Ooh. With no infection?

Respondent: Even acute catheters, they stay for more than even three months. Yes. So, they are expensive, but the long term is cheaper.

Interviewer: Is cheaper. Okay.

Respondent: Yes. For the hospital and for the patients. Yes. So even the other medical supplies usually we go for quality. And that is why you find also our machines they are quality. They are not like we just pick anything in the market.

Interviewer: In the market mm-hmm.

Respondent: We believe the best. If it can be found in America, it should be found in Kenya.

Interviewer: Mm-hmm. Okay. Let us talk about the infection prevention and control guidelines. Do you have any at the facility...at the unit?

Respondent: Yes. We do have.

Interviewer: Mm-hmm. Where are these placed?

Respondent: Actually we have in the, almost everywhere. It is in the notice board, we have in the files and every staff was given to their email.

Interviewer: Mm-hmm. Are they a specific kind like CDC or they are developed by the facility?

Respondent: We developed ours by our own department. It was developed by Dr. Maritim.

Interviewer: Mm-hmm. Okay. And so they are posted somewhere within the unit.

Respondent: Yes, yes.

Interviewer: And...

Respondent: We have Dr. Maritim, Dr. Gatenjwa, are the champions.

Interviewer: Mm-hmm. Who drafted these guidelines?

Respondent: The whole group was involved, and then we adapted. Yes. It was a consultative kind of drafting. Because we came from a background of maybe like different sub-specialties now we come from speciality we are now super-specialists. And different of us we come from different environment where we trained. Like for me I trained in the University of Witwatersrand. Maritim trained in the University of Cape Town. Koech trained in [21:05]. Koech trained in Kenyatta and we are here.

Interviewer: And you are here.

Respondent: So we get the best. Yes. Surprisingly, I delegate...as the HoD I delegate my duties, most of my duties to my colleagues, because I am almost retiring, I also want to ensure that they get hands on.

Interviewer: They are capacity built...

Respondent: I actually don't do much. Yes. Because like transplant meeting, Koech. Issues with the dialysis, Dr. Maritim. So I oversee them most of the time.

Interviewer: Okay. So and these guidelines what do they cover? Are they just the hand-washing or what is the scope?

Respondent: They generally cover other than the baseline issues on infection prevention, we talk about how to drape, how to wash the hands, how to clean the floor, how to even like when collecting samples. How to go about...

Interviewer: Collecting samples.

Respondent: When there is an infection. How fast we go, how do you treat, and how do you manage and control the process. Yeah. It is a big document.

Interviewer: Okay. Does it cover all the other procedures for instance when operating the dialysis machine or catheters?

Respondent: There is also a different one again, but still of course under that umbrella there is also...those ones are there also.

Interviewer: Mm-hmm. And all of these are within the unit?

Respondent: Yes.

Interviewer: Put on the wall or on the table?

Respondent: We have a big file.

Interviewer: Mm-hmm. You have a big file?

Respondent: Yes, we have a file. Even for the engineers the same thing. Yes. We have engineers there, they will even show you. We even...our rooms like the water treatment plug is under the lock and the key. Not everybody can go in.

Interviewer: Mm-hmm. Okay. And...

Respondent: And we are covered with CCTV. So we review also CCTV footage.

Interviewer: Footages. Okay.

Respondent: Yeah. To see if there is any breach.

Interviewer: Mm-hmm. And are they used? These guidelines, to what extent can you say they are used?

Respondent: Yes. We use. We use. We use.

Interviewer: Okay.

Respondent: You know it has become part and parcel of us. And the way we developed is, we are writing our book the way as we do. So it is part and parcel of us.

Interviewer: Of what you do everyday?

Respondent: Yes, what we do everyday.

Interviewer: That is for all the staff, or just the doctors?

Respondent: All the staff. Each one of us has a role...the way we do it.

Interviewer: Mm-hmm. Okay. And are there...in terms of the utilization of these IPC guidelines, have you noticed any gaps, maybe among staff, within the unit?

Respondent: Of course there are. Sometimes people will...like the new staff, it will take time to pick up. Of course the best option is to sit down and coach them here and make sure they are at par. We also organize team building exercises. We also...the way we run our procedures eh...there is no seniority. You cannot say this patient should be seen by the consultant, this one to be seen by the MO, this one to be seen by the Clinical Officer. No. You come, if you are the first doctor, you see the first patient.

Interviewer: The first patient.

Respondent: So you go like that. And the reason behind this is so the patients...we don't separate the patients, two we don't bring seniority here, three we are mentors. We ought to mentor everybody and we want everybody to be friendly and we want everybody to be...feel at home. And maybe over these you can find out from even her, at least she has rotated in renal how you find...in fact surprisingly I think we are the unit where all the registrars are rotating all the time. They want to come back again because we are hands on and we are available.

Interviewer: Available. Okay. So the gaps mostly relate to people who are new to the unit, who may not have grasped everything all at once?

Respondent: Mm-hmm.

Interviewer: Are there ways that you remind the staff about adhering to these IPC guidelines?

Respondent: Yes. So we have our weekly meeting on Mondays between 8 and 9. We discuss kidney transplant, this is also another forum. We have also monthly meetings, so most of our meetings we discuss. We do have the [26:05] contracting process and one of the indicators is that. And we look at it like that. So everyday is an opportunity.

Interviewer: Mm-hmm. Everyday is an opportunity?

Respondent: Yes.

Interviewer: So you mostly remind yourselves during the meetings that ah...

Respondent: You don't even need to remind because it is part and parcel of you so you train. It is like you are part and...it is becoming part of you. It is part of your components to do...one of the activities you need to do. Other than teaching how to see patients, you also need to see how to do the aspect of the prevention.

Interviewer: The prevention. Okay. And the other thing I want to ask is concerning...there is the training that you go through to...as a doctor, but then there are may be also training for just infection prevention and control.

Respondent: Yes.

Interviewer: Have you had any training yourself?

Respondent: Yes.

Interviewer: And the other staff?

Respondent: Yes. We do have even our document there in the file.

Interviewer: Okay. So you have had training...

Respondent: There is Sr. Obundo and her team have been a [27:14] they have been sensitizing coming to the unit.

Interviewer: Mm-hmm. That is...she is a nurse or?

Respondent: She is a nurse, yes.

Interviewer: Okay. But training on the infection and prevention, prevention and control?

Respondent: Yes. Even Dr. Kwobah has a lot.

Interviewer: Okay. Then in my last bit I just want to capture what you think are the facilitators and the barriers of the utilization of these IPC guidelines by the staff within the unit. You have mentioned that there are...the people who are new may not grasp everything at once so they may have lapses here and there. What other things would you say would either facilitate or make it easier for people to adhere to IPC guidelines or would make it more challenging?

Respondent: So thank you for the question, as I said earlier on, is the way the environment is at, conducive environment, friendly environment, the tone on how you bring that aspect of the issue of prevention. Yeah? Somebody will understand. You know they should not be forced, somebody should own the process. And for us what we have done is to make sure that our staff own the process and they call for help. They call for support. And of course the issue of continuous sensitization, training for them. We also give opportunities for the...a number of even conferences. What I normally do is eh...because most of the time, I ensure those who have not gone before, they go.

Interviewer: They go.

Respondent: It is fairness. I don't want to disfavour anybody including the cleaner. You know most of us who are seniors eh...we tend to consider ourselves a lot. You forget the cleaner, you forget the patient attendant eh, the gardener. They also need to be and seen there and see what they do, what do people do differently. So that exposure is also key and that is what we normally do. I think as a department we almost have everybody now attending...having attended a conference and team building in our department. Because we don't want anybody to feel he has been leaved or she has been left behind because of...is a junior officer or something of the sort. We should be at par with the rest.

Interviewer: Mm-hmm. So that you feel makes it easy for people to utilize these guidelines?

Respondent: Yes and even share with you if there is any challenge. Yes. You see if I have a challenge, if you tell me, I should take it positively should not that you want to hurt me or something of the sort. We are one team we want to build. We also...we do small parties for those who have excelled, those who have maybe gone for further studies, for conferences, those who have retired, and so forth. So they also feel happy. We do some small [30:27] we do some bread and soda there, you enjoy. Yes.

Interviewer: Mm-hmm. You enjoy yourselves?

Respondent: Yes.

Interviewer: And you think that is a big motivation for...

Respondent: Indeed. You know the motivation should come from us. Yes.

Interviewer: Okay. And on the part of the challenges are there things that you feel...factors that you feel may make it challenging for the staff to adhere to IPC?

Respondent: So what we...allow me to say, you know we are a multi-specialist hospital. We should be a super-specialist hospital in terms of...such that there are other fields which can help us to achieve this like the infectious disease team, pulmonology team, we have got cardio-thoracic team, all those other departments. In internal medicine we need around 52 departments. So that like if you have one area, each one of you do a certain component and the patients alike. Similar so infection control it is the same thing in terms of legislation as a country, issues of drugs, antibiotic misuse, need to be adhered to because the basic thing is, it is easier to prevent than to treat. And I want to allude the Kenya Government issues of the primary health care. I think it is the first time that we are looking at this primary health care as an important part and this is where we missed for a long time. I am certain most of the issues are going to be sorted out there. Yeah.

Interviewer: Okay. Yeah. So, my last question, I know you are...

Respondent: Yes. And I hope it is the last one.

Interviewer: Yeah, yeah this is the last one [laughs]. I wanted to ask if you have any recommendations for what can be done to improve the IPC utilization in the renal unit.

