

**FACTORS INFLUENCING QUALITY MANAGEMENT OF MEDICATION BY
NURSES AT KENYATTA NATIONAL HOSPITAL PAEDIATRIC WARDS.**

**A DISSERTATION SUBMITTED IN PART FULFILLMENT OF THE
REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN
PAEDIATRIC NURSING OF THE UNIVERSITY OF NAIROBI.**

BY

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SUBMITTED NOVEMBER 2011

DECLARATION

I, James Mutua Ndambuki declare that this dissertation is my original work and that it has not been presented elsewhere for academic or any other awards.

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DEDICATION

For their unconditional love and support, I dedicate this dissertation to my family; my wife Mary Wambui and daughters Sandra Wayua and Danielle Mwende, you have been my inspiration and to you I owe everything.

To my parents Mr and Mrs Onesmus Mwinzi – who have instilled in me the importance of integrity, the rewards of industry, and the primacy of education.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BScN	Bachelor of Science in Nursing
CME	Continuous Medical Education
ECN	Enrolled Community Nurse
ERC	Ethics and Research Committee
HIV	Human Immunodeficiency Virus
KDHS	Kenya Demographic and Health Survey
KNH	Kenyatta National Hospital
KRCHN	Kenya Registered Community Health Nurse
KRN	Kenya Registered Nurse
NCK	Nursing Council of Kenya
NCST	National Council for Science and Technology.
SPSS	Statistical Package for Social Scientists
UK	United Kingdom
USA	United States of America
WHO	World Health Organization

OPERATIONAL DEFINITIONS

- Caregiver/caretaker** - Any person charged with the care of the child in the hospital can be parent, house help or grandparent.
- Challenges** - Any aspect/ difficult that one may attribute as the cause for non adherence to set guidelines for the procedure.
- Management of drugs** - Ordering, collection from pharmacy, safe storage, preparation and safe administration to the patient by nurse.
- Medication error** any aspect of drug administration that is not observed when giving drugs to patients based on the 5 rights
- Paediatric medical ward** - Ward where children with medical conditions less than thirteen years of age are admitted.
- Quality management of medication** - The nurses use of the six rights of drug administration in a clean environment with adequate staff coverage, availability of needed protocols/policies and material resource to ensure safe medication administration to patients.

ABSTRACT

Background: Quality administration of medications is more than a mechanical task done in compliance with a prescription. Nurses must have basic knowledge of indications, dosages and side effects of medications to accurately interpret prescription orders. Safe drug administration ensures patients' drug safety, cost containment and reduced length of patient hospitalization. Pediatric nurses at KNH have been shown not to adhere to laid down procedures while administering oral medication to children. This could be attributed to several factors probably associated with the nurses' knowledge and practice, caretakers' contribution, care environment, hospital policy and availability of material and human resources. Our literature search did not find any study done on factors influencing quality management of medications by pediatric nurses in Kenya. **Objective:** The study sought to determine factors influencing quality management of medication by nurses at KNH paediatric medical wards. **Methods:** A descriptive cross-sectional survey involving 80 nurses, 180 caretakers and four nurse managers was done. Two sets of semi-structured researcher-administered questionnaires were issued. The first set was administered to nurses while the second one was employed on caretakers who had children in the wards. A written guide was used to conduct in-depth interviews with the nurse managers. An observation tool was further used to collect data as nurses were administering medication. These tools collected both quantitative and qualitative data. Data analysis was done using SPSS software (version 16) while qualitative data was analyzed manually. Findings of the study were presented in bar graphs, pie charts and frequency tables. **Results:** High workload (90%), language barrier (56%), absence of paediatric formulations (55%), multiple tasks (21%), lack of support (20%) and limited physical space (19%) were the main challenges that nurses encountered during drug administration. There was only one nurse (1.25%) trained in pediatric

nursing. Our analysis revealed an association between quality drug administration and number of years worked in paediatric wards (fisher's exact $p < 0.05$) and the attendance of continuing medical education (CME) (Fishers exact $p < 0.05$). **Conclusion:** The findings in this study indicate a need for concerted efforts and partnerships among the pediatric care stakeholders (nurses, patients/caregivers, hospital management and ministry of health) in enhancing quality medication administration in the pediatric wards. This will boost the nurses' professional confidence in delivery of care and minimize errors in drug administration thus ensuring patient safety and quick recovery. The challenges faced by paediatric nurses should be addressed by the hospital administration if quality administration of medication is to be achieved. **The study duration and budget:** The study took eleven months to complete at an estimated cost of Kshs.105 060. Funding was provided for by KNH, the researchers' employer.

