

**NURSING ROLE IN THE CONTROL OF ANTIMICROBIAL RESISTANCE AT NYERI
COUNTY REFERRAL HOSPITAL**

BY

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**A RESEARCH PROPOSAL FOR THE PARTIAL FULFILLMENT OF THE DEGREE
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OF NURSING SCIENCES**

FEBRUARY, 2023

Student Declaration

This research proposal is an original report and has not been submitted or presented for an award to any institution.

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Supervisor's Declaration

I declare that this research proposal has been submitted with my approval as the supervisor.

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Sign _____ Date _____

Acknowledgement

We acknowledge the Almighty God for this far, our parents for all the support they have given us and our supervisor, Mrs. Grace Gachuri for positive guidance, advice and encouragement.

Dedication

We dedicate this research to the Kenyatta University School of Nursing students, School of Nursing administration, clinical supervisors, and lecturers.

List of Abbreviations

ANA: American Nurses Association

AMR: Antimicrobial Resistance

AMS: Antimicrobial Stewardship

CDC: Centers for Disease Control and Prevention

NCK: Nursing Council of Kenya

NCRH: Nyeri County Referral Hospital

MIC: Minimal Inhibitory Concentration

SM: Self Medication

IV: Intravenous

PPEs: Personal Protective Equipment

WHO: World Health Organization

Definition of Key Terms

Nurse: A person trained to competency in relevant fields of practice and who has been licensed by the NCK to practice independently in health care facilities, to promote and maintain health.

Attitude: A person's perception, feelings or way of thinking about something, such as health.

Knowledge: Understanding of someone or something, such as facts, information, description or skills which is acquired through experience or education by perceiving, deceiving, or learning.

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Abstract

Introduction: Antimicrobial resistance has become a great threat to global health. Nurses are frontline clinical workers involved in vital clinical procedures and decisions. They are in direct contact with patients more than any other clinician, and perform procedures that determine the occurrence of resistance such as, drug administration and infection prevention. The nursing role in antimicrobial stewardship will be a good indicator of the nurses' knowledge regarding AMR and AMS, and also help us understand the issues informing their decisions and practices such as their attitude, hospital policies, and even workload. **Methodology:** The study used a descriptive cross-sectional study design. A stratified sampling method was applied, and a sample of 60 nurses from different strata was used. Data collection tools were self-administered questionnaires. **Results:** There is good practice of antimicrobial stewardship. This is evidenced by nurses practicing infection prevention, nurses ensuring timely administration of antimicrobials and adhering to directly observed therapy when administering antimicrobials. A gap in practice was noted because in some units there were no antimicrobial registers, hence nurses didn't record AMR cases. Despite the study findings demonstrating good knowledge of nurses regarding AMR and its prevention, the researchers noted gaps in knowledge regarding specific aspects of AMR, such as its cause. The nurses' attitude, the participants showed a positive attitude towards AMR and its prevention. Nurses adhere to hospital guidelines aimed at AMS. **Conclusion:** Nurses are well informed of the threat antimicrobial resistance is bringing to the health care system. They are also actively involved in antimicrobial stewardship practices due to their positive attitude towards their role in controlling antimicrobial resistance. The resources needed to ensure proper control are insufficient. **Recommendations:** Nurses' knowledge regarding antimicrobials and causes of resistance should be enhanced to promote their involvement and participation in AMS programs. Hospitals should devise clearly guidelines regarding nurses' role in antimicrobial decision-making and regarding clinicians responsible for collection of specimens to curb the resistance and its spread. Health sector stakeholders should consider consistent availability of vital amenities like hand gloves, segregation bins and hand washing points to support efforts towards AMR prevention.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter covers the background to the study, the problem statement, study justification, objectives, research questions, significance, scope of the study, limitations, and assumptions.

1.1 Background of the study

Antimicrobial resistance (AMR) results due to the public's indiscriminate use, abuse and misuse of antimicrobials such as antibiotics, antivirals, antimalarials and antifungals. AMR has a global impact on public health, leading to increased morbidity, mortality and healthcare costs. It has grown to a point that World Health Organization (WHO) has taken the lead for a coordinated and multisectoral response (Danielis et al., 2022, Al-Taani et al., 2022). Antibiotics, as a group of medications, have been subject to indiscriminate use, which is considered to be a primary factor in the development of antimicrobial-resistant microorganisms, leading to complications in patients.

Healthcare professionals are directly involved in the prescribing and use of antibiotics. They might respond to patients' inappropriate requests or might carry out inappropriate practices, which in turn increase the chances for antimicrobial resistance (Al-Taani et al., 2022) or prevent AMR by following recommended practices for identifying the disease causing microorganisms and enforcing infection prevention and control measures (CDC, 2019). Faced with the challenges of inadequate high-quality diagnostics, poor adherence to antimicrobial prescription guidelines by professionals, and availability of antimicrobials, low and middle-income countries are, and will be, the most affected by AR (WHO, 2015).

Antimicrobial stewardship (AMS) refers to the proper use of antimicrobials in order to preserve their future effectiveness. Nurses' involvement in AMS is widely recommended as they make up most of the healthcare workforce at the patients' bedside. Nurses play a crucial role in the fight against AMR through ensuring proper hand hygiene and proper working methods in the care of patients. They ensure that surfaces are cleaned and disinfected (Bryson, 2021). The first objective of the WHO Global Action Plan on Antimicrobial Resistance, which was adopted in

2015, prioritizes AMR claiming that the key approach to address the lack of expertise in antimicrobial misuse is to ensure that healthcare workers are educated and trained to develop the necessary competencies. This can be achieved through the standardization of educational sources for AMR based on global evidence and best practices.

Considering the large amount of time nurses spend at patients' bedside, the aim of this study is to examine the knowledge of nurses regarding antimicrobial resistance and its prevention, the nursing practices that contribute to antimicrobial resistance, and those that contribute to its prevention and also the factors that influence those nursing practices.

1.2 Problem statement

Antimicrobial resistance is currently considered the greatest threat to global health by the World Health Organization (WHO, 2015). Self-medication of antimicrobials without consulting a doctor to alleviate disease symptoms is a common behavior practiced worldwide by many sections of the society, and this contributes to AMR leading to increased healthcare costs and higher mortality and morbidity. Besides self-medication, the people practicing it also have a habit of discarding the drugs once the symptoms subside or save the leftover antibiotics for future use. The habit of keeping leftover antibiotics may be either due to higher doses of antibiotics prescribed or high quantity purchased than the required or the recommended dose was not completed (Kota et al., 2022). This may eventually contribute to AMR because incase such symptoms manifest later, the patient is likely to use the leftovers and yet maybe it's another infection all together.

There have been cases of frequent readmission of patients especially children in public hospitals because of recurrence of medical conditions. This can be attributed to the syndromic approach to managing conditions because in as much as prescriptions are made, they are meant to target a wide variety of bacteria hoping that the one causing the infection is in the group. This eventually leads to AMR because it's easy to miss out on the proper drug or drug dosage because the specific causative agents and the severity of the infection have not been clinically determined. Therefore, for successful implementation of programs to control AMR in the country, it is important to understand nurses' practices and what informs their decisions on matters AMR and its prevention.