Respondent: Training, sensitization, of course we need the...every part of our society to adhere to the infection prevention control measures. Not just in the hospital, not just in renal. It should be across the board. And I think we should start from our basic. I think when we were in primary we were taught these things. During my time, I had the opportunity of being taught. And I think we have left so much. I have not reviewed the...seen the curriculum, but should be also invented in terms of eh...from nursery, primary, high school, and should be taught early so that people can know.

Interviewer: Can know. Can adhere.

Respondent: Okay.

Interviewer: Thank you so much.

Respondent: Thank you very much.

Interviewer: Let me leave you at this point.

Respondent: Enjoy your evening.

Interviewer: So, welcome very much, today is 24th of October 2023 and this is the second interview today.

Respondent: Okay.

Interviewer: Yeah. So, let us start by understanding you and your role at the renal unit and this is without your name because we are trying to record anonymously. [Laughs]

Respondent: Okay.

Interviewer: Yeah. So who are you in the renal unit and what are your day to day activities or roles?

Respondent: Okay. In the renal unit, I work as a nephrology nurse and I have been a nephrology nurse since 2014. But I have worked in this renal unit for about four years.

Interviewer: Okay. For about four years, this particular one?

Respondent: Yes. Although I have worked in different renal units.

Interviewer: Okay. Since 2014?

Respondent: Yes.

Interviewer: Ooh. And ah...in your current role, what are your day to day [interruption]. Now, I was asking about your roles in the current ah...

Respondent: My role in the renal unit?

Interviewer: Mm-hmm.

Respondent: Okay. My role as a renal nurse or a nephrology nurse is to take care of the patients on dialysis. The patients that we normally have end-stage renal disease, or chronic renal failures and we have to dialyze them. So when I report to the renal unit in the morning, I am supposed to organize my patients, to identify my patients that I

have been allocated to and then to arrange for dialysis session. Yeah. And each dialysis patient...each patient is supposed to be dialyzed for about four hours.

Interviewer: Mm-hmm. Four hours?

Respondent: Yes.

Interviewer: Okay. So you identify them. And you are the one who conducts the dialysis?

Respondent: Yes.

Interviewer: Okay. Mm-hmm. Other than that, are there any other things you do with the patients?

Respondent: Umm...okay mostly it is dialysis. Up there in the renal unit it is just dialysis, so you just have to interact with the patient during the dialysis session and most of the patients are out-patients. Some are in-patients. So the out-patient ones are the stable patients and we are able to at least talk to them and interact with them how they stay during...their stay at home, any problems they had before they came for dialysis on that particular day. Because they are regular patients who come for routine dialysis twice per week. Each patient comes twice per week. So they are scheduled. There are some who are scheduled for Monday...Monday-Thursday, Tuesday-Friday, Wednesday and Saturday. Yeah.

Interviewer: Mm-hmm. Okay. So you have a discussion with them about any new developments from the time...

Respondent: Yeah. If they...if they...if maybe they felt sick or if they had any complications at home after dialysis.

Interviewer: Okay. In our study we are very much interested in the infection prevention at the renal unit where you work. Would you be able to describe for me some of the measures in place at the renal unit? Specifically for infection prevention.

Respondent: Okay. Just ah...before we talk about the measures, we have ah...our main important issue is catheters, so we make sure that the patients do not contact any infection on the catheters, because when they get the infection it affects them, their

bloodstream so they become infected. They suffer from catheter related infections. So it is upon us to make sure that the patients are...don't get infections. That means we have to apply measures of IPC very much. Yes.

Interviewer: Mm-hmm. So you mean the place where the catheter is installed?

Respondent: Yeah. So if it not well taken care of, the patient is bound to get infection...infections. Yeah. And infections...the septicemia, they are very dangerous to the patient. Yes.

Interviewer: Mm-hmm. Okay.

Respondent: So we make sure that the environment is well taken care of. Waste disposal...we make sure that we dispose off the wastes correctly. We are also just trying also, because now it is a very big institution we might not have all the requirements that we need for infection prevention especially for waste ah...

Interviewer: Disposal.

Respondent: Disposal, yeah. But for these other IPC measures, before we get to the patient, we have sanitizers that we use for hand hygiene.

Interviewer: For hand hygiene, ehe.

Respondent: Yeah. We also have areas for hand-washing where we do our hand washing before we start the procedures. So the main thing is washing hands and sanitizing.

Interviewer: And sanitizing.

Respondent: So that we prevent the patients from getting infections. And then we also try to minimize the infections by making sure that the patients are spaced. Not so close to each other so that they don't contract infections from other patients, because every patient might be having a different type of infections. Like some will come with respiratory diseases, maybe coughing, so that one, they need to protect the other patients from...

Interviewer: From such.

Respondent: Yeah, from such. And then we encourage also the patients to have gloves, not, not gloves, the...the...

Interviewer: Masks?

Respondent: Masks. And also we have to have the masks so that we prevent the infections. And we also have trolleys so when you are dealing with...we might not manage because we have so many patients, we may not manage to have each trolley for each patient, so we share the...

Interviewer: The trolleys.

Respondent: The trolleys. So when you are dealing with one patient, maybe when you are connecting the patient or disconnecting, you deal with one patient you have one trolley, but when you are going to the next one you make sure that it is well cleaned and disinfected. Yeah.

Interviewer: Mm-hmm. Before you use it with the next patient?

Respondent: With the next patient. Just to avoid the contraction of infections to different patients. And we also use...for aseptic techniques we use ah...sterile gloves. We have clean gloves for clean procedures and for surgical procedures or aseptic technique we use the surgical gloves and the sterile gloves. That is also one way of preventing infections.

Interviewer: Infections. Mm-hmm. So these measures are...they are largely ah...would you say they are largely hospital driven or they are staff driven?

Respondent: Mmm...I don't really know what you mean.

Interviewer: [laughs]

Respondent: Because now, okay, when you go for the training, to become a nephrology nurse you go for an extra training. So in the training you are taught how to keep the...to observe the measures...you are also...you are trained so when you come there it is like ah...it is just in you, you are supposed to take care of that. Nobody in the hospital will be following you to do this, this. It is upon you to know this is what I am supposed to do to the patient and that is how I am suppose to conduct my procedures. Yeah.

Interviewer: Mm-hmm. So it is more of in the staff to know what to do.

Respondent: Yeah. To do yes.

Interviewer: Okay. And with that, have you had any gaps in your infection prevention measures that you have at the unit?

Respondent: Yeah. Sometimes we don't...we might miss. But on my side this hospital has most of the materials or whatever we need to use to prevent infections. But now the part that we are supposed to...maybe to change, which might be difficult maybe to

management, is just the waste disposal. Because now we don't have different...in the room...in the unit, we don't have different ah...those containers for disposing off different type of...

Interviewer: Wastes.

Respondent: Yes like waste. Like the general waste, the infectious waste. All of them are just disposed in one bucket. Yeah. But now we have the different ones for disposing the needles, the sharps. Yeah, those ones we have different...we don't dispose them in the same...

Interviewer: In the same place?

Respondent: Yes.

Interviewer: As the others.

Respondent: At least they are trying but being a big organization, it is a bit hard. If you work in a private hospital maybe you could get the bins well arranged. This is for this, this is for this. Yeah.

Interviewer: Okay. So the waste disposal area has a bit of a gap?

Respondent: Yeah. That one has a gap. And then another way of preventing infections to the patients, it is by the way we put on maybe gowns or even the whatever...what are they called? The scrubs. So when you come from home, you change and then when you come out from hospital you also change. Yeah you don't go going everywhere with your clothes. Just to prevent infections.

Interviewer: Mm-hmm. Okay. So that one is being done?

Respondent: Yeah. That one we do it.

Interviewer: So we don't have a gap in that area?

Respondent: No. That one has no gap.

Interviewer: Are there other areas where there are gaps?

Respondent: Mmm...maybe...[pause] most of the...okay the hospital is trying its best [laughs] to provide for us anything to use...

Interviewer: That you need.

Respondent: Yeah.

Interviewer: Yeah, it could be in terms of the hospital providing commodities, but it could also be in terms of the implementation or rather the personal or...space...

Respondent: So, in terms of the implementation, I can say the staff, they try very much not to...just prevent infections. Yes. We try very much. Because we know what infections can do to even us also and to the patients. So we try our best. Yes.

Interviewer: Mm-hmm. Okay. How concerned are you that your patients or you might acquire infections during work? [laughs]

Respondent: We are really concerned about that. That is why we use...we have a...we put our gears in place to prevent us from contracting the infections or even from us giving out the infections to the patients. But now, a place where I can say, like now wherever we are working, we have shortage of staff and some of us could be having these maybe colds, you know cold is also a way of...you can infect the patient. So, sometimes if it is not very serious, you are supposed to come to work. And by that you know it is easy to even infect others.

Interviewer: Others, ehe.

Respondent: Yeah. Because now it will be because of shortage. Unless you are very sick, [laughs] which is now when you can...you can be given maybe permission to be away. Yeah.

Interviewer: Mm-hmm. So you think shortage of staff is a gap in terms of preventing infection?

Respondent: Yeah it is a gap. Yeah it could be a gap and big gap.

Interviewer: Mm-hmm. Are there other issues that may be occasioned by the shortage of staff? Like, other than the fact that maybe a staff may have to work when they are sick but not very sick.