CHAPTER ONE: INTRODUCTION

1.0 BACKGROUND INFORMATION

Medication administration involves providing the patient with a substance prescribed and intended for the diagnosis, treatment, or prevention of a medical illness or condition (Gupta et al, 2007). There are various ways in which medication can be administered by nurses. These methods include topical (application to the skin), parenteral (injections), inhalational and oral medication. Of the various ways of drug administration, oral medication is commonly used for paediatric outpatient clinics because of its convenience, ease of use and cost containment. Oral drugs come in various forms; they can either be in liquid or in solid forms (Kristine 2002). On the other hand, parenteral medication is the commonest method of drug administration for paediatric inpatients.

When infants and children are admitted in hospital, parents entrust their care and safety to the medical personnel mainly the pediatric nursing team. Pediatric nurses provide holistic care to the sick children by employing several procedures. One of these procedures is medication management. The management of medication in the ward by pediatric nurses involves ordering of the medicines from the pharmacy, storage of the drugs in a safe place in the ward, preparation of some medication for the patient, administering the medication to the patient and monitoring the patients' progress after taking the medication. This involvement of the nurse has led many nursing scholars to conclude that administration of medication is the chief responsibility of the nurse (Kristine 2002).

Pediatric nurses ensure sick children take their medicines as prescribed and with strict adherence to the five factors usually referred to as the 'six rights' the nurses are trained to observe viz:-at

the right time, right dosage, right route ,right drug, right patient and right documentation (Downie et al, 2002). Any measure of deviation from right procedure of medication for nurses has traditionally been based on the five rights'. However despite the 6 rights of medication administration, medication errors still occur as a result of other factors. Smelter (2007) notes that the five rights fail to acknowledge that human factors and system weaknesses contribute to errors and therefore pediatric nurses' duty should not be so much to achieve the five rights but to follow the procedural rules set by organization to produce the outcomes.

The failure to administer medication as per the laid down procedure may lead to medication errors. According to Mosby's medical dictionary a medication error can be defined as any incorrect or wrongful administration of a medication, such as a mistake in dosage or route of administration, failure to prescribe or administer the correct drug or formulation for a particular disease or condition, use of outdated drugs, failure to observe the correct time for administration of the drug, or lack of awareness of adverse effects of certain drug combinations (Mosby 2009).Administration of medication is thus an important aspect of the practice of nursing. Nurses have an important role in detection and prevention of potential and actual medication errors promoting positive patient outcomes (Benner et al, 2002)

1.1 PROBLEM STATEMENT

The type and frequency of errors in the administration of drugs is a reflection of the quality of the nursing care system (Barker & Allan, 1995).This means that drug administration procedure if carried out right, one would be right to assume that nursing care is generally sound. Furthermore, according to Armitage and Knapman (2003) nurses spend 40% of their time doing drug administration which is a significant amount of time dedicated to one procedure in delivery of care by nurses. It would therefore be apt if the procedure for administration of medication was

done in the right manner given the trust patients put in medication for the healing of their ailments. However, in the course of carrying out these procedures, nurses may be forced by some factors to ignore set standards. These factors maybe within or outside nurses' control.

The problem of non adherence to set drug administration guidelines by paediatric nurses has been attributed to these shortfalls. In a study done in Singapore on quality assurance on the administration of medication by nurses in neonatal intensive care unit ,non compliance with the standard practice of medication administration by paediatric nurses was shown to be common (Raja et al, 2009). In addition, health workers surveyed in a study in Tanzania were also found to rarely adhere to guidelines for integrated management of childhood infections leading the researcher to recommend a paradigm shift to focus on the reasons for health worker non adherence to guidelines (Walter et al, 2009). A study conducted at KNH on determination of the daily nursing procedures performed to children, drug administration was established as one of the procedures carried out on a daily basis (Makworo, 2010). Makworo (2010) also established that oral drug administration procedure as set out in the Kenya Nursing Council Manual was not adhered to by all the nurses observed. The researcher's experience, having worked in the paediatric medical wards in Kenyatta National Hospital (2003-2009) is that there have been perpetual complaints on the decline in the quality of nursing care, especially on drug administration in several meetings attended prompting the hospital management to start looking for ways of addressing the problems. Nurses working in the hospital have also anecdotally alleged that medication administration procedure in children is challenging. Key informants (doctors and nurse managers) at KNH pediatric wards have also expressed concerns over general decline in standards of nursing care especially medication practice.