1.3 Study Justification

This study will establish the nurses' practices that contribute to the occurrence of AMR and its prevention. This will be a good indicator of the nurses' knowledge regarding AMR and AMS, and also help us understand the issues informing their decisions and practices such as their attitude, hospital policies, and even workload. It will be of great help to everyone involved in the managing patients with infections—from the qualified nurses, nurse administrators and student nurses at the hospitals, other healthcare professionals, and policymakers in the healthcare system. The nurses' knowledge will help determine the effectiveness of the practices and health messages given by nurses to patients.

This study will also help the school of nursing administration realize the gaps in the nurses understanding, the areas of emphasis and correction and hence effectively devise ways to include antimicrobial resistance and antimicrobial stewardship into the nursing curriculum so as to bring up nurses who will actively help in combating AMR.

1.4 Objectives

1.4.1 Broad Objective

To assess the nursing practices contributing to antimicrobial resistance and its prevention.

1.4.2 Specific Objectives

- a.) To define nursing responsibilities towards control of antimicrobial resistance.
- b.) To identify nursing practices that may contribute to AMR.
- c.) To determine the factors that influence nursing practices that relate to antimicrobial use.

1.5 Research Questions

- a.) What are the nursing responsibilities towards control of antimicrobial resistance?
- b.) What are the nursing practices that contribute to antimicrobial resistance?
- c.) What factors influence the nursing practices that relate to antimicrobial use?

1.6 Scope of the study

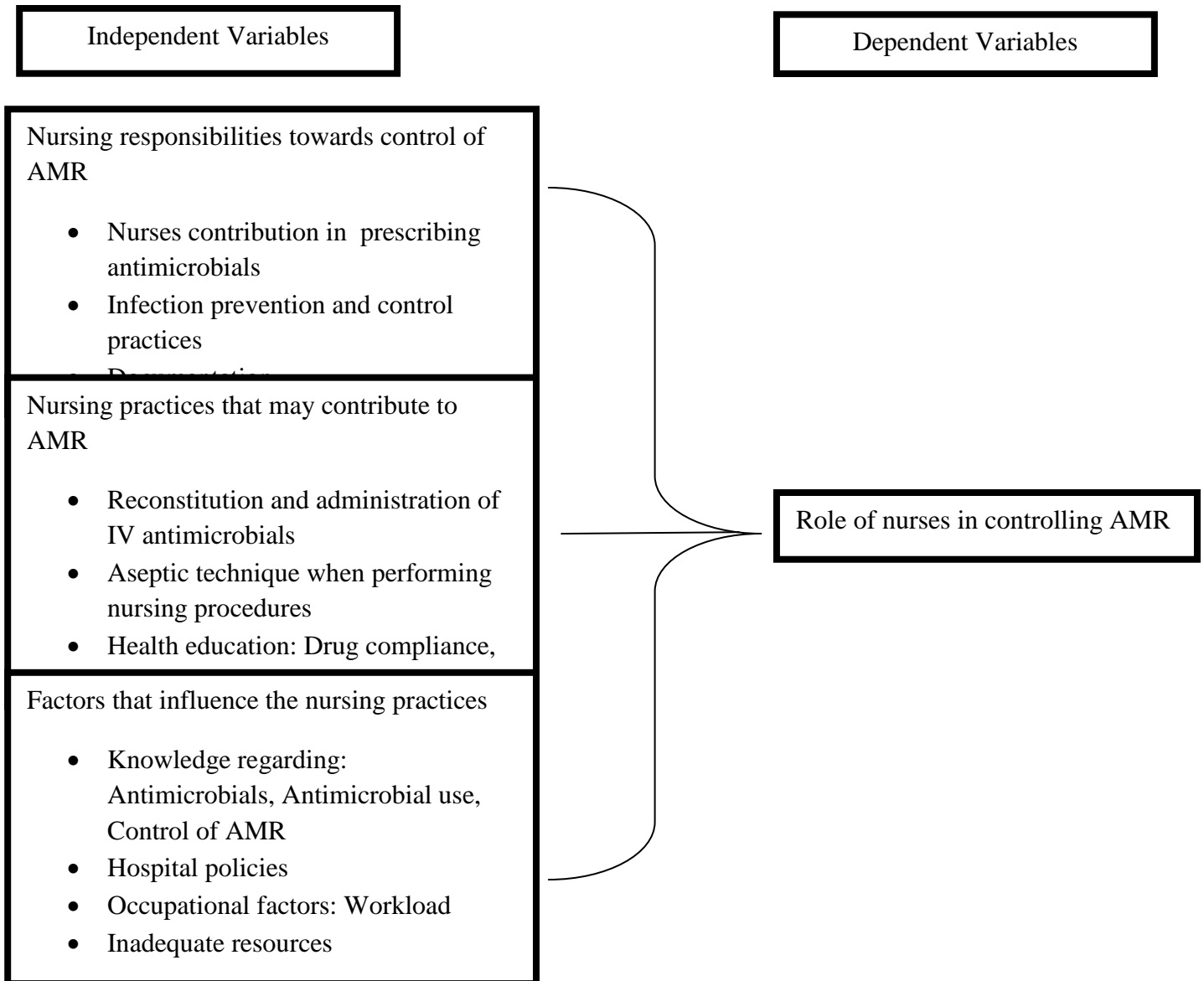
The study is delimited to qualified nursing officers who practice at Nyeri County Referral Hospital.

1.7 Study limitations

This study is faced with the following limitations:

a.) The study is only specific to nurses hence it may not be generalizable to other healthcare providers.

1.8 Conceptual framework



CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides an overview of literature concerning nurses' knowledge about antimicrobials and the prevention of resistance, nursing practices that contribute to occurrence and prevention of resistance, and the factors influencing nursing practices.

2.1 Nursing responsibilities towards control of AMR

Nurses are frontline clinical workers involved in vital clinical procedures and decisions. They are in direct contact with patients more than any other clinician, and perform procedures that determine the occurrence of resistance such as, drug administration and infection prevention (Monsees et al., 2019). Ensuring optimal drug administration is a key role nurses perform both in in-patient and out-patient settings. Since nurses are often in contact with patients, they could report signs that could rule out antimicrobial therapy during diagnosis thus preventing inappropriate antimicrobial therapy (Monsees et al., 2019).

In addition, intravenous administration of antimicrobials requires monitoring which is performed by nurses. Prolonged antimicrobial therapy beyond the recommended duration leads to resistance. Nurses ensure timely administration of antimicrobials, and adherence to the prescribed duration of therapy which are known determinants of occurrence of resistance. Furthermore, oral step-down (conversion of treatment from intravenous to the oral route) is facilitated by nurses as they closely monitor patients' progress and report when they can tolerate oral antimicrobials (Monsees et al., 2019).