Respondent: Mm-hmm. Not very sick. If you are very sick, actually you will not work, but if you are just [laughs] you are having mild...of which maybe you don't

know if the cold is infectious. You can infect fellow staff or even the patients. And you know the patients have low immunity so it is easier for them to get infected.

Interviewer: Mm-hmm. And ah...I just wanted to follow up on that like, other than that aspect of maybe having to expose the patients or other staff to infections when you are not very sick but somehow sick, are there any other gaps that may be occasioned by the fact that staff are few? Any other gaps in infection prevention.

Respondent: Mmm...not really.

Interviewer: Mm-hmm.

Respondent: Yeah. The hospital is really trying, I have seen they are really trying to give us the measures to use especially in sanitization, soap for washing hands, use of gloves. Yeah, we have not missed the gloves, we have not missed sanitizers, we have not missed soap to wash hands, we have not missed water. You know those are the main, important...yes. And then also cleaning of the environment. We have people who clean, so the area is normally clean. So, just to try very much to prevent ah...

Interviewer: Infections.

Respondent: Infections.

Interviewer: We were talking about the risk and one question I wanted to ask is, how would you rate the risk of either you or a patient getting infected during...at the renal unit rather?

Respondent: The chances are not very high. Yeah, so maybe I can rate it at...out of? Rating out of 10 or?

Interviewer: Just whichever way you can [laughs] choose to rate.

Respondent: Okay, I can rate maybe 3, 3 out of 10. Yeah. 3 or 2 out of 10.

Interviewer: Chances?

Respondent: Yeah chances.

Interviewer: Mm-hmm. That someone might get infected?

Respondent: Yes.

Interviewer: Okay. Have you had any incidences...any real cases where you have had to deal with infections acquired while at the renal unit?

Respondent: For patients?

Interviewer: For patients or even for staff.

Respondent: Mmm...for patients, there is a time they...during corona time, they used to infect each other because now...

Interviewer: Corona?

Respondent: Yeah, with corona. And even now we could even contract...[laughs]

Interviewer: Corona? [laughs]

Respondent: Yeah. But now when it comes to their real...the main issue about ah...our main issue is catheters. You know if the patient they are not...their catheters are well taken care of, they don't have ah...they are not at risk of infection. Unless they are infected with these other respiratory...from outside but not from inside.

Interviewer: From inside.

Respondent: Yeah, not in the renal unit. Maybe in other wards. So I will not talk about other wards because I don't know about other wards...what happens there. Yes. But not in the renal unit.

Interviewer: So you have not had any case related to renal unit specifically?

Respondent: Not...patients infect even each other. But now the corona time, anybody could get [laughs] infection.

Interviewer: Okay. The one area we also desire to hear from you about is the issue about guidelines for infection prevention, the IPC guidelines. Do you have them at the renal unit?

Respondent: Yeah. They are. If you go to the in-charge, they will give you maybe a copy of the guidelines. We operate...we have guidelines for IPC, I think those are part of the guidelines that we require. Yeah, in the unit.

Interviewer: So you have mentioned they are with the in-charge?

Respondent: The copy?

Interviewer: Mm-hmm.

Respondent: Yeah, you know us we can just have...we don't have the guidelines that this is the written copy, but we know this is what is supposed to be done, this is what is supposed to be done.

Interviewer: Okay. You have them in your head? [laughs]

Respondent: Yeah, that is what...because we are using them so, yeah. But now if you want a copy we just get it from maybe the...

Interviewer: The in-charge.

Respondent: Yeah, Doc can also talk to them and get a copy from them, they can give her the copy.

Interviewer: Okay.

Respondent: Yes.

Interviewer: So these guidelines they are with the in-charge. Are there also copies in any other place other than from the in-charge's office?

Respondent: Ah...I used to...you know...

Interviewer: Like in the service areas.

Respondent: Like us we don't have maybe time to read all those ah...maybe whatever is put on the notice board, but when we get time we normally read. So there is a time, wherever we take tea, the staff-room, we have guidelines, so many guidelines there.

Interviewer: Posted in that room?

Respondent: Yes. Yeah.

Interviewer: Okay. The guidelines, what do they cover? What is the scope of...

Respondent: They guide us on how to take care of the catheter, the catheters, to prevent those infections, catheter acquired infections. They also guide us on how to keep the environment clean, the working area so that ah...that means when you finish up a procedure you are supposed to clear up just waiting for the next procedure. They guide us on hand-washing, on how to take care of our hands, to wash our hands, those steps in hand-washing, on how to dispose certain materials after procedures. Yes.

Interviewer: Okay. So they cover all that?

Respondent: Mm-hmm.

Interviewer: Do they also cover like how to conduct certain procedures? Like you said you dialyze.

Respondent: Yeah, yes, yeah. They also cover the procedure, the steps that you are supposed to do, what you are supposed to do when you want to maybe to connect a patient to a dialysis machine, what you are supposed to do after connecting patient on the machine.

Interviewer: Okay. So then how do you guys use them?

Respondent: The guidelines?

Interviewer: The guidelines, yeah.

Respondent: Like how we use them, how?

Interviewer: Like I just...I am trying to just understand the mechanism by which you use them. Because you said mostly it is in your mind...in your head because you...

Respondent: Yeah. Yes.

Interviewer: You have undergone the training.

Respondent: Yes.

Interviewer: Umm...so is that...is it everyone there knows the off head or are there other ways...

Respondent: Yeah they know them.

Interviewer: People use them?

Respondent: We know them off head. We know this is supposed to be done, this is what is supposed to be done, yeah. But now in case you are not sure of a procedure...of what you are supposed to do, you just contact maybe the office and then they will guide you and we also have a general...somebody in charge of IPC in the hospital. I don't know if you have come across the person? Yeah. So she goes in every unit on her own arranged days how to...to see how people are conducting their

procedures. Yeah. To see the environment how clean it is kept. Also is it personal ah...how you keep your...kempt, being kempt, eh. Like us we are not supposed to have long nails [laughs] yeah because of the procedures because now the bacteria they harbour in the...

Interviewer: In the nails.

Respondent: In the nails. So that we are not supposed to have that. So that is natural. You will not find maybe somebody in the unit, maybe few people who have long nails. Yeah.

Interviewer: Mm-hmm. Okay. And so there is something I wanted to ask you but it looks like it is gone [laughs]. I wanted to ask you a follow up on the aspect that ah...I will remember then I ask you. But to what extent...how...let me put it this way, how would you describe the renal unit's staffs adherence to IPC guidelines?

Respondent: Mmm...in terms of percentage or what?

Interviewer: No, like to what extent are they adherent? You can...

Respondent: They adhere to.

Interviewer: Mm-hmm. To the infection prevention and control guidelines?

Respondent: Mm-hmm. So extent is in terms of moderately or...

Interviewer: Yeah, yeah, you can use whichever description you can.

Respondent: Umm... [pause] I cannot say it is to an extreme, there are some people who might not follow them strictly but most of the people...so we can say that they adhere to the measures of infection prevention.

Interviewer: Mm-hmm. To a good extent but not absolutely?

Respondent: Yeah, not ah...we cannot say it is 100%. Maybe for the staff, because now, we also work with students and also when the students come we also teach them how to get into the system. Yeah. Because now when the students come, some of them don't know how to handle aseptic techniques. They keep on contaminating everything and you know we need to really follow the procedures well so that we avoid the...we minimize as much as possible the rate of infection.

Interviewer: Mm-hmm. So there being students sometimes there are lapses here and there.

Respondent: Yeah, there could be lapses.

Interviewer: What areas are mostly affected [laughs] when students come?

Respondent: Especially the...for hand-washing you know you need now to remind them about hand-washing. And then also you need to show them...to stand there maybe to show them the procedure. And if you are so busy...you are busy with another procedure and they carry out, you know you know you are not supervising, so anything can happen. Yeah. They can contaminate the field, and you know by that, the patient may get infection. So you might get some patients with...when they come back they are having fever, they are having chills, just because of...and also for the catheter there is a way we protect it by covering it. And we are the only ones who open it and close it. So sometimes when it is not well covered, when the patient go home, they come back when it is dirty. That means that it has come through [laughs] it has been infected. Yeah, some of them come with some infected catheters.

Interviewer: Okay. So that kinda poses the risk of infection when it...that gets in eh?

Respondent: Yes and you know when the patient also, when they go, you tell them, there is also education to the patient. You tell them this catheter is not supposed to be used by any other person even when they go to the wards, the other staff there should not handle...

Interviewer: Touch it, mm-hmm.

Respondent: Yes. Now some of them are curious, they say they start itching themselves, you know the covering will stay...the dressing will stay for about two to three days before they come for the change, so they feel maybe like itching. Some of them are very curious they just open it up.

Interviewer: To see what...[laughs]

Respondent: Yeah and then when they open, once you open something, you keep on touching, so by touching with dirty hands, they can get infected, so it is very hard, I can say that is also a gap because it is very hard also to control such because now the

patients don't understand the risk of getting infection very much. So as much as we try, they might also be...they might also ah...

Interviewer: They are also a problem in a way?

Respondent: Yeah, they can also be a problem.

Interviewer: Okay. And do you have any mechanism for reminding people to adhere to IPC guidelines or...

Respondent: What I can say, when you are dealing with a patient, especially when you want to connect the patient, when you get the catheter dirty or when it is open, you just educate them on how to keep the catheter clean. And if it is open, maybe the covering was not well done, maybe by the students who were learning, they are supposed to come back for redressing. So if they don't come back for redressing they wait for the next visit, that is now when the infections...but most of the patients they adhere to the education that you give them. Some of them will never touch, they don't touch. There are only one one, and especially the new ones. The new ones, the newly diagnosed, those who have started dialysis. But once they get that infection, they will not like it again. So whatever education you give them...