The concerns raised by these studies require solutions and lay the basis of my study. In my literature search no published study was found to have been conducted on factors influencing quality management of medication in children by paediatric nurses in Kenya. This study is aimed at determining the factors which could hinder or enhance the achievement of quality management of medication to children probably impacting negatively or positively on their health. Ultimately the goal of the study is to contribute in mitigation of the reported nursing errors attributed to drug administration and improve the quality of drug administration by the paediatric nursing staff in KNH.

1.2 STUDY JUSTIFICATION

This study is being conducted at a time when the burden of disease in Kenya is reported to be on the increase. While the increased disease burden may not entirely be attributed to medication administration practice by paediatric nurses alone, studies have shown that lack of proper medication management including treatment and non compliance may play a significant role in the development of resistance of micro organisms to available medications.

Paediatric nurses work in complex environments. They take care of their primary patients the children and secondary patient the family. Understanding the complexity of delivering pediatric nursing care is essential for making changes that effectively promote the health worker environment especially in pediatric department. To achieve the intended outcomes of healthy work environments (quality care, safe patient outcomes and nurse satisfaction), it is important that attention is directed to factors that complicate or support the paediatric nursing work. Literature search did not find any published study conducted on factors that influence proper management of medication by paediatric nurses as an aspect of quality care in Kenya despite information pointing to drug administration problems in government institutions including KNH.

Understanding the factors that influence pediatric nurses' delivery of care including drug administration practice is an important step towards improvement of the quality of drug administration. This allows clinical paediatric nurses and administration systems to eliminate situations that promote errors and to incorporate changes that minimize them, creating a safer patient environment.

1.3 RESEARCH QUESTIONS

1. What are the nurse characteristics that enhance quality medication management?
2. What challenges do nurses encounter when administering medication to children?
3. To what extent are patients/ caregiver involved in drug administration by paediatric nurses?
4. What are the patients /caregiver characteristics that influence drug administration?

1.4 STUDY BENEFITS

It is hoped the study findings will enhance adherence to the six rights of drug administration and to the laid down procedures of medication administration. This will lead to health preservation through quality pediatric care. The results also will provide reference material for evidence - based practice, nursing education and will be used to strengthen drug administration policies. It is also presumed that adherence to drug administration procedure will minimize wastage of drugs.

1.5 OBJECTIVES

1.5.1 Main objective

The study sought to determine factors influencing quality management of medication to children aged 0-5 years by nurses at Kenyatta National Hospital medical paediatric wards.

1.5.2 Specific objectives

1. To determine nurse characteristics that influence quality medication administration in children.
2. To assess the awareness of the standard medication administration procedures by nurses in accordance with the Nursing Council of Kenya standard guidelines.
3. To evaluate the environment within which nurses administer medication to children.
4. To determine the role of caregiver in medication administration practice.
5. To establish the challenges encountered by nurses during medication administration procedures.
6. To determine patient/caretaker characteristics that influence quality medication administration in children.

1.6 HYPOTHESIS

Quality management of medication by nurses is not related to nurses' demographic factors, experience and level of education.

1.7 STUDY ASSUMPTIONS

The study had the following assumptions:

That after reading through the consent form; the respondents would appreciate the importance of the study and respond to the questionnaire with honesty.

That the sampled number of respondents would be met within the stipulated time of the study.