The documentation of procedures related to antimicrobial use is vital in monitoring and evaluating antimicrobial stewardship programs. Appropriate documentation of antimicrobial use in patients informs the decisions of the multi-disciplinary team which prevents antimicrobial overtreatment or under treatment (Monsees et al., 2019). Antimicrobial registers are important in antimicrobial surveillance and inform the decisions of hospital antimicrobial stewardship committee. Nurses are often tasked with completing antimicrobial registers, an important component of the antimicrobial stewardship (Monsees et al., 2019).

Infection prevention is crucial in the occurrence of nosocomial and iatrogenic infections. Both nosocomial and iatrogenic infections are resistant to standard antimicrobial therapy, and require treatment with broad spectrum antimicrobials over extended durations contributing to AMR(Gitaka et al., 2020). Nurses perform infection prevention practices such as, meticulous hand washing before and after handling patients, proper waste segregation in the wards, the use of PPEs, and advocating for a clean pathogen free patient environment. Moreover, by virtue of patient advocacy, nurses supervise the multidisciplinary team by ensuring adherence to infection control measures in the wards which could prevent or facilitate the occurrence of resistance(American Nurses Association & Centers for Disease Control and Prevention, 2019)

2.2 Nursing Practices Contributing to AMR

Nursing literature indicates that intravenous (IV) administration of medicines has the potential for the greatest harm. There is an assumption that parenteral antibiotics are reconstituted correctly, delivered on time and over the correct time period by the nurse who is administering the drug. Non-delivery of the prescribed dose may result in treatment failure. Sub-therapeutic levels of antimicrobials occur when the antimicrobial concentration falls below the MIC required to kill or stop the growth of the microorganism for a prolonged period of time hence lead to AMR (Rout et. Al., 2019).

Antimicrobial misuse and overuse precipitate the occurrence of resistance. Self-medication is another wrong growing practice among the public and also healthcare professionals. The World Health Organization (WHO) defined self-medication(SM) as “the use of drugs to treat self-diagnosed diseases or symptoms, or the intermittent or continued use of a prescribed drug for chronic or recurrent disease or symptoms.” (WHO, 2019) The public ignorantly practice self-medication and taking over-the counter-drugs without any prescription because nurses don’t give adequate health education addressing the issue (Zeramariam et al., 2019). In addition to self-medication, there is poor compliance to antimicrobials among patients, yet they are not worried about the effects so that such as antimicrobial resistance.

2.3 Factors Influencing Nursing Practices

Despite the acknowledgement of their importance in antimicrobial stewardship, studies have reported the undefined role of nurses in such programs (ANA & CDC, 2019; Monsees et

al., 2019). This could be attributed to work environment and profession-related factors such as, nurses' workload, inadequate resources, and hospital policies. As Gitaka et al.(2020) reported, Kenya's health care system dispenses several obligations to nurses, who are at the same time markedly understaffed. In public hospitals for instance, the nurse to patient ratio is currently at 8.3 per 10,000populations, which is below the WHO recommendation of 25. This marked understaffing predisposes nurses to fatigue, a factor which contributes to poor antimicrobial vigilance and the uptake of antimicrobial stewardship interventions such as, close antimicrobial monitoring.

Furthermore, public hospitals especially in resource scarce regions of the country are faced with inadequate resources which limit nurses' ability to implement infection prevention practices (Gitaka et al., 2020). Reported instances revealed a lack of basic infection prevention equipment such as, hand-washing points, inadequate water, and inadequate bins for proper waste segregation in general wards. Moreover, the lack of resources also impairs rolling out of educational programs aimed at improving nurses' knowledge on antimicrobials and resistance thus contributing to AMR(Kirby et al., 2020).

Regarding hospital policies, Kirby et. al (2020) reported interprofessional jurisdiction and hierarchical conflicts as major determinants of nurses' inclusion in antimicrobial stewardship activities. Studies have identified subtle nursing activities performed on daily basis that influence antimicrobial decision-making (ANA & CDC, 2019; Kirby et al., 2020). Activities such as, antimicrobial dosing, culture and sensitivity reporting and de-escalation are traditionally considered the role of the hospitalist, infectious disease specialist or pharmacist, despite nurses performing this role on a daily basis. Furthermore, antimicrobial decision-making and prescribing is outlined in various hospitals as the role of medical and clinical officers, and hence nurses' contribution may be regarded to interfere with such decisions (Kirby et al., 2020). This influences nurses' involvement in the prevention of resistance and stewardship. It is in this light that the study opted to investigate nursing practices contributing to AMR and its prevention with an aim of identify barriers, and improve nurses' involvement in antimicrobial stewardship.

Due to the paucity of studies focusing on the knowledge of nurses regarding AMR, little is known about the status of their knowledge. However, the few studies conducted identified the existence of gaps in knowledge of nurses regarding AMR and its prevention. In their article

aimed at assessing nurses' knowledge about facts about antimicrobials, their use, and the prevention of antimicrobial resistance, (Lalithabai et al., 2022) highlighted the need for up-to-date knowledge on AMR and its prevention among nurses. Despite the study reporting moderate knowledge of nurses concerning facts about antimicrobials, their understanding of occurrence of resistance and their involvement in prevention of resistance was sub-optimal.

Another study conducted in Lambarene, Gabon by (Adegbite et al., 2022) also reported similar findings. The researchers found nurses were moderately aware of the causes of AMR, since more than half of the demonstrated moderate knowledge to the study's question items focused on facts about antimicrobials, their use, and the occurrence and prevention of resistance. Following the evidences mentioned above, the researchers of this study found it invaluable to assess nurses' knowledge about facts about antimicrobials, their use, and prevention of antimicrobial resistance as part of antimicrobial stewardship.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter will comprise the following: Research design, location of study, study population, sampling technique and sample size determination, tools for data collection, validity and reliability of the tools, logistical and ethical considerations, data collection technique, and methods of analyzing data.

3.1 Research design

Based on the need to determine the nursing practices that contribute to or help in curbing AMR in NCRH, the adoption of a descriptive cross-sectional design is deemed appropriate for the study. The use of cross-sectional design is justified by the fact that it will allow the researcher to obtain data on the existing knowledge of nurses regarding AMR during the study without manipulating the sample population.

3.2 Location of study

The study was conducted at NCRH located in Nyeri County, a county referral hospital offering antenatal, family planning, growth monitoring and promotion, radiology services (e.g; X-ray, MRI, Ultrasound scan), renal dialysis, basic emergency obstetric care, caesarean section, comprehensive emergency obstetric care, curative in-patient services and curative outpatient services. The choice of the hospital was based on the fact that it is a referral hospital and therefore the flow of patients with medical conditions is quite high hence we will fully get to understand the practices nurses use to manage the high patient population of about 400 patients which may be a contributing or preventing factor on AMR

3.3 Study population

The study involved qualified nurses practicing in NCRH, specifically in the medical wards, surgical wards, paediatric wards, orthopedic wards and ICU. The hospital had approximately 300 nurses, 250 Diploma and 50 Degree nurses; with about 70 working in the chosen wards.