Interviewer: They adhere to.

Respondent: They adhere to that yeah, because they know how much they suffered [laughs] and they wouldn't like to suffer. Yes.

Interviewer: And for the staff?

Respondent: [talks to someone in the background]

Interviewer: And for the staff, are there any sort of reminders or they are expected to just know?

Respondent: No. No. They are reminders, like when you go to the [laughs] the hand-washing place, there are those posters, we have posters for waste disposal, we have posters, those will keep on reminding you how to wash hands, even the steps of washing hands, yeah, they remind you.

Interviewer: Okay, you talked about an IPC person who comes to check the unit.

Respondent: Yeah.

Interviewer: How often?

Respondent: She comes on her own plans. Maybe even, maybe once per month one after every two months, but now even a gap that I would suggest, you know things change, maybe if they could be having IPC conferences and seminars where people go and read the current maybe the current...

Interviewer: Practices?

Respondent: Practices. Because also practices, There is dynamism, so if you learn, if you go for those seminars you will be able to learn different things on how you are suppose to conduct even procedures or even prevention of infections. So that you do not stay with the old style that you learnt.

Interviewer: Mm-hmm. Okay. Are there...like for you personally, have you had any training on IPC, just focused on IPC other than your training. I know it may have been included in your training for being a nurse. [laughs]

Respondent: Mm-hmm. Okay. I said I have worked here for four years, about five years, but before I came here I used to work in Kenyatta and then I was sent to open up a renal unit in ah...the new renal unit in Machakos and then from that I was taken to Kitale to open up there. So in Kitale they had a...how do you call it? An arrangement where at least two people from each unit were in the IPC committee. So that when we have even maybe some learning, the IPC people from maybe Nairobi, they could come and teach us about IPC. So you would be called to go and learn those...the new measures etc. So when you come back you can also teach your staff. This is the new practice, yeah.

Interviewer: Mm-hmm. Okay.

Respondent: So I was one of the committee members there, but when I came here I have not seen anybody even in my unit that is in the IPC committee, I have not heard of here. I have not heard of that.

Interviewer: Mm-hmm. But you personally have attended a training?

Respondent: Yes.

Interviewer: How many? [laughs]

Respondent: One or two.

Interviewer: For IPC?

Respondent: Yeah. Wherever they could have a conference they could invite us to go and learn some guidelines.

Interviewer: But since coming here, have you guys, either you or other staff, had trainings on IPC?

Respondent: No. Here no. That is maybe a gap that I can say there is gap. Yeah. Because things keep on changing we also renal conferences, people go for that, but for IPC, I have never heard of that.

Interviewer: Okay. And do you think that any lapses that may happen, or the ones that we have talked about in the previous questions, do you think they could lead to mortality? Or to what extent are they serious?

Respondent: They can. Yeah. Any infection especially for our patients. You know they are very delicate. Any gap can lead to death, mortality.

Interviewer: Mm-hmm. Okay. So you think that it is possible that this can...

Respondent: Yeah, it is possible.

Interviewer: Okay.

Respondent: Especially patients, you know we have different type of patients, we have patients who have infections on the catheter, the one that is not being seen. You know the one that is being seen when you are cleaning you will see maybe even pus there but now the one that cannot be seen and they have infection inside.

Interviewer: Inside.

Respondent: They are feeling pain but they don't say. You know now when it continues for a long time, when they come back you just find somebody had sepsis and now when they are put on antibiotics, now they are admitted for treatment, and you know the treatment maybe did not work because they delayed...they delayed

saying out this is how I am feeling, they just kept quiet. Yes. So some of them die, but not many, it is rare.

Interviewer: It is rare, but it can lead to death?

Respondent: Yeah, because now...yeah it can lead to death, but most of them, when they feel something, when they feel cold, they feel shivers, they normally tell us and then we take appropriate action, yeah, if it is antibiotics, they are put on antibiotics to cure the...

Interviewer: Sepsis.

Respondent: Yeah.. the infection.

Interviewer: Okay. Lastly I want us to just think about the factors that you think would make it easy for the renal unit to adhere to the IPC guidelines. What factors could those be? I know you mentioned at some point shortage of staff...

Respondent: Yeah, shortage of staff.

Interviewer: That is a gap and other gaps that you mentioned.

Respondent: And then also if we could maybe improve on the waste disposal, just by buying those bins and then people are trained this is where you dispose of this, this and then if they could also have additional trolleys for maybe each patient so that you shouldn't be moving from this to this, because sometimes you will find you have a procedure and maybe there is an emergency. You know the same trolley you don't have time to start wiping it very fast to go to the other patient with an emergency, you may just carry along with you like that and then you continue, because it is an emergency. But now I don't know how it will look like, because now the unit...the unit itself...you have been there?

Interviewer: Mm-hmm.

Respondent: It is big, and then now if you put also those trolleys everywhere it brings congestion.

Interviewer: Congested ehe.

Respondent: But that is now how it is supposed to be.

Interviewer: Mm-hmm. But you feel that if you had a trolley for each patient...

Respondent: Each patient that would be...

Interviewer: That would make it easier for...

Respondent: Easier for, yeah, for procedures. Because now even if you are doing another procedure, and you get another one just next to the person...the patient you are dealing with, an emergency, we are talking of emergency, it is easier to remove gloves, even to wash hands or sanitize as you go to the next procedure. But now changing of trolley becomes a challenge.

Interviewer: So that is a system issue?

Respondent: Yes.

Interviewer: Are there other system issues that you think might make it easier for the staff to adhere to the guidelines?

Respondent: Mmm...just ah...I think even when you have maybe mmm...what can I say? As much as people know what we are supposed to do but it is always good to keep on reminding so that they are reminded on day to day basis on how to conduct some procedures.

Interviewer: Okay. Okay. And on the flip side, what are some of the factors that you feel may be, may make it challenging for people to adhere to the IPC guidelines, for instance you mentioned that you were few?

Respondent: Yeah shortage. By the way shortage alone, [laughs] can also make it is a difficult, because people, maybe somebody will see I don't need to go and wash hands there I just continue, you know after whatever I know in a IPC, when you are dealing with gloves, when you remove your gloves you are supposed to wash hands or sanitize and put on another gloves if you are changing. But now if you are so busy and the shortage, you might just remove gloves and...

Interviewer: And wear?

Respondent: Yeah, put on another glove . Yeah, because of time factor and something, yeah.

Interviewer: Okay. And you also talked of emergencies.

Respondent: Yeah and emergencies.

Interviewer: Mm-hmm. Are there other things that you think might be challenging?

Respondent: Mmm...[pause]

Interviewer: [laughs] None that you can think?

Respondent: Yeah.

Interviewer: So lastly, I want to understand if you have any recommendations that you can suggest. You have already suggested that bins need to be installed and people trained on how to use them. Any other recommendations that maybe we have not talked about? I know you have been mentioning recommendations as we go along, [laughs] yeah.

Respondent: Maybe, [laughs] those are just the only recommendations that I have for now.

Interviewer: That you can think of?

Respondent: Mm-hmm.

Interviewer: So when you are closing, I need to just capture your feeling about the guidelines. Of course there is the practice of IPC but then there is the guidelines. What is your feeling about those guidelines? The ones that you say are posted in certain places but are also in the file. Do you feel they are helpful?

Respondent: Now, the problem is, you know you can be having guidelines and some of them maybe we might not be applying them. The ones that we apply are the ones that we know. So it is just ah...maybe lack of time that we don't have even time to go through the guidelines, because when you come to work, the work is ah...there is a lot of work.

Interviewer: There is a lot.

Respondent: Yeah, it is not like the way we are here we can do this, that is why I told her I cannot ah...[interruption]

Interviewer: Yes, you were saying something, sorry.

Respondent: Yeah. I was talking about guidelines. When the guidelines are there, you know now, maybe if everybody could be given those copies, so that when they have their free time even at home, maybe they can read. But now at work you cannot read.

Interviewer: You cannot read.

Respondent: Yeah, there is no time for reading.

Interviewer: So do you think they are being being helpful? [laughs]

Respondent: The guidelines?

Interviewer: Yeah.

Respondent: They are not really helpful when they are written and we are not...we don't have them, so we need to...yeah...maybe I could be saying we know the guidelines, we know everything, but now there are some guidelines which we don't know. Yes.

Interviewer: Okay. Let me end here, I can see you are being called.

Respondent: Yeah I have patients. Yes.

Interviewer: And I really appreciate for the time. [laughs]

Respondent: Yes. You see now, that is why I told....just put off, yeah.

Interviewer: So, welcome very much, today is 24th of October 2023 and this is the second interview today.

Respondent: Okay.

Interviewer: Yeah. So, let us start by understanding you and your role at the renal unit and this is without your name because we are trying to record anonymously. [Laughs]

Respondent: Okay.

Interviewer: Yeah. So who are you in the renal unit and what are your day to day activities or roles?

Respondent: Okay. In the renal unit, I work as a nephrology nurse and I have been a nephrology nurse since 2014. But I have worked in this renal unit for about four years.

Interviewer: Okay. For about four years, this particular one?

Respondent: Yes. Although I have worked in different renal units.

Interviewer: Okay. Since 2014?

Respondent: Yes.