1.8 THEORETICAL FRAMEWORK

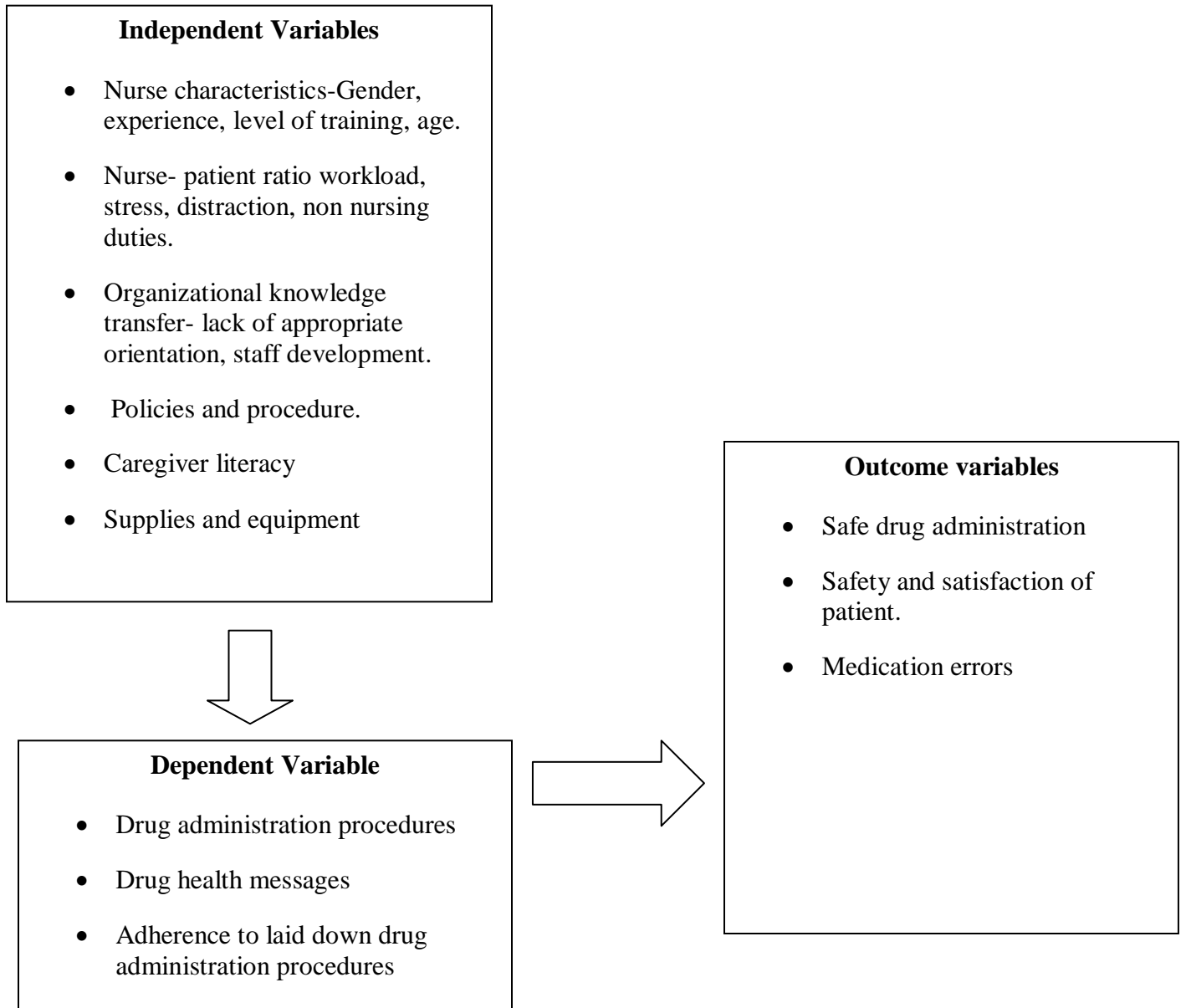
This study was based on the Casey partnership model (1988). The model is based on the philosophy that the best people to care for the child is the family with the help from various professional staff. It comprises of five concepts of child, family, health, environment and the nurse. The focus of the model is on working in partnership with children and their families. It emphasizes the concept of family centered care to ensure Childs needs are met within the family set up.

Based on this model the nurse gives professional support to the already existing family systems of care in order to strengthen them. Nurses are called upon by their duty to create relationships that enhance and prepare the children for care. Families have the principal caregivers' role as they spend most of their time caring for the children whether sick or well. According to Bolster and Manias (2010), to ensure a person centered care is applied to medication activities, nurses should undertake ongoing assessment of patients needs in relation to their medication and encourage opportunities for increased patient participation. According to this model, the nurse should provide teaching and support to children and families to enhance partnership formation and promote the right of children to have caregivers accompany them during hospitalization and treatment. How well these caregivers are involved in the planning of care of the child in the hospital determines whether the care at home especially concerning administration of drugs on discharge are given correctly and minimizes cases of children readmission to hospitals as a result

of lack of adherence to the best practice of medication management. Furthermore, nurse abilities and readiness to develop therapeutic relationships with the patient increase medication safety and protects patients from potential adverse events (Popescu et al. 2011).

Nurses' characteristics of level of education, experience relate positively with better outcomes of care for the patient (independent variables). Caregiver characteristics like the social economic status, level of education provide a basis upon which a partnership of care can be launched and therefore ensure patient safety (outcome variable) is maintained through better communication as the relationship is mutual. A positive attitude of the nurse, caregiver and child in drug administration ensures that all aspects that could harm the child are addressed as understanding of all is upheld.