3.3 Sample

3.3.1 Sample size

The study used Yamane sample size formula quoted by Thongsri & Chootong et al. (2021) in determining sample size

$$n = \frac{N}{1 + N(e^2)}$$

Where;

n= sample size

N= population size

E= acceptable sampling error

95% confidence level is used

Therefore,

$$n = \frac{70}{1 + 70(0.0025)}$$

$$n = 60$$

The samples in the different levels will be as follows:

Strata	Population		Sample	
	Number	Percentage	Number	Percentage
Medical Wards	20	28.57%	18	28.57%
Surgical Wards	20	28.57%	18	28.57%
Paediatric Ward	10	14.29%	8	14.29%

Orthopedic Wards	10	14.29%	8	14.29%
ICU	10	14.29%	8	14.29%
TOTAL	70	100%	60	100%

3.3.2 Sampling technique

The study employed both convenience and purposive sampling technique to get participants for the study. The sample population was conveniently selected based on their availability and accessibility by the researcher at the various wards in Nyeri County Referral Hospital. Only qualified nurses practicing in the medical wards, surgical wards, paediatric wards, orthopedic wards and ICU were selected. The wards were chosen because most patients admitted in these wards mostly have conditions that are as a result of infections and therefore they are mostly treated using antimicrobials, they will therefore give u a clear picture of the nurse’s role in controlling AMR.

3.4 Inclusion criteria

The study required all the nurses taking part in the study to be practicing in medical-surgical unit only in NCRH.

3.5 Exclusion criteria

Nurses who declined participate in the study.

3.7 Tools for data collection

The tools for data collection were questionnaires constructed by the researchers based on the aims and objectives of the study. Both open and closed-ended questions were used in the development of the questionnaire. The questionnaire was formatted following the study's variables as outlined in the conceptual framework. The instructions were clearly outlined for accuracy and easy understanding. The components included a consent form before the main

contents. The study tool was pretested before the actual study to determine efficacy and effectiveness.

3.8 Validity of study tools

The study tools were presented to the research supervisor, who in turn, advised on the adjustments necessary. After that, the necessary changes were implemented, and the final copy was submitted to the supervisor for approval.

3.9 Reliability of study tools

The study tools were pretested among selected nurses who were not members of the subject group, that is, the nurses who were working in paediatrics, ICU and maternity units in NCRH. The outcome was compared against the set standards and objectives of the study to determine reliability.

3.10 Data Collection technique

The questionnaire was self-administered. The participants submitted the questionnaires once they completed filling. That took about 5 minutes to fill each questionnaire. The participants were only required to fill one questionnaire once and not multiple times. This method was considered the best option due to the ease of questionnaire administration.

3.11 Data Analysis

Collected data was processed, cleaned, and analysed using the IBM SPSS. The descriptive methods of data analysis was employed, including both measures of central tendencies and dispersions such as mean and standard deviations respectively, will be calculated and tabulated. Percentages will also be determined.

Graphs, pie charts, and tables were used to present standard deviations and percentages.

3.12 Logistical and ethical considerations

This study upheld ethical principles of research following research ethics. This came following a detailed explanation of the aims and purpose of the study among the subjects. There was absolute anonymity as the subjects shall not be required to input their identifiers on the research tool. The

participants not coerced to participate but given the freedom to participate at will. Respect for persons was upheld through consent seeking which was the first content of the data collection tool (Anabo et al., 2019). All the collected information from participants was kept confidential, only accessible to the researchers and the research supervisor.

The collected data was available to the Nyeri County Referral Hospital and Kenyatta University School of Nursing and will be used in policy making towards curbing the rise of AMR.

3.13 Dissemination

The study results will be made available to Nyeri County Referral Hospital and Kenyatta University School of Nursing in the form of a written report to aid in utilizing the findings in the future. The researchers also look forward to publishing the findings and having them shared and presented at conferences

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter contains the analyzed research findings with regard to the stated study objectives. A total of 60 students across different classes consented to the study with a response rate of 100%. The results are presented in the form of tables.

4.1 Socio-demographic Data

Majority (46.7%, n=28) of the nurses are young aging between 22-32 years. A big proportion (63.3%, n=38) of the nurses are female. Majority (48.3%, n=29) of the nurses are KRCHNs, whose number is twice that of BScNs, 14 (23.3%). Most (46.7%, n=28) nurses have a work experience of up to 5 years.

Table 4.1

		Frequen cies (n=60)	Percentage %
Age	22-32	28	46.7%
	33-43	18	30.0%
	44-54	14	23.3%
	>55	0	0.0%
Gender	Male	22	36.7%
	Female	38	63.3%
	Other	0	0.0%
Qualifications	MScN	1	1.7%

Experience	BScN	14	23.3%
	KRCHN	29	48.3%
	KECHN	16	26.7%
	<1	8	13.3%
	1-5	28	46.7%
	6-10	12	20.0%
	>10	12	20.0%
Deployment area	Adult medical ward	17	28.3%
	Adult surgical ward	20	33.3%
	Paediatric ward	7	11.7%
	Orthopedic ward	8	13.3%
	Critical care unit	8	13.3%

4.2 Nursing practices towards control of AMR

Regarding nursing practices, the results indicate there is good practice on antimicrobial stewardship. Majority (93.33%, n=56) & (90%, n=54) of the nurses claimed that they encourage patients to adhere to treatment regimens at all times and 48 (80%) of the nurses reported that they discourage patients from sharing antimicrobials with others.

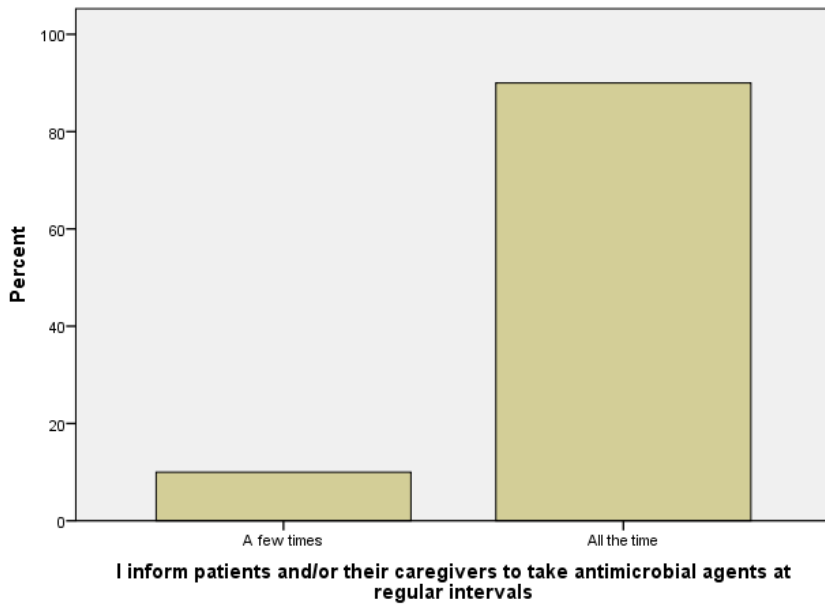
Poor practices are also noticeable from the results with (56.67%, n=34) and (53.33%, n=32) reporting that their units never record cases of antimicrobial resistance designated registers and that their units never have designated registers for cases of drug resistance respectively.