Interviewer: Ooh. And ah...in your current role, what are your day to day [interruption]. Now, I was asking about your roles in the current ah...

Respondent: My role in the renal unit?

Interviewer: Mm-hmm.

Respondent: Okay. My role as a renal nurse or a nephrology nurse is to take care of the patients on dialysis. The patients that we normally have end-stage renal disease, or chronic renal failures and we have to dialyze them. So when I report to the renal unit in the morning, I am supposed to organize my patients, to identify my patients that I have been allocated to and then to arrange for dialysis session. Yeah. And each dialysis patient...each patient is supposed to be dialyzed for about four hours.

Interviewer: Mm-hmm. Four hours?

Respondent: Yes.

Interviewer: Okay. So you identify them. And you are the one who conducts the dialysis?

Respondent: Yes.

Interviewer: Okay. Mm-hmm. Other than that, are there any other things you do with the patients?

Respondent: Umm...okay mostly it is dialysis. Up there in the renal unit it is just dialysis, so you just have to interact with the patient during the dialysis session and most of the patients are out-patients. Some are in-patients. So the out-patient ones are the stable patients and we are able to at least talk to them and interact with them how

they stay during...their stay at home, any problems they had before they came for dialysis on that particular day. Because they are regular patients who come for routine dialysis twice per week. Each patient comes twice per week. So they are scheduled. There are some who are scheduled for Monday...Monday-Thursday, Tuesday-Friday, Wednesday and Saturday. Yeah.

Interviewer: Mm-hmm. Okay. So you have a discussion with them about any new developments from the time...

Respondent: Yeah. If they...if they...if maybe they felt sick or if they had any complications at home after dialysis.

Interviewer: Okay. In our study we are very much interested in the infection prevention at the renal unit where you work. Would you be able to describe for me some of the measures in place at the renal unit? Specifically for infection prevention.

Respondent: Okay. Just ah...before we talk about the measures, we have ah...our main important issue is catheters, so we make sure that the patients do not contact any infection on the catheters, because when they get the infection it affects them, their bloodstream so they become infected. They suffer from catheter related infections. So it is upon us to make sure that the patients are...don't get infections. That means we have to apply measures of IPC very much. Yes.

Interviewer: Mm-hmm. So you mean the place where the catheter is installed?

Respondent: Yeah. So if it not well taken care of, the patient is bound to get infection...infections. Yeah. And infections...the septicemia, they are very dangerous to the patient. Yes.

Interviewer: Mm-hmm. Okay.

Respondent: So we make sure that the environment is well taken care of. Waste disposal...we make sure that we dispose off the wastes correctly. We are also just trying also, because now it is a very big institution we might not have all the requirements that we need for infection prevention especially for waste ah...

Interviewer: Disposal.

Respondent: Disposal, yeah. But for these other IPC measures, before we get to the patient, we have sanitizers that we use for hand hygiene.

Interviewer: For hand hygiene, ehe.

Respondent: Yeah. We also have areas for hand-washing where we do our hand washing before we start the procedures. So the main thing is washing hands and sanitizing.

Interviewer: And sanitizing.

Respondent: So that we prevent the patients from getting infections. And then we also try to minimize the infections by making sure that the patients are spaced. Not so close to each other so that they don't contract infections from other patients, because every patient might be having a different type of infections. Like some will come with respiratory diseases, maybe coughing, so that one, they need to protect the other patients from...

Interviewer: From such.

Respondent: Yeah, from such. And then we encourage also the patients to have gloves, not, not gloves, the...the...

Interviewer: Masks?

Respondent: Masks. And also we have to have the masks so that we prevent the infections. And we also have trolleys so when you are dealing with...we might not manage because we have so many patients, we may not manage to have each trolley for each patient, so we share the...

Interviewer: The trolleys.

Respondent: The trolleys. So when you are dealing with one patient, maybe when you are connecting the patient or disconnecting, you deal with one patient you have one trolley, but when you are going to the next one you make sure that it is well cleaned and disinfected. Yeah.

Interviewer: Mm-hmm. Before you use it with the next patient?

Respondent: With the next patient. Just to avoid the contraction of infections to different patients. And we also use...for aseptic techniques we use ah...sterile gloves. We have clean gloves for clean procedures and for surgical procedures or aseptic technique we use the surgical gloves and the sterile gloves. That is also one way of preventing infections.

Interviewer: Infections. Mm-hmm. So these measures are...they are largely ah...would you say they are largely hospital driven or they are staff driven?

Respondent: Mmm...I don't really know what you mean.

Interviewer: [laughs]

Respondent: Because now, okay, when you go for the training, to become a nephrology nurse you go for an extra training. So in the training you are taught how to keep the...to observe the measures...you are also...you are trained so when you come there it is like ah...it is just in you, you are supposed to take care of that. Nobody in the hospital will be following you to do this, this. It is upon you to know this is what I am supposed to do to the patient and that is how I am suppose to conduct my procedures. Yeah.

Interviewer: Mm-hmm. So it is more of in the staff to know what to do.

Respondent: Yeah. To do yes.

Interviewer: Okay. And with that, have you had any gaps in your infection prevention measures that you have at the unit?

Respondent: Yeah. Sometimes we don't...we might miss. But on my side this hospital has most of the materials or whatever we need to use to prevent infections. But now the part that we are supposed to...maybe to change, which might be difficult maybe to management, is just the waste disposal. Because now we don't have different...in the room...in the unit, we don't have different ah...those containers for disposing off different type of...

Interviewer: Wastes.

Respondent: Yes like waste. Like the general waste, the infectious waste. All of them are just disposed in one bucket. Yeah. But now we have the different ones for disposing the needles, the sharps. Yeah, those ones we have different...we don't dispose them in the same...

Interviewer: In the same place?

Respondent: Yes.

Interviewer: As the others.

Respondent: At least they are trying but being a big organization, it is a bit hard. If you work in a private hospital maybe you could get the bins well arranged. This is for this, this is for this. Yeah.

Interviewer: Okay. So the waste disposal area has a bit of a gap?

Respondent: Yeah. That one has a gap. And then another way of preventing infections to the patients, it is by the way we put on maybe gowns or even the whatever...what are they called? The scrubs. So when you come from home, you change and then when you come out from hospital you also change. Yeah you don't go going everywhere with your clothes. Just to prevent infections.

Interviewer: Mm-hmm. Okay. So that one is being done?

Respondent: Yeah. That one we do it.

Interviewer: So we don't have a gap in that area?

Respondent: No. That one has no gap.

Interviewer: Are there other areas where there are gaps?

Respondent: Mmm...maybe...[pause] most of the...okay the hospital is trying its best [laughs] to provide for us anything to use...

Interviewer: That you need.

Respondent: Yeah.

Interviewer: Yeah, it could be in terms of the hospital providing commodities, but it could also be in terms of the implementation or rather the personal or...space...

Respondent: So, in terms of the implementation, I can say the staff, they try very much not to...just prevent infections. Yes. We try very much. Because we know what infections can do to even us also and to the patients. So we try our best. Yes.

Interviewer: Mm-hmm. Okay. How concerned are you that your patients or you might acquire infections during work? [laughs]

Respondent: We are really concerned about that. That is why we use...we have a...we put our gears in place to prevent us from contracting the infections or even from us giving out the infections to the patients. But now, a place where I can say, like now wherever we are working, we have shortage of staff and some of us could be having these maybe colds, you know cold is also a way of...you can infect the patient. So, sometimes if it is not very serious, you are supposed to come to work. And by that you know it is easy to even infect others.

Interviewer: Others, ehe.

Respondent: Yeah. Because now it will be because of shortage. Unless you are very sick, [laughs] which is now when you can...you can be given maybe permission to be away. Yeah.

Interviewer: Mm-hmm. So you think shortage of staff is a gap in terms of preventing infection?

Respondent: Yeah it is a gap. Yeah it could be a gap and big gap.

Interviewer: Mm-hmm. Are there other issues that may be occasioned by the shortage of staff? Like, other than the fact that maybe a staff may have to work when they are sick but not very sick.

Respondent: Mm-hmm. Not very sick. If you are very sick, actually you will not work, but if you are just [laughs] you are having mild...of which maybe you don't know if the cold is infectious. You can infect fellow staff or even the patients. And you know the patients have low immunity so it is easier for them to get infected.

Interviewer: Mm-hmm. And ah...I just wanted to follow up on that like, other than that aspect of maybe having to expose the patients or other staff to infections when you are not very sick but somehow sick, are there any other gaps that may be occasioned by the fact that staff are few? Any other gaps in infection prevention.

Respondent: Mmm...not really.

Interviewer: Mm-hmm.

Respondent: Yeah. The hospital is really trying, I have seen they are really trying to give us the measures to use especially in sanitization, soap for washing hands, use of gloves. Yeah, we have not missed the gloves, we have not missed sanitizers, we have not missed soap to wash hands, we have not missed water. You know those are the main, important...yes. And then also cleaning of the environment. We have people who clean, so the area is normally clean. So, just to try very much to prevent ah...

Interviewer: Infections.

Respondent: Infections.

Interviewer: We were talking about the risk and one question I wanted to ask is, how would you rate the risk of either you or a patient getting infected during...at the renal unit rather?

Respondent: The chances are not very high. Yeah, so maybe I can rate it at...out of?
Rating out of 10 or?

Interviewer: Just whichever way you can [laughs] choose to rate.

Respondent: Okay, I can rate maybe 3, 3 out of 10. Yeah. 3 or 2 out of 10.