Fig 1.1 Conceptual framework



CHAPTER TWO: LITERATURE REVIEW

2.1 QUALITY HEALTH CARE

Quality health care can be more exactly described as striving for and reaching excellent standards of care. It involves assessing the appropriateness of medical tests and treatments and measures to continually improve personal health care in all fields of medicine. Quality care is safe, effective, patient centered, timely, efficient and equitable (Hughes 2008)

Quality health care is achieved through accreditation or inspection standards that ensure that proper procedures are put in place and followed. It also ensures that medical records are continuously reviewed in order to assess the effectiveness of treatments or procedures. Improving patient care is the driving force behind standards and regulations in quality health care. In the context of the Kenyan quality model, a conceptual framework for quality healthcare improvement in Kenya, quality is defined as totality of features and characteristics of the Kenyan health system that relates to its ability to satisfy a stated or implied health need. It goes further to state that quality improvement as a process among others entails improvement on adherence to standards and guidelines (Okeyo & Adelahardt 2003). Standards and guidelines are set to ensure patient safety is ultimately upheld. In keeping with this goal Kenyatta National hospital in 2007 launched a service charter to promote a partnership between the staff and the patients for provision of quality health care (KNH 2007). As one of the obligation in this charter, patients are supposed to receive treatment in a courteous, compassionate and attentive manner with attention to detail by the nurses.

In drug administration, quality is to be realized if standards are followed and safety of the patient guaranteed. This is through delivering the drugs safely by ensuring medication administration

guidelines set by relevant bodies are adhered to. Poor quality will therefore include failure to deliver the drug as required by the guidelines and thereby resulting in undesirable outcomes ranging from adverse drug reaction, failure of the drug to act accordingly leading to a likelihood of exacerbation of the illness and even as a result leading to death. Cox (2000), envisages a situation where nurses maintain a duty of care by upholding safe and appropriate nursing interventions in pursuit of quality drug use. She continues to argue that whilst legislation and nursing standards offer principles and parameters for such interventions they cannot provide directives and thus remaining the nurses sole responsibility to understand the factors that influence medication management to attain best practice on the patients behalf.

2.2 MEDICATION MANAGEMENT

Effective medicines management means putting the patient at the centre of care and ensuring patients are better informed with care targeted at the point of delivery through maximizing the use of resources and making better use of professional skills and knowledge. (Courtenary & Griffiths 2010).

Courtenary and Griffiths (2010), continue to observe that by appropriately managing the safe administration of medicines, nurses are key to improving patient satisfaction, reducing unwanted effects of medication and preventing hospital admissions. For quality medication management, policies and procedures that align with legislation and system controls that support safe and effective medication administration must be present. Watts (2003) sums up medication management as administering medication safely and efficiently, assessing and monitoring the effects of medication, interdisciplinary collaboration, and finally evaluating desired and undesired effects of medication.

Lack of adherence to medicine regimes can be detrimental to hospitalized patients and it is therefore important to apply the principles of medicines management to address inappropriate and ineffective use of medicines at all times (Courtenary and Griffiths 2010). Healthcare professionals have a duty of care to patients and this includes all aspects related to the administration of medication. Paediatric nurses have extra duty requiring them to be more vigilant furthermore they take care of 'delicate' beings. They must be able to justify their decision-making and must work within professional codes of conduct. Healthcare practitioners especially nurses should focus on areas of medication use process that would have the greatest impact including complete patient information, accurately communicating drug information and properly educating patients (Grissinger and Kelly 2005) . Grissinger and Kelly (2005), note that through sharing of information and improving the patient education process, health care practitioners should play more active role in medication error reduction activities by working together as a team towards the goal of improving patient safety. Staffs who undertake the administration of drugs must ensure that they follow the guidelines and standards for this task set by their employer.

Where patients require a third person to help with the administration of their medicine like happens in paediatrics, it is the responsibility of the health professional (paediatric nurse) to ensure that the directions as laid down by the prescriber have been understood. Though it is the patients' right to determine who will administer the medication, the prescriber and/or health professional (nurse) involved in the patients care has a duty to ensure that any information required to ensure the safe administration of the medicine is provided and understood. Failure to do so could result in harm and if a patient decides to take legal action, the health professional's practice could be brought into question.

In spite of both professional and organizational standards to guard the patient against harm, the number of medication errors remains a significant problem in our healthcare systems.

2.3 RIGHTS OF MEDICATION ADMINISTRATION

Guidance to nurses and midwives on medication management guide of 2007 in United Kingdom (An bord altránais, 2007) provides guiding principles for medication management that each nurse/midwife should adhere to in their delivery of care related to medicinal products. It is noted in the guide that the prescription or medication order should be verified that it is correct, prior to administration of the medicinal product. Clarification of any questions regarding the prescription/medication order should be conducted at this time with the appropriate health care professional. The expiration date of the medication should be checked prior to administration noting that expired medications should not be administered.

In addition, there are five rights of medication administration that should be applied for each patient/service user as indicated in these guidelines,

The right medication:

This involves matching the prescription/medication order against the label of the dispensed being aware of look-alike and similar sounding medications; in this case best practice indicates using generic names of medications whenever possible.