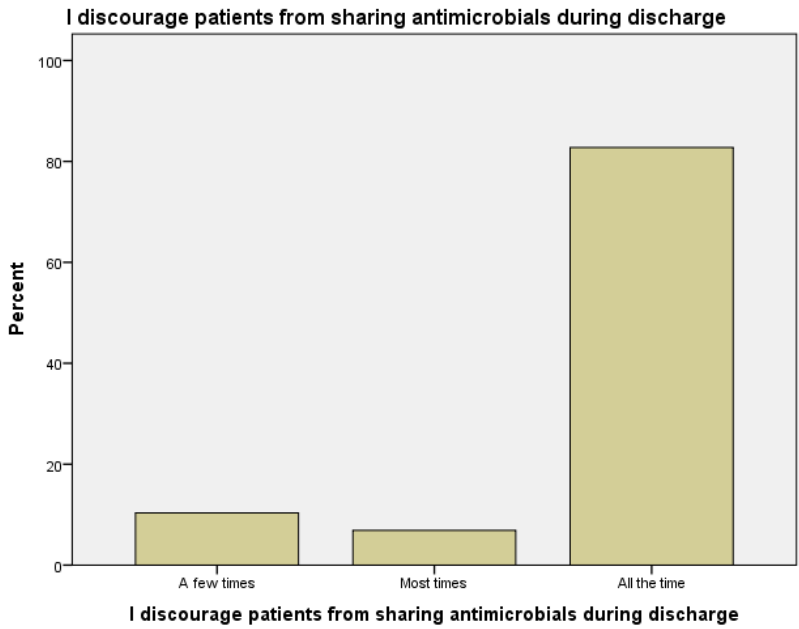
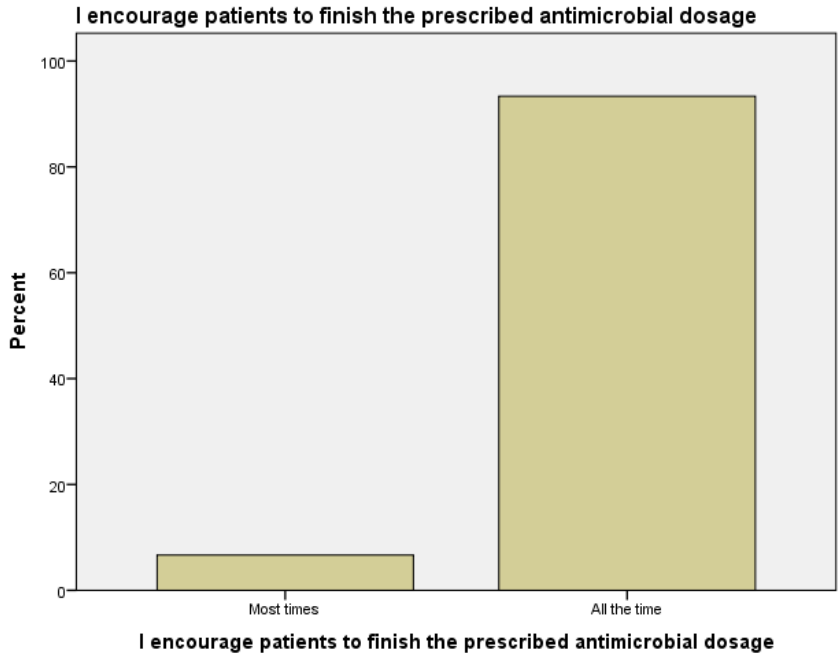
	Never	A few times	Most times	All the time
	Count	Count	Count	Count
I use a pair of gloves for each patient	0	10	18	32
I wash hands before and after contact with patients.	0	0	22	38
Nurses should be involved in monitoring antimicrobial therapy to facilitate oral step-down.	0	0	20	40
Nurses ensure timely administration of antimicrobial agents.	0	0	16	44
I/ my colleague in charge of drugs update the antimicrobial register after every medication round.	0	10	22	28

The unit has a designated register for any cases of drug resistance.	32	14	10	4
The unit records all cases of antimicrobial resistance in a designated register.	34	14	10	2
The unit has a designated register for any cases of adverse drug reaction.	24	14	14	8
The unit records all cases of undesired reactions to antimicrobial drugs in a designated register.	18	20	12	10
I inform patients and/or their caregivers to take antimicrobial agents at regular intervals	0	6	0	54
I encourage patients to finish the prescribed antimicrobial dosage	0	0	4	56
I discourage patients from sharing antimicrobials during discharge	0	6	4	48

I believe every patient in a ward should be treated with an antimicrobial drug to protect them from Hospital Acquired Infections	4	20	26	10
I adhere to the aseptic technique during sterile procedures (e.g wound dressing, I.V drug administration)	0	4	38	18
I adhere to directly observed therapy in the administration of oral antimicrobial agents	0	4	24	32

I inform patients and/or their caregivers to take antimicrobial agents at regular intervals





4.3 Factors Affecting Nursing Practice

4.3.1 Knowledge

Results of this study indicate that nurses have a good understanding of antimicrobial stewardship. All the nurses could correctly define antimicrobial resistance, identify its causes and the required corrective actions. However, there are gaps in knowledge as evidenced by a few nurses 2-4(3.33%-6.67%) who disagreed on the misuse and overuse of antimicrobials as the major cause of antimicrobial resistance, empirical administration of antimicrobials should be followed by appropriate culture and sensitivity tests and implementing infection prevention and control is the key action in the control of AMR.

	Strongly Disagree	Disagree	Agree	Strongly Agree
	Count	Count	Count	Count
Antimicrobial resistance refers to changes in the structure or genome of a microbe that reduces the effectiveness of antimicrobial agents	0	0	7	53
The misuse and overuse of antimicrobials are the major cause of antimicrobial resistance.	0	2	4	54

Empirical administration of antimicrobials should be followed by appropriate culture and sensitivity tests.	0	4	24	32
Antimicrobial stewardship programs aim to optimize antimicrobial use and prevent antimicrobial resistance.	0	0	4	56
Implementing infection prevention and control is the key action in the prevention of resistant infections and their spread.	0	2	18	40