Interviewer: Chances?

Respondent: Yeah chances.

Interviewer: Mm-hmm. That someone might get infected?

Respondent: Yes.

Interviewer: Okay. Have you had any incidences...any real cases where you have had to deal with infections acquired while at the renal unit?

Respondent: For patients?

Interviewer: For patients or even for staff.

Respondent: Mmm...for patients, there is a time they...during corona time, they used to infect each other because now...

Interviewer: Corona?

Respondent: Yeah, with corona. And even now we could even contract...[laughs]

Interviewer: Corona? [laughs]

Respondent: Yeah. But now when it comes to their real...the main issue about ah...our main issue is catheters. You know if the patient they are not...their catheters are well taken care of, they don't have ah...they are not at risk of infection. Unless they are infected with these other respiratory...from outside but not from inside.

Interviewer: From inside.

Respondent: Yeah, not in the renal unit. Maybe in other wards. So I will not talk about other wards because I don't know about other wards...what happens there. Yes. But not in the renal unit.

Interviewer: So you have not had any case related to renal unit specifically?

Respondent: Not...patients infect even each other. But now the corona time, anybody could get [laughs] infection.

Interviewer: Okay. The one area we also desire to hear from you about is the issue about guidelines for infection prevention, the IPC guidelines. Do you have them at the renal unit?

Respondent: Yeah. They are. If you go to the in-charge, they will give you maybe a copy of the guidelines. We operate...we have guidelines for IPC, I think those are part of the guidelines that we require. Yeah, in the unit.

Interviewer: So you have mentioned they are with the in-charge?

Respondent: The copy?

Interviewer: Mm-hmm.

Respondent: Yeah, you know us we can just have...we don't have the guidelines that this is the written copy, but we know this is what is supposed to be done, this is what is supposed to be done.

Interviewer: Okay. You have them in your head? [laughs]

Respondent: Yeah, that is what...because we are using them so, yeah. But now if you want a copy we just get it from maybe the...

Interviewer: The in-charge.

Respondent: Yeah, Doc can also talk to them and get a copy from them, they can give her the copy.

Interviewer: Okay.

Respondent: Yes.

Interviewer: So these guidelines they are with the in-charge. Are there also copies in any other place other than from the in-charge's office?

Respondent: Ah...I used to...you know...

Interviewer: Like in the service areas.

Respondent: Like us we don't have maybe time to read all those ah...maybe whatever is put on the notice board, but when we get time we normally read. So there is a time, wherever we take tea, the staff-room, we have guidelines, so many guidelines there.

Interviewer: Posted in that room?

Respondent: Yes. Yeah.

Interviewer: Okay. The guidelines, what do they cover? What is the scope of...

Respondent: They guide us on how to take care of the catheter, the catheters, to prevent those infections, catheter acquired infections. They also guide us on how to keep the environment clean, the working area so that ah...that means when you finish up a procedure you are supposed to clear up just waiting for the next procedure. They guide us on hand-washing, on how to take care of our hands, to wash our hands, those steps in hand-washing, on how to dispose certain materials after procedures. Yes.

Interviewer: Okay. So they cover all that?

Respondent: Mm-hmm.

Interviewer: Do they also cover like how to conduct certain procedures? Like you said you dialyze.

Respondent: Yeah, yes, yeah. They also cover the procedure, the steps that you are supposed to do, what you are supposed to do when you want to maybe to connect a patient to a dialysis machine, what you are supposed to do after connecting patient on the machine.

Interviewer: Okay. So then how do you guys use them?

Respondent: The guidelines?

Interviewer: The guidelines, yeah.

Respondent: Like how we use them, how?

Interviewer: Like I just...I am trying to just understand the mechanism by which you use them. Because you said mostly it is in your mind...in your head because you...

Respondent: Yeah. Yes.

Interviewer: You have undergone the training.

Respondent: Yes.

Interviewer: Umm...so is that...is it everyone there knows the off head or are there other ways...

Respondent: Yeah they know them.

Interviewer: People use them?

Respondent: We know them off head. We know this is supposed to be done, this is what is supposed to be done, yeah. But now in case you are not sure of a procedure...of what you are supposed to do, you just contact maybe the office and then they will guide you and we also have a general...somebody in charge of IPC in the hospital. I don't know if you have come across the person? Yeah. So she goes in every unit on her own arranged days how to...to see how people are conducting their

procedures. Yeah. To see the environment how clean it is kept. Also is it personal ah...how you keep your...kempt, being kempt, eh. Like us we are not supposed to have long nails [laughs] yeah because of the procedures because now the bacteria they harbour in the...

Interviewer: In the nails.

Respondent: In the nails. So that we are not supposed to have that. So that is natural. You will not find maybe somebody in the unit, maybe few people who have long nails. Yeah.

Interviewer: Mm-hmm. Okay. And so there is something I wanted to ask you but it looks like it is gone [laughs]. I wanted to ask you a follow up on the aspect that ah...I will remember then I ask you. But to what extent...how...let me put it this way, how would you describe the renal unit's staffs adherence to IPC guidelines?

Respondent: Mmm...in terms of percentage or what?

Interviewer: No, like to what extent are they adherent? You can...

Respondent: They adhere to.

Interviewer: Mm-hmm. To the infection prevention and control guidelines?

Respondent: Mm-hmm. So extent is in terms of moderately or...

Interviewer: Yeah, yeah, you can use whichever description you can.

Respondent: Umm... [pause] I cannot say it is to an extreme, there are some people who might not follow them strictly but most of the people...so we can say that they adhere to the measures of infection prevention.

Interviewer: Mm-hmm. To a good extent but not absolutely?

Respondent: Yeah, not ah...we cannot say it is 100%. Maybe for the staff, because now, we also work with students and also when the students come we also teach them how to get into the system. Yeah. Because now when the students come, some of them don't know how to handle aseptic techniques. They keep on contaminating everything and you know we need to really follow the procedures well so that we avoid the...we minimize as much as possible the rate of infection.

Interviewer: Mm-hmm. So there being students sometimes there are lapses here and there.

Respondent: Yeah, there could be lapses.

Interviewer: What areas are mostly affected [laughs] when students come?

Respondent: Especially the...for hand-washing you know you need now to remind them about hand-washing. And then also you need to show them...to stand there maybe to show them the procedure. And if you are so busy...you are busy with another procedure and they carry out, you know you know you are not supervising, so anything can happen. Yeah. They can contaminate the field, and you know by that, the patient may get infection. So you might get some patients with...when they come back they are having fever, they are having chills, just because of...and also for the catheter there is a way we protect it by covering it. And we are the only ones who open it and close it. So sometimes when it is not well covered, when the patient go home, they come back when it is dirty. That means that it has come through [laughs] it has been infected. Yeah, some of them come with some infected catheters.

Interviewer: Okay. So that kinda poses the risk of infection when it...that gets in eh?

Respondent: Yes and you know when the patient also, when they go, you tell them, there is also education to the patient. You tell them this catheter is not supposed to be used by any other person even when they go to the wards, the other staff there should not handle...

Interviewer: Touch it, mm-hmm.

Respondent: Yes. Now some of them are curious, they say they start itching themselves, you know the covering will stay...the dressing will stay for about two to three days before they come for the change, so they feel maybe like itching. Some of them are very curious they just open it up.

Interviewer: To see what...[laughs]

Respondent: Yeah and then when they open, once you open something, you keep on touching, so by touching with dirty hands, they can get infected, so it is very hard, I can say that is also a gap because it is very hard also to control such because now the

patients don't understand the risk of getting infection very much. So as much as we try, they might also be...they might also ah...

Interviewer: They are also a problem in a way?

Respondent: Yeah, they can also be a problem.

Interviewer: Okay. And do you have any mechanism for reminding people to adhere to IPC guidelines or...

Respondent: What I can say, when you are dealing with a patient, especially when you want to connect the patient, when you get the catheter dirty or when it is open, you just educate them on how to keep the catheter clean. And if it is open, maybe the covering was not well done, maybe by the students who were learning, they are supposed to come back for redressing. So if they don't come back for redressing they wait for the next visit, that is now when the infections...but most of the patients they adhere to the education that you give them. Some of them will never touch, they don't touch. There are only one one, and especially the new ones. The new ones, the newly diagnosed, those who have started dialysis. But once they get that infection, they will not like it again. So whatever education you give them...

Interviewer: They adhere to.

Respondent: They adhere to that yeah, because they know how much they suffered [laughs] and they wouldn't like to suffer. Yes.

Interviewer: And for the staff?

Respondent: [talks to someone in the background]

Interviewer: And for the staff, are there any sort of reminders or they are expected to just know?

Respondent: No. No. They are reminders, like when you go to the [laughs] the hand-washing place, there are those posters, we have posters for waste disposal, we have posters, those will keep on reminding you how to wash hands, even the steps of washing hands, yeah, they remind you.

Interviewer: Okay, you talked about an IPC person who comes to check the unit.

Respondent: Yeah.

Interviewer: How often?

Respondent: She comes on her own plans. Maybe even, maybe once per month one after every two months, but now even a gap that I would suggest, you know things change, maybe if they could be having IPC conferences and seminars where people go and read the current maybe the current...

Interviewer: Practices?

Respondent: Practices. Because also practices, There is dynamism, so if you learn, if you go for those seminars you will be able to learn different things on how you are suppose to conduct even procedures or even prevention of infections. So that you do not stay with the old style that you learnt.