The right patient/service-user:

The nurse being certain of the identity of the individual who is receiving the medication by checking the medical record number and/or identification band and asking the patient/service user to state her/his name. It is important to confirm the name and age as a means of ensuring the correct identity.

The right dosage:

Nurse ensures the dosage is appropriate based on age, size, vital signs or other variables and whenever necessary to measure the dose (e.g., liquid form) ensuring the appropriate equipment is used.

The right form:

Ensuring that the correct form, route and administration method of the medication are as prescribed. If this information is not indicated on the prescription or on the label of the medication, it should be clarified with the prescriber.

The right time:

Ensuring the correct timing, frequency and duration of the prescribed order

The timing of doses of medications can be critical for maintaining specific therapeutic blood-drug levels (e.g., antibiotics) and avoiding interactions with other medications

Accurately documenting medication administration times.

Accordingly, the guidelines recommend that student nurses/midwives may administer medicinal products under the supervision of a nurse/midwife noting that the registered nurse/midwife retains accountability for the administration of medicinal products.

The five rights as enumerated here are not exhaustive. There have been several studies which have come up with more rights. Some schools of thought have it that there are six rights of medication while others have come up with seven rights of medication. For example Elliott and Liu (2010), have proposed nine medication rights viz- Right patient, Right documentation,

Right drug, Right action, Right route, Right form, Right time, Right response, Right dose. According to this review, following 'the medication rights' is a guarantee to patient safety when

medication is being administered by nurses. The feeling among scholars is that a more comprehensive list of 'rights' should be developed to ensure patients benefit from improved management of medications by nurses taking care of patients.

Despite the Rights of medication administration being championed as the best way to ensure patient safety, it has been argued that the five rights (5R's) should only be accepted as goals of the medication process and not the only way to medication safety. Smeltzer (2007) ,vice president of the institute of safe medication practice in the USA, wrote that the 5R's were only merely stated goals or desired outcomes of safe medication practice that offered no procedural guidance on how to achieve the goals. She continued to write' thus simply holding healthcare practitioners accountable for giving the right drug to the right patient in the right dose by the right route at the right time failed miserably in ensuring patient safety. Concluding that adding a sixth, seventh or eighth right was not the answer either'. From this argument therefore it is apparent that much more needs to be addressed if the patients' safety is to be ensured. It should also be an eye opener to the nurses that medication administration is not merely the interpretation of a prescription but that nurses should be well versed with the patient's condition to be able to detect any wrong prescriptions before a wrong drug is administered. For example, a patient with psychosis may be prescribed anti arrhythmic drug, following the 5R's the nurse administers the drug to the patient compromising the patients' safety though the right procedure of medication administration will have been followed.

The Nursing Council of Kenya has come up with a procedure entirely capturing the aspects of proper medication administration. The procedure for medication as per NCK entails:-

- Explanation of the procedure to the patient
- Washing of hands

- Identification of the patient(reading name of patient, patients number, confirming by calling patients name)
- Reading through treatment sheet and noting drugs that are due for administration according to time and date.
- Noting any contraindications, side effects, drug reaction and drug interactions.
- Reading the prescription against the containers, noting the dosages on the prescription and on the container.
- Calculating the amount of drug to be administered.
- In the case of liquid medicines, removing the cork cap and pouring drug in medicine measure.
- Measuring medicine at eye level.
- Using separate container for each different mixtures
- Taking the medicine to patient and checking the dose, date and time against the prescription before giving it to the patient.
- Confirming again the right patient by name before giving the medicine.
- Making sure the patient swallows the medicine in his or her presence.
- Recording all the drugs in the patients' notes and in drug register.
- Leaving the patient in a comfortable position.

2.4 MEDICATION ERRORS

Medication administration can be a complex procedure if done without guidelines. Care should be taken to ensure that medicines are delivered safely. The lapses which can occur if caution is thrown to the wind can be of serious consequences even leading to death (Gorman 2003). These lapses which may be construed as non adherence to laid down procedures contribute to the

growing statistic of medication errors. Frequency of errors occurring during drug administration is high but the errors are rarely reported (Stratton et al, 2004). Drug administration has been said to be among the most delicate procedures carried out by nurses. When it comes to children the propensity to err while administering drugs to children is three fold that of adults (Kaushal et al, 2003). Gladstone (1995) in her study demonstrated that drug administration was one of the highest risk areas of nursing practice and that error or negligence on the nursing personnel may jeopardize safety of the patient.