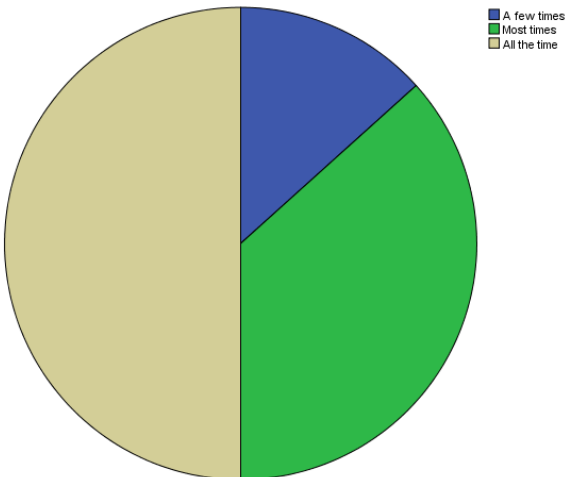
4.3.2 Hospital Policies

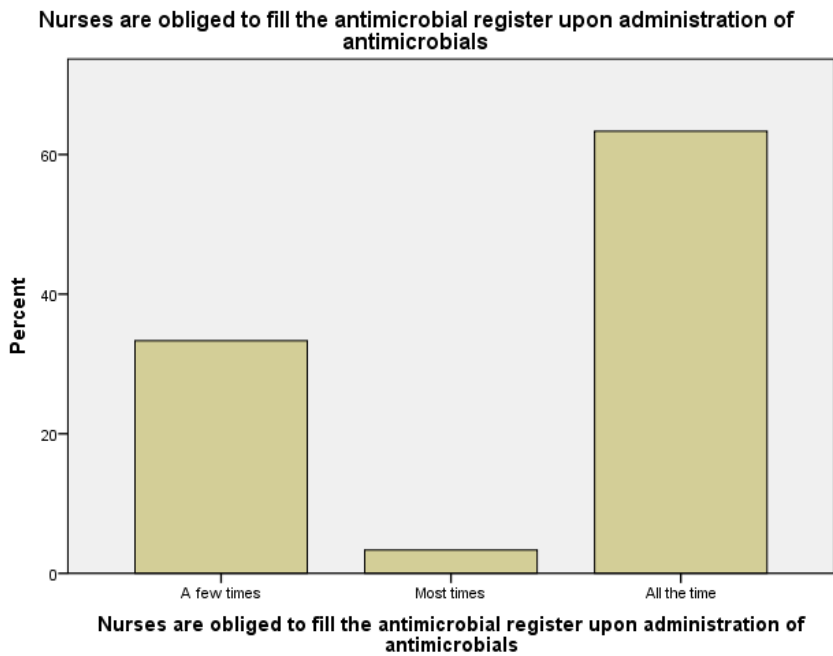
The results indicate that the hospital has adopted policies that support antimicrobial stewardship as reported by majority (50%, n=30) of the nurse that the hospital has treatment guidelines that guide the prescription and administration of antimicrobials all the times and (36.67%, n=22) reported that that happens most times. 38 (63.33%) of the nurses claimed that they are obliged to fill the antimicrobial register upon administration of antimicrobials and majority (53.33%, n=32) of the nurses claimed that they collect specimen (e,gblood) for laboratory investigations.

	Never	A few times	Most times	All the time
	Count	Count	Count	Count

The hospital has treatment guidelines that guide the prescription and administration of antimicrobials.	0	8	22	30
Nurses are involved in the antimicrobial decision-making (including changing an antimicrobial when desired therapeutic response is not achieved).	14	22	12	12
Nurses are obliged to fill the antimicrobial register upon administration of antimicrobials	0	20	2	38
Nurses collect specimen (e,g blood) for laboratory investigations	22	0	32	6

The hospital has treatment guidelines that guide the prescription and administration of antimicrobials.





4.3.4 Resource supply

The results indicate that there is insufficient supply of resources such as gloves 50% (n=30) claimed that there were enough gloves few of the times, and 50% (n=30) reported that the nurse to patient ratio has never been 1:5, indicating shortage of nurses. On the other hand, segregation bins are reported to be enough at all the time by 96.67% (58) of the nurses and handwashing points seem to be available for the nurses to use in good measure as reported by (53.33%, n=32) of the nurses.

	Never	A few times	Most times	All the time
	Count	Count	Count	Count

Color coded waste segregation bins are available in your unit.	0	2	0	58
There are more than three handwashing points in your unit.	2	6	20	32
There are enough gloves for carrying out the required nursing procedures in the unit.	4	30	16	10
There nurse to patient ratio in your unit is 1:5	30	14	2	14

4.3.5 Attitude

Regarding nurses' attitude towards antimicrobial resistance and its prevention, results indicate that nurses have a positive attitude in support of antimicrobial attitude with majority accepting their role in curbing antimicrobial resistance. This is because most nurses strongly agree with the statements that nurses are responsible for reporting issues related to antimicrobial misuse 34 (56.67%), 30 (50.0%) agreeing that they read and understand instructions before administering antimicrobials and 36 (60%) claiming to be part of the antimicrobial stewardship team and playing an active role in stewardship programs.

	Strongly Disagree	Disagree	Agree	Strongly Agree
	Count	Count	Count	Count

Antimicrobials can be taken without prescription.	44	10	0	6
Nurses are responsible for reporting issues related to antimicrobial misuse	0	0	26	34
Instructions are read and understood before administering antimicrobials	0	4	30	26
Nurses are part of the antimicrobial stewardship team and play an active role in stewardship programs	0	0	24	36

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This chapter discusses the results of the study. It aimed at evaluating the nursing role in the control of AMR at Nyeri County Referral Hospital.

5.1 Nursing Practices towards control of AMR

The findings show that there is good practice of antimicrobial stewardship. Most of the nurses encouraged patients on drug adherence and discouraged them from sharing antimicrobials with others who might be presenting with the same symptoms. Infection prevention is well practiced, with majority of the nurses (53.33%, n=32) and (63.33%, n=38) using a pair of gloves for each patient and washing hands before and after attending to a patient respectively. The results are supported by American Nurses Association & Centers for Disease Control and Prevention (2019), which states that nurses perform infection prevention practices such as, meticulous hand washing before and after handling patients, proper waste segregation in the wards, the use of PPEs, advocating for a clean pathogen free patient environment and supervising the multidisciplinary team by ensuring adherence to infection control measures in the wards which could prevent or facilitate the occurrence of resistance. The findings also indicated that nurses ensure timely administration of antimicrobials and adhere to directly observed therapy when administering antimicrobials. This is supported by Monsees et al. (2018) which shows that nurses ensure timely administration of antimicrobials and adherence to the prescribed duration of therapy hence dealing with the known to be the determinants of occurrence of resistance.

A weakness in practice was noted in documentation; most nurses never recorded AMR cases since their units didn't have the designated registers for drug resistance and adverse drug reactions. Despite antimicrobial registers being important in antimicrobial surveillance and inform the decisions of hospital antimicrobial stewardship committee and nurse being tasked with completing antimicrobial registers (Monsees et al., 2019), the practice has not been well adopted in the hospital.

5.2 Factors Affecting Nursing Practice

5.2.1 Knowledge

Despite the study findings demonstrating good knowledge of nurses regarding AMR and its prevention, the researchers noted gaps in knowledge regarding specific aspects of AMR, such as its cause. This is concordant to Lalithabai et al.'s (2022) study conducted among nurses at an acute health care facility in Saudi Arabia that showed moderate knowledge on details of causes of AMR and its prevention. The question item 23 had some participants disagreeing, an evidence of gaps in detailed knowledge on causes of AMR.

5.2.2 Attitude

Regarding nurses' attitude, the participants showed a positive attitude towards AMR and its prevention. They admitted monitoring and reporting issues concerning antimicrobial misuse to relevant authorities, and participating in stewardship programmes. The finding is concordant to that of Kirby et al. (2020) which found a positive attitude in nurses regarding AMR and its prevention, hence the continued fight for their involvement in stewardship programmes. These study findings also showed significant correlation between nurses' knowledge and attitude. Participants demonstrated good knowledge and attitude regarding AMR and its prevention, showing the important role of knowledge in positive attitudinal development.