Interviewer: Mm-hmm. Okay. Are there...like for you personally, have you had any training on IPC, just focused on IPC other than your training. I know it may have been included in your training for being a nurse. [laughs]

Respondent: Mm-hmm. Okay. I said I have worked here for four years, about five years, but before I came here I used to work in Kenyatta and then I was sent to open up a renal unit in ah...the new renal unit in Machakos and then from that I was taken to Kitale to open up there. So in Kitale they had a...how do you call it? An arrangement where at least two people from each unit were in the IPC committee. So that when we have even maybe some learning, the IPC people from maybe Nairobi, they could come and teach us about IPC. So you would be called to go and learn those...the new measures etc. So when you come back you can also teach your staff. This is the new practice, yeah.

Interviewer: Mm-hmm. Okay.

Respondent: So I was one of the committee members there, but when I came here I have not seen anybody even in my unit that is in the IPC committee, I have not heard of here. I have not heard of that.

Interviewer: Mm-hmm. But you personally have attended a training?

Respondent: Yes.

Interviewer: How many? [laughs]

Respondent: One or two.

Interviewer: For IPC?

Respondent: Yeah. Wherever they could have a conference they could invite us to go and learn some guidelines.

Interviewer: But since coming here, have you guys, either you or other staff, had trainings on IPC?

Respondent: No. Here no. That is maybe a gap that I can say there is gap. Yeah. Because things keep on changing we also renal conferences, people go for that, but for IPC, I have never heard of that.

Interviewer: Okay. And do you think that any lapses that may happen, or the ones that we have talked about in the previous questions, do you think they could lead to mortality? Or to what extent are they serious?

Respondent: They can. Yeah. Any infection especially for our patients. You know they are very delicate. Any gap can lead to death, mortality.

Interviewer: Mm-hmm. Okay. So you think that it is possible that this can...

Respondent: Yeah, it is possible.

Interviewer: Okay.

Respondent: Especially patients, you know we have different type of patients, we have patients who have infections on the catheter, the one that is not being seen. You know the one that is being seen when you are cleaning you will see maybe even pus there but now the one that cannot be seen and they have infection inside.

Interviewer: Inside.

Respondent: They are feeling pain but they don't say. You know now when it continues for a long time, when they come back you just find somebody had sepsis and now when they are put on antibiotics, now they are admitted for treatment, and you know the treatment maybe did not work because they delayed...they delayed saying out this is how I am feeling, they just kept quiet. Yes. So some of them die, but not many, it is rare.

Interviewer: It is rare, but it can lead to death?

Respondent: Yeah, because now...yeah it can lead to death, but most of them, when they feel something, when they feel cold, they feel shivers, they normally tell us and then we take appropriate action, yeah, if it is antibiotics, they are put on antibiotics to cure the...

Interviewer: Sepsis.

Respondent: Yeah.. the infection.

Interviewer: Okay. Lastly I want us to just think about the factors that you think would make it easy for the renal unit to adhere to the IPC guidelines. What factors could those be? I know you mentioned at some point shortage of staff...

Respondent: Yeah, shortage of staff.

Interviewer: That is a gap and other gaps that you mentioned.

Respondent: And then also if we could maybe improve on the waste disposal, just by buying those bins and then people are trained this is where you dispose of this, this and then if they could also have additional trolleys for maybe each patient so that you shouldn't be moving from this to this, because sometimes you will find you have a procedure and maybe there is an emergency. You know the same trolley you don't have time to start wiping it very fast to go to the other patient with an emergency, you may just carry along with you like that and then you continue, because it is an emergency. But now I don't know how it will look like, because now the unit...the unit itself...you have been there?

Interviewer: Mm-hmm.

Respondent: It is big, and then now if you put also those trolleys everywhere it brings congestion.

Interviewer: Congested ehe.

Respondent: But that is now how it is supposed to be.

Interviewer: Mm-hmm. But you feel that if you had a trolley for each patient...

Respondent: Each patient that would be...

Interviewer: That would make it easier for...

Respondent: Easier for, yeah, for procedures. Because now even if you are doing another procedure, and you get another one just next to the person...the patient you are dealing with, an emergency, we are talking of emergency, it is easier to remove gloves, even to wash hands or sanitize as you go to the next procedure. But now changing of trolley becomes a challenge.

Interviewer: So that is a system issue?

Respondent: Yes.

Interviewer: Are there other system issues that you think might make it easier for the staff to adhere to the guidelines?

Respondent: Mmm...just ah...I think even when you have maybe mmm...what can I say? As much as people know what we are supposed to do but it is always good to keep on reminding so that they are reminded on day to day basis on how to conduct some procedures.

Interviewer: Okay. Okay. And on the flip side, what are some of the factors that you feel may be, may make it challenging for people to adhere to the IPC guidelines, for instance you mentioned that you were few?

Respondent: Yeah shortage. By the way shortage alone, [laughs] can also make it is a difficult, because people, maybe somebody will see I don't need to go and wash hands there I just continue, you know after whatever I know in a IPC, when you are dealing with gloves, when you remove your gloves you are supposed to wash hands or sanitize and put on another gloves if you are changing. But now if you are so busy and the shortage, you might just remove gloves and...

Interviewer: And wear?

Respondent: Yeah, put on another glove . Yeah, because of time factor and something, yeah.

Interviewer: Okay. And you also talked of emergencies.

Respondent: Yeah and emergencies.

Interviewer: Mm-hmm. Are there other things that you think might be challenging?

Respondent: Mmm...[pause]

Interviewer: [laughs] None that you can think?

Respondent: Yeah.

Interviewer: So lastly, I want to understand if you have any recommendations that you can suggest. You have already suggested that bins need to be installed and people trained on how to use them. Any other recommendations that maybe we have not talked about? I know you have been mentioning recommendations as we go along, [laughs] yeah.

Respondent: Maybe, [laughs] those are just the only recommendations that I have for now.

Interviewer: That you can think of?

Respondent: Mm-hmm.

Interviewer: So when you are closing, I need to just capture your feeling about the guidelines. Of course there is the practice of IPC but then there is the guidelines. What is your feeling about those guidelines? The ones that you say are posted in certain places but are also in the file. Do you feel they are helpful?

Respondent: Now, the problem is, you know you can be having guidelines and some of them maybe we might not be applying them. The ones that we apply are the ones that we know. So it is just ah...maybe lack of time that we don't have even time to go through the guidelines, because when you come to work, the work is ah...there is a lot of work.

Interviewer: There is a lot.

Respondent: Yeah, it is not like the way we are here we can do this, that is why I told her I cannot ah...[interruption]

Interviewer: Yes, you were saying something, sorry.

Respondent: Yeah. I was talking about guidelines. When the guidelines are there, you know now, maybe if everybody could be given those copies, so that when they have their free time even at home, maybe they can read. But now at work you cannot read.

Interviewer: You cannot read.

Respondent: Yeah, there is no time for reading.

Interviewer: So do you think they are being helpful? [laughs]

Respondent: The guidelines?

Interviewer: Yeah.

Respondent: They are not really helpful when they are written and we are not...we don't have them, so we need to...yeah...maybe I could be saying we know the guidelines, we know everything, but now there are some guidelines which we don't know. Yes.

Interviewer: Okay. Let me end here, I can see you are being called.

Respondent: Yeah I have patients. Yes.

Interviewer: And I really appreciate for the time. [laughs]

Respondent: Yes. You see now, that is why I told....just put off, yeah.

Appendix 7: IREC Approval



MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/1/2/3

Reference: IREC/483/2023
Approval Number: 0004428

Dr. Catherine Awuor Rasowo,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Dr. Rasowo,

EVALUATION OF INFECTION PREVENTION CONTROL PRACTICES AT THE HEMODIALYSIS UNIT IN MOI TEACHING AND REFERRAL HOSPITAL

This is to inform you that **MTRH/MU-IREC** has reviewed and approved the above referenced research proposal. Your application approval number is **FAN: 0004428**. The approval period is **25th May, 2023- 24th May, 2024**. This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, Material Transfer Agreements (MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by **MTRH/MU-IREC**.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **MTRH/MU-IREC** within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to **MTRH/MU-IREC** within 72 hours.
- v. Clearance for export of biological specimens must be obtained from **MOH at the recommendation of NACOSTI** for each batch of shipment.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to **MTRH/ MU-IREC**.

Prior to commencing your study; you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and other relevant clearances from study sites including a written approval from the CEO-MTRH which is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH) and its satellites sites.

Sincerely,


PROF. E. WERE

CHAIRMAN

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE



cc CEO - MTRH Dean - SOP
Principal - CHS Dean - SON

Dean - SOM
Dean - SOD



MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3
25th May, 2023

Appendix 8: Hospital Approval (MTRH)



MOI TEACHING AND REFERRAL HOSPITAL

Telephone: (+254)-0532033471/2/3/4
 Fax: 0532061749
 Email: ceo@mtrh.go.ke/ceosoffice@mtrh.go.ke

NANDI ROAD
 P.O. BOX 3-30100
 ELDORET, KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

29th May, 2023

Dr. Catherine Awuor Rasowo,
 Moi University,
 School of Medicine,
 P.O. Box 4606-30100,
 ELDORET-KENYA.