Though a core procedure in paediatric nursing, oral medication seems to draw little attention towards its propensity as a route through which errors might occur. The notion is that parenteral medication is more prone to errors than any other of drug administration. This information is corroborated by a study done in Ethiopia in which of the 89.9 % medication administration errors identified, 90.8% occurred with intravenous medication while 8.2 % were due to oral medication. (Feleke &Girma 2010). All medications administration procedures should be treated as potential areas of error and therefore done with care.

Children's care is more demanding and engaging especially when it comes to medication. Their inability to inform the nurse of a wrong drug being erroneously administered and their bodies' incompetence to handle "big" margins of error are considerations that are paramount when engaging drug administration procedure for children. Some scholars have argued that the likelihood towards adverse drug effect is higher in children than adults (Stratton et al, 2004). Even with these findings, administration errors have been found to be common in pediatrics prompting Ghaleb et al (2010), to recommend that causes and extent of medication errors needed to be explored in the local setting and improvement strategies pursued.

2.5 FACTORS THAT INFLUENCE NURSES' PERFORMANCE DURING MEDICATION.

To maximize health and wellbeing is the primary goal of nursing care and so nurses work towards optimizing the quality of people's lives (Wilson2009). This is the foundation on which the nurse quest to be able to deliver quality care to the patients should be based. Studies show that there are challenges which might jeopardize the delivery of patient care by nurses in the desired manner. Included among the challenges are aspects to do with increase in nurse patient load, bed occupancy rate, unstable patients' condition, non nursing tasks correlating positively with perceived patient outcomes as Kandari and Thomas (2009) and Dickson et al (2010) found out. The problem of workload and the way it influences nurses' delivery of quality care is clearly illustrated by this study. This is not a problem unique to Kuwait but in many other developing countries. Nurses though might be tempted to argue that shortcomings in their delivery of nursing care is solely attributable to high patient load which might be misplaced. This study seems to imply that adverse patient outcomes are to be attributed to the factor of high patient numbers but other factors which were not explored here might be involved.

Meurier et al (1997), listed lack of knowledge or information, work overload, stressful atmosphere and lack of support from senior staff as being the contributing factors leading to error. Many nurses are reluctant to admit their ignorance when it comes to understanding some aspects of paediatric nursing care. Nurses continue giving care without getting updated on the latest trends in all aspects of nursing including medication management. Most drug preparations are made with the adult patient in mind and so paediatric nurses are called upon to ensure they get updated on aspects to do with childrens' medication. In Kenya some medications have been withdrawn from childrens' management like Nimesulide, a Non steroidal anti-inflammatory drug

which was withdrawn as an analgesic for children in Kenya. Also anti-cough syrups in the Kenyan markets, experts warn should be cautiously used. Some of these aspects must be kept in mind by paediatric nurses as they take care of their patients.

According to Karen and Maralyn (2006), factors such as distraction, interruptions, and registered nurse to patient ratios were shown to be the most commonly selected reasons for medication errors compromising the goal of achieving quality service delivery. The policy matters cannot be left out of the care of the paediatric patient. Paediatric patient is taken care in the presence of the caregiver who plays the significant role of taking care of the child. Paediatric nurses in essence take care of the child and the caregiver together. However the other members of the family must be involved in the care. The hospital administration regulates the visiting hours for the relatives. Though this might not be popular; it should be done but in a way that does not affect the care given to the patient. Though this might be the case, nurses still face the challenge of visitors interrupting the care especially medication administration through distraction and this might lead to medication administration errors and therefore influence quality administration of medication negatively (Stratton et al, 2004).

Anooshen et al (2008), added a different dimension in their findings showing that nurse practice errors result as consequence of appointment of unsuitable working shift(long shift hours, successively work shift),human resource management insufficiency(fewer nurses and more patients) or lack of proper attention of nurse to patient ratio. The Working shifts have been shown to be an area of contention by nurses and their supervisors. Long working hours have been shown to affect output and accuracy. The best balance must be struck between nurses and supervisors to ensure the quality delivery of care by nurses.

Allocation of time plays a role in the way nurses work. Nurses might find the time allocated to deliver services inadequate and thus find themselves rushing through procedures. Paediatric nurses attitudes and practices on medication administration according to Davis et al (2005) were influenced by accessibility of information, time constraints and professional conflicts. Professional conflict though an area downplayed, may have a significant role to play as a factor that influences medication administration negatively. Not much has gone to the study of this owing to the clearly defined roles of the several cadres of nursing in the developed world where most studies seem to have been carried as opposed to the set up in Africa and especially Kenya where the roles are not clearly defined. Demotivation might arise from these conflicts and might impact unfavorably to the clientele in our country. Further to these problems the hospital facilities seem to have lagged behind in terms of improvement to match the population growth. The health facilities are stretched beyond their capacity and nurses have to do with what is available to meet their patients' needs. The delivery of care is definitely affected by these environmental factors. Paediatric wards admit many patients and medication administration must be done prudently to ensure all patients get their medication on time and in an appropriate manner.