5.2.3 Hospital Policies

According to the study findings, nurses adhere to hospital guidelines aimed at AMR and its prevention. They admitted following antimicrobial treatment guidelines and filling antimicrobial registers post administration. The findings are in agreement with Gitaka et al.'s (2020) study findings that reported the adoption and use of antimicrobial treatment guidelines in lower and middle income countries to curb AMR spread. Guidelines inform the choice of antimicrobial agents and stipulate circumstances for the use of a specific agent. The measure has proven effective in reducing the prevalence of antimicrobial misuse and hence resistance. It is also evident from the findings that are left out in antimicrobial decision making despite their involvement in their administration. Furthermore, a significant number also stated lack of clear guidelines on specimen collection.

Inter-professional jurisdiction and hierarchical conflicts often cause confusion on the role of nurses in specimen collection and preservation with most facilities in Kenya delineating the task to clinical and medical officers, hence nurses are left out in trainings regarding such procedures, negatively impacting stewardship programs (Kirby et al., 2020). Moreover, despite their role in antimicrobial administration, nurses contribute the least to antimicrobial decision-making, as their views are often viewed as interfering with the physicians', a factor that affects their inclusion in stewardship programs and the implementation of stewardship programs.

5.2.4 Resources

Lower and middle income countries face scarcity of resources in most of their public health facilities (Gitaka et al., 2020). The evidence is concordant to the study findings which revealed scarcity of vital amenities like gloves as nurses reported enough gloves were rarely available. Furthermore, the nurse to patient ratio was registered at more than 1:5 that is below the WHO recommendation. There was also a significant correlation between resource allocation and department, as enough hand washing points, segregation bins and gloves were always available in surgical and critical care departments. As Gitaka et al. (2020) reported, resource scarcity and the need for AMR prevention leads to prioritization of resource allocation within departments, where those with increased antimicrobial gaining more priority.

5.3 Limitations

The findings of this research are limited to only one hospital. Therefore, it is not possible to generalize these findings to other hospitals.

5.4 Conclusion

Nurses are well informed of the threat antimicrobial resistance is bringing to the health care system. They are also actively involved in antimicrobial stewardship practices due to their positive attitude towards their role in controlling antimicrobial resistance.

However, the resources needed to ensure proper control are insufficient hence improvisation is mostly done, which sometimes doesn't meet the required standards.

5.5 Recommendations

- In order to continue with efforts towards AMR and its prevention, nurses' knowledge regarding antimicrobials and causes of resistance should be enhanced to promote their involvement and participation in stewardship programs, and hence the prevention of AMR. Due to their positive attitude, integration of educative sessions will be easier to enhance their knowledge.
- Since nurses are key stakeholders in antimicrobial administration, they should be part of the antimicrobial decision-making team in public hospitals. Furthermore, hospitals should devise clearly guidelines regarding clinicians responsible for collection of specimens to curb the resistance and its spread. The use of antimicrobial treatment guidelines should be upheld due its importance in guiding and regulating antimicrobial use.
- Despite resource availability being a major hindrance to AMR prevention, health care stakeholders should consider consistent availability of vital amenities like hand gloves, segregation bins and hand washing points to support efforts towards AMR prevention. Moreover, department heads should avail adequate antimicrobial registers for continued surveillance of stewardship programs.

5.6 Recommendation for further research

Due to logistical and resource issues, the study used a small sample size which impairs the generalization of study findings, hence studies using a larger sample size should be conducted. Furthermore, a study should be done on the effects of nursing practices towards control of AMR.

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APPENDICES

APPENDIX I: INFORMED CONSENT

Study Title

NURSING ROLE IN THE CONTROL OF ANTIMICROBIAL RESISTANCE A NYERI COUNTY REFERRAL HOSPITAL

Investigators

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Introduction

We are Kenyatta University undergraduate nursing students from the School of Nursing. This research will be submitted to the university as an undergraduate nursing program requirement. The study participants in this study are qualified nurses practicing in Nyeri County Referral Hospital in the Medical-surgical unit.

Purpose of Study

As the researchers, we kindly request you participate in this study. First, however, you need to understand the purpose of this study.

We are conducting this study to assess the nursing practices that contribute to antimicrobial resistance and its prevention. It is expected that the data obtained from this study will identify gaps in the provision of nursing care to the various patients. In addition, the results will further inform all those involved in making policies and setting standards for nursing practice and help them improve the status of nursing care in the hospital.

Study Procedures

After consenting, we request that you answer the questionnaire provided through the printed forms. The questions are based on the study variables, where your practices as nurse and knowledge regarding AMR will be assessed. The results will greatly help the whole nursing community, including the student nurses, qualified nurses, and the school administration. Finally, submit the responses. This will take around 10-15 minutes per study participant.

Risks

The questions in this questionnaire may make you feel uncomfortable or upset. However, you are at liberty to answer some or all of the questions.

Benefits

Responding to the questionnaire will help you as a student in that the study will help identify gaps in the clinical training, and an improvement of the same will be made.

Confidentiality

Your responses to this questionnaire are anonymous. The following measures have been put in place to ensure your confidentiality:

1. Your name and identification data will not be documented. The responses will also be encoded to ensure anonymity and confidentiality are maintained at all stages.
2. Only the researchers will access the responses to ensure privacy and data protection.
3. Only the aggregate results of this study will be disseminated to the school administration to improve clinical learning at conferences and in scientific journals.

Contact Information

You are encouraged to ask questions or get assistance from the primary researchers:

Martin Omondi

Tel: 0743-787803

Email: gabrielmatineomondi@gmail.com OR

Gabriel Aseka

Tel: 0741-312482

Email: asekagabriel1999@gmail.com.

If you have any concerns with the researchers, you may contact the following supervisors and Kenyatta University Ethical review committee office:

Mrs. Grace Gachuri

Department: Medical-surgical Nursing, Kenyatta University

Tel: +254722980352

Email: gachuri.grace@ku.ac.ke

Voluntary Participation

You are free to partake in this research of your own free will. You can withdraw from the research of your own free will, without any cost or giving a reason. Refusal to participate in the study will not affect your relationship with the researchers, if any.

Participant's Statement of Consent

I have read or been told about what the study entails and have understood. My questions have been answered. I voluntarily agree to participate in this study.

Name.....Signature.....Date.....

Name of the witness(s) (in case the participant cannot write /read)

Name.....Signature.....Date.....

Management consent

We have been informed about the contents of this form and have understood. Our questions have been answered regarding this research activity and we hereby grant permission for the group to proceed with the study and/ or use the hospital resources in their study.

Name.....Signature.....Date.....