EVALUATION OF INFECTION PREVENTION AND CONTROL PRACTICES AT THE HEMODIALYSIS UNIT IN MOI TEACHING AND REFERRAL HOSPITAL

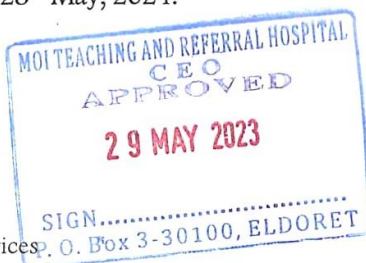
You have been authorised to conduct research within the jurisdiction of Moi Teaching and Referral Hospital (MTRH) and its satellites sites. You are required to strictly adhere to the regulations stated below in order to safeguard the safety and well-being of staff, patients and study participants seen at MTRH.

- 1 The study shall be under Moi Teaching and Referral Hospital regulation.
- 2 A copy of MTRH/MU-IREC approval shall be a prerequisite to conducting the study.
- 3 Studies intending to export human bio-specimens must provide a permit from MOH at the recommendation of NACOSTI for each shipment.
- 4 No data collection will be allowed without an approved consent form(s) to participants unless waiver of written consent has been granted by MTRH/MU-IREC.
- 5 Take note that data collected must be treated with due confidentiality and anonymity.

The continued permission to conduct research shall only be sustained subject to fulfilling all the requirements stated above.

The approval period is 29th May, 2023 – 28th May, 2024.

Done 29/5/2023
 DR. WILSON K. ARUASA, MBS, EBS
 CHIEF EXECUTIVE OFFICER



- c.c. - Senior Director, Clinical Services
 - Director, Nursing Services
 - HOD, HRISM

All correspondences should be addressed to the Chief Executive Officer

Visit our Website: www.mtrh.go.ke

TO BE A GLOBAL LEADER IN THE PROVISION OF EXCEPTIONAL MULTI-SPECIALTY HEALTH CARE, TRAINING AND RESEARCH

Appendix 9:Nacosti Application

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 542504	Date of Issue: 03/November/2023
RESEARCH LICENSE	
	
This is to Certify that Dr., CATHERINE AWUOR RASOWO of Moi University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Uasin-Gishu on the topic: EVALUATION OF INFECTION PREVENTION AND CONTROL PRACTICES AT THE HEMODIALYSIS UNIT IN MOI TEACHING AND REFERRAL HOSPITAL, for the period ending : 03/November/2024.	
License No: NACOSTI/P/23/31240	
542504	
Applicant Identification Number	Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code	
	
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	
See overleaf for conditions	

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objectives of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

- The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to.
- The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way:
 - Endanger national security
 - Adversely affect the lives of Kenyans
 - Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear Test Ban Treaty Organization (CTBT), Chemical, Biological, Radiological and Nuclear (CBRN).
 - Result in exploitation of intellectual property rights of communities in Kenya
 - Adversely affect the environment
 - Adversely affect the rights of communities
 - Endanger public safety and national cohesion
 - Plagiarize someone else's work
- The License is valid for the proposed research, location and specified period.
- The Licensee shall not give authority to transfer research materials.
- The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
- The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
- The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
- Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
- The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
- The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
- Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and Innovation (NACOSTI),
Off: Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA.
Telephone: 070 4407000, 071 5788787, 071 5404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix 10: Observational tools

CDC Dialysis Collaborative Facility Name: _____ Date: _____ Start time: _____ AM / PM
 Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Observer: _____ Location within unit: _____

Audit Tool: Catheter connection and disconnection observations

(Use a “√” if action performed correctly, a “Φ” if not performed. If not observed, leave blank)

Procedure observed, C=connect D=disconnect	Discipline properly (if required)	Mask worn	Hand hygiene performed	New clean gloves worn	Catheter removed from blood line aseptically (disconnection only)	Catheter hub scrubbed	Hub antiseptic allowed to dry	Catheter connected to blood lines aseptically (connection only)	New caps attached aseptically (after disconnecting)	Gloves removed	Hand hygiene performed

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **O**=other

Duration of observation period = _____ minutes

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:



ional Center for Emerging and Zoonotic Infectious Diseases

CDC Dialysis Collaborative

Facility Name: _____ Date: _____ Start time: _____ AM / PM

Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Observer: _____ Location within unit: _____

Audit Tool: Catheter exit site care observations

(Use a “√” if action performed correctly, a “Φ” if not performed. If not observed, leave blank)

Discipline	Mask worn properly (if required)	Hand hygiene performed	New clean gloves worn	Skin antiseptic applied appropriately	Skin antiseptic allowed to dry	No contact with exit site (after antisepsis)	Antimicrobial ointment applied aseptically	Dressing applied aseptically	Gloves performed	Hand removed hygiene	Comments

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **O**=other

Duration of observation period: _____ minutes

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:



Facility Name: _____ Observer: _____
Date: _____ Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Start time: _____ AM / PM

Audit Tool: Hemodialysis station routine disinfection observations^{*}

(Use a “√” if action performed correctly, a “Φ” if not performed/ performed incorrectly. If not observed, leave blank. All applicable actions within a row must have “√” for the procedure to be counted as successful.)

*This audit tool applies when there is no visible soil on surfaces at the dialysis station. If visible blood or other soil is present, surfaces must be cleaned prior to disinfection.

[illegible]

Discipline: P=physician, N=nurse, T=technician, S=student, O=other

Duration of observation period: _____

Number of procedures performed correctly =

Total number of procedures observed during audit =

ADDITIONAL COMMENTS/OBSERVATIONS:

* Ensure the patient has left the dialysis station before disinfection is initiated.

CDC Dialysis Collaborative

Facility Name: _____ Date: _____ Start time: _____ AM / PM

Day: M W F Tu Th Sa Shift: 1st 2nd 3rd 4th Observer: _____ Location within unit: _____

Audit Tool: Hemodialysis hand hygiene observations

(Use a “√” for each ‘hand hygiene opportunity’ observed. Under ‘opportunity successful’, use a “√” if successful, and leave blank if not successful)

[illegible]

Discipline: **P**=physician, **N**=nurse, **T**=technician, **S**=student, **D**=dietitian, **W**=social worker, **O**=other

Duration of observation period =

minutes Number of successful hand hygiene opportunities observed =



Guide to Hand Hygiene Opportunities in Hemodialysis

Hand hygien opportunity category	Specific examples
1. Prior to touching a patient	• Prior to entering station to provide care to patient • Prior to contact with vascular access site • Prior to adjusting or removing cannulation needles
2. Prior to aseptic procedures	• Prior to cannulation or accessing catheter • Prior to performing catheter site care • Prior to parenteral medication preparation • Prior to administering IV medications or infusions
3. After body fluid exposure risk	• After exposure to any blood or body fluids • After contact with other contaminated fluids (e.g., spent dialysate) • After handling used dialyzers, blood tubing, or prime buckets • After performing wound care or dressing changes
4. After touching a patient	• When leaving station after performing patient care • After removing gloves
5. After touching patient surroundings	• After touching dialysis machine • After touching other items within dialysis station • After using chairside computers for charting • When leaving station • After removing gloves

Please make note of the following during this session.

Yes	No	Comments
There is a sufficient supply of alcohol-based hand sanitizer		
There is a sufficient supply of soap at handwashing stations		
There is a sufficient supply of paper towels at handwashing stations		
There is visible and easy access to hand washing sinks or hand sanitizer		



Facility Name: _____ Observer: _____

Date(s): _____ Location of Medication Preparation: _____

Audit Tool: Hemodialysis injectable medication preparation

Observe a medication preparation session. (Use a “√” if action performed correctly, a “Φ” if not performed/performed incorrectly. If not observed, leave blank. All applicable actions within a row must have “√” for the procedure to be counted as successful.)

Day (i.e., M, Tu, W)	Shift (i.e., 1 - 4)	Discipline	Med prep done in designated area	Med prep area is clean *	All vial(s) are inspected **	Hand hygiene performed	Septum of all vial(s) disinfected	All vials entered with new needle and new syringe	Med prep done aseptically	All single-dose vial(s) discarded	All multi-dose vial(s) discarded or stored properly

Discipline: P=physician, N=nurse, T=technician, S=student, O=other

Total number of sessions observed = _____

Number of sessions performed correctly = _____

ADDITIONAL COMMENTS/OBSERVATIONS:

*Preparation of injectable medications must be performed in a designated clean area that is free of obvious contamination sources (e.g., blood, body fluids, contaminated equipment, tap water).

*Vial should be discarded if sterility is questionable, or expiration date or beyond-use date has been exceeded. If a multi-dose vial will not be immediately discarded after use, the vial should be labeled upon opening to indicate the beyond-use date.



(Use a “√” if action performed correctly, a “Φ” if not performed/performed incorrectly. If not observed, leave blank. All applicable actions within a row must have “√” for the procedure to be counted as successful.)

Discipline	Medication properly transported to patient station*	Hand hygiene performed	Clean gloves worn	Injection port disinfected with antiseptic**	Medication administered aseptically	Syringe discarded at point of use	Gloves removed	Hand hygiene performed
Discipline: P=physician, N=nurse, T=technician, S=student, O=other								
Duration of observation period:								
Number of procedures performed correctly = _____								

Number of procedures performed correctly = _____

Total number of procedures observed during audit = _____

ADDITIONAL COMMENTS/OBSERVATIONS:

* Medications should be transported directly from medication preparation area to individual patient. Medications should be prepared as close as possible to the time of medication administration. Medications that are not immediately administered by the person who prepared the medication must be labeled appropriately.

**Appropriate antiseptics are chlorhexidine, povidone-iodine, tincture of iodine, and 70% alcohol.