APPENDIX II: DATA COLLECTION TOOL

QUESTIONNAIRE ON NURSING ROLE IN THE CONTROL OF ANTIMICROBIAL RESISTANCE AT NYERI COUNTY REFERRAL HOSPITAL

Part 1: Demographic Information

Kindly tick against the appropriate option applicable to you					
1.	Age	A. 22-32 years	B. 33-43 years	C. 44-54 years	D. Above 65 years
2.	Genders	A. Male	B. Female	C. Other	
3.	Qualifications	A. MScN	B. BScN	C. KRCHN	D. KECHN
4.	Years of experience	A. < 1 year	B. 1 to 5 years	C. 6 to 10 years	D. > 10 years
5.	Area of deployment	A. Adult medical ward	B. Adult surgical ward	C. Paediatric ward	D. Orthopedic ward
		E. Critical care unit			

Part 2: Nursing Practices towards control of AMR

		All the time	Most times	A few times	Never	Comments that explain the response
		3	2	1	0	
6.	I use a pair of gloves for each patient.					

7.	I wash hands before and after contact with patients.					
8.	Nurses should be involved in monitoring antimicrobial therapy to facilitate oral step-down.					
9.	Nurses ensure timely administration of antimicrobial agents.					
10.	There is an antimicrobial register in your department.					
11.	I/ my colleague in charge of drugs update the antimicrobial register after every medication round.					
12.	The unit has a designated register for any cases of drug resistance.					
13.	The unit records all cases of antimicrobial resistance in a designated register.					
14.	The unit has a designated register for any cases of adverse drug reaction.					
15.	The unit records all cases of undesired reactions to antimicrobial drugs in a designated register.					
16.	I inform patients and/or their caregivers to take antimicrobial agents at regular intervals					
17.	I encourage patients to finish the prescribed antimicrobial dosage					
18.	I discourage patients from sharing antimicrobials during discharge					
19.	I believe every patient in a ward					

	should be treated with an antimicrobial drug to protect them from Hospital Acquired Infections					
20.	I adhere to the aseptic technique during sterile procedures (e.g wound dressing, I.V drug administration)					
21	I adhere to directly observed therapy in the administration of oral antimicrobial agents					

Part 4: Factors Affecting Nursing Practices

i. Knowledge

		Strongly Agree	Agree	Disagree	Strongly Disagree	Comments that explain the response
		3	2	1	0	
22.	Antimicrobial resistance refers to changes in the structure or genome of a microbe that reduces the effectiveness of antimicrobial agents.					
23.	Antimicrobial stewardship programs aim to optimize antimicrobial use and prevent antimicrobial resistance.					
24.	Implementing infection prevention and control is the key action in the prevention of resistant infections and their					

spread.					
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ii. Hospital Policies

		All the time	Most times	A few times	Never	Comments that explain the response
25.		3	2	1	0	
	The hospital has treatment guidelines that guide the prescription and administration of antimicrobials.					
26.	Nurses are involved in the antimicrobial decision-making (including when to change an antimicrobial when the response is not as expected)					

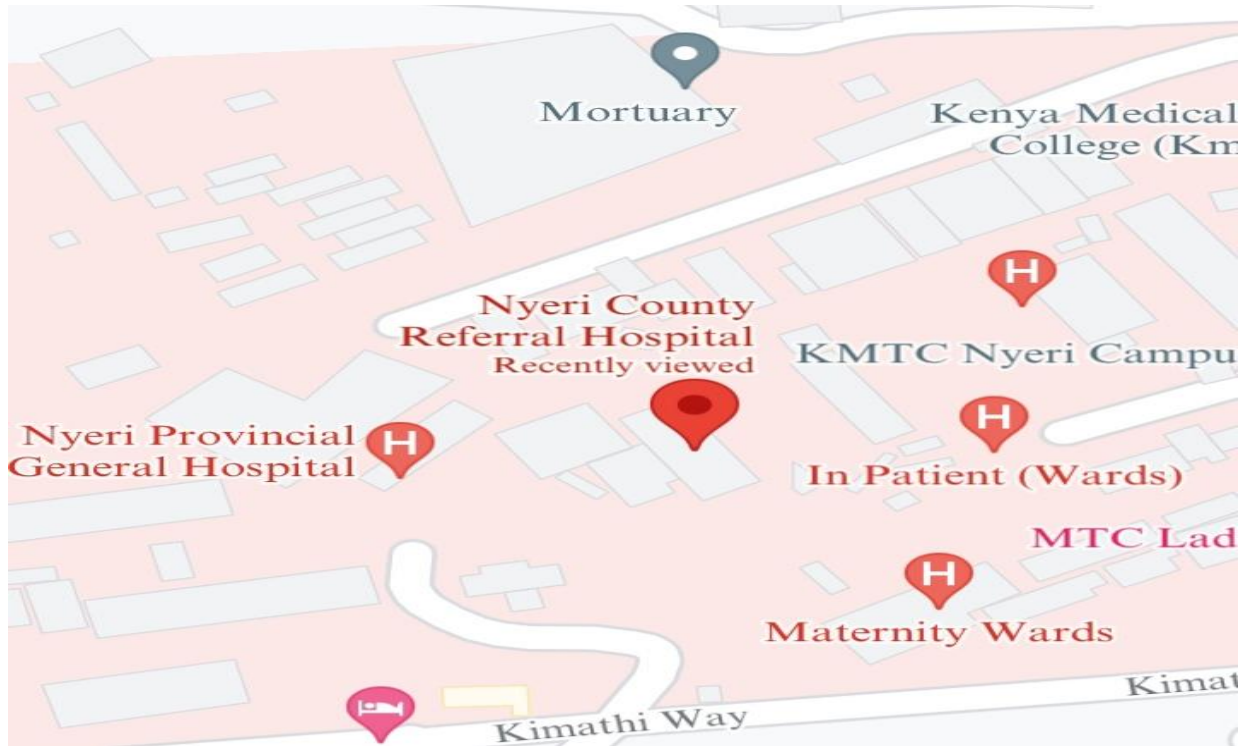
iii. Resource Supply

		All the time	Most times	A few times	Never	Comments that explain the response
		3	2	1	0	
27.	Colour coded waste segregation bins are available in your unit.					
28.	There are enough gloves for carrying out the required nursing procedures in the unit.					
29.	There nurse to patient ratio in your unit is 1:5					

iv. Attitude

		All the time	Most times	A few times	Never	Comments that explain the response
		3	2	1	0	
30.	I participate in antimicrobial stewardship campaign held in the hospital.					
31.	I/My colleagues effect oral step-down of antimicrobials in the unit.					
32.	Antimicrobial resistance is a threat to the provision of quality healthcare.					

APPENDIX III: STUDY AREA MAP



APPENDIX IV: BUDGET

Budget

Serial no.	Item	Unit price	Total
1.	Printing reams	1000*1	Ksh. 1000.00
2.	Transport	50*3*5	Ksh. 450.00
3.	Lunch and snacks	200*3*5	Ksh. 3000.00
4.	Pens	20*3	Ksh. 60.00
5.	Note book	150*3	Ksh. 450.00
6.	Printing final document	300*3	Ksh. 900
7.	Binding final document	200*3	Ksh. 600
8.	Miscellaneous	10% of the total	Ksh. 646.00
	Grand Total		Ksh. 7,106