Though these studies have shown some commonalities, for the realization of better patient outcomes it is apparent that there are pertinent issues that affect nurses' performance and need to be addressed to ensure nurses' level of satisfaction with their service delivery is increased and patients' safety realized. The studies also show incongruence as to what nurses perceive to be the most important factors that affect their performance and increase the chances of errors occurring. When paediatric nurses take care of children, caregivers must come into play. Caregivers cannot therefore be ignored and play a significant role in the nurse plan to care for the young. Lau et al

(2010) sees care givers life experience and self confidence as assets that facilitate medication management and so their experience should be utilized. However caregivers negative emotional states, low literacy levels, other competing responsibilities are seen as barriers to medication management (Lau et al 2010).

2.6 NURSING AND MEDICATION EDUCATION

Nursing level of training has been correlated positively with better care and better patient outcomes. Needleman et al (2002), in their study noted that higher proportion of hours of nursing care provided by registered nurses and a greater number of hours of care by registered nurses per day were associated with better care for hospitalized patients. Since patients/ guardians are likely to continue medication at home, it would be good if they got the best from the nurses doing things right. They learn medication administration from what the nurses do and what nurses teach them. It therefore follows that the people tasked with medication administration and education to patients and guardians should be well prepared in pharmacology. In UK, a study to assess nurses perception of their pharmacology educational needs, nurses were found to have limited understanding of pharmacology and dissatisfied with the teaching of pharmacology (King 2004). This begs the questions, are nurses adequately prepared to handle medication management and are our patients in safe hands when it comes to drugs management by nurses?

Drug management by nurses goes beyond interpretation of a prescription. The nurse should be well prepared in basic pharmacology which includes-: drug absorption mechanisms, the metabolic action of the liver, method by which substances are transported in the blood stream and the excretory function of the kidney (Downie et al, 2008). They should also be well versed with the drugs common indications, dosage and side effects to primarily anticipate any

eventualities and be early in intervention. Lapses may occur due to ignorance and therefore lack of knowledge or information could lead to medication error (Meurier et al, 1997).

Nurses should therefore be prepared adequately especially in this era of globalization to tackle medication management comfortably. Jordan (2002) commends that empowering nurses to address 'care gaps' in medication management may benefit the service users. Furthermore professional development programmes are important as they raise the morale and general improvement in patient care in the hospital (Kemp&Tindiweigi 2001)

CHAPTER THREE: METHODOLOGY

3.0 MATERIALS AND METHODS

3.1 STUDY AREA

The study was carried out in paediatric medical wards at Kenyatta National Hospital (KNH). KNH is situated along Hospital road off Ngong road in Nairobi, Kenya. It is the largest teaching and referral hospital in East and Central African region. Administratively, KNH has 50 wards, 22 out-patient clinics, 24 theatres (16 specialised) and Accident & Emergency Department. Out of the total bed capacity of 1800, 209 beds are for the Private Wing. Sometime, the average bed occupancy rate goes to 300%. In addition, at any given day the Hospital hosts in its wards between 2500 and 3000 patients. The hospital paediatric department has four general medical wards, newborn unit, paediatric emergency unit, oncology paediatric ward and a paediatric outpatient clinic. The idea of conducting the study was mooted by the fact that KNH has the largest pediatric inpatient capacity in the region. Time and budget constraints also played a role in my decision to carry out the study in the four KNH paediatric medical wards.

3.2 STUDY DESIGN

This is a descriptive cross sectional study. Questionnaires, observation checklist and interview guide, were used to collect both qualitative and quantitative data.

3.3 STUDY POPULATION

The study population composed of nurses working in medical paediatric in-patient wards and caregivers of children under the age of 5 years admitted in the paediatric wards at the time of the study. There were 100 nurses working in these wards during the time of the study.

Table 3.1: Number of nurses per medical paediatric ward in KNH

WARD	3A	3B	3C	3D	TOTAL
NURSES	25	25	25	25	100

Table 1 showing the distribution of nursing staff across the four paediatric medical wards in KNH.

3.4 STUDY VARIABLES

3.4.1 Independent variables

- Adherence to drug administration procedures
- Nurse demographic characteristics-education, experience, age, gender
- Nursing work characteristics-workload/Nurse patient ratio, burn-out, non-nursing duties/competing tasks
- Nurses' attitude
- Work environment-space, supplies, equipment
- Caregiver education level.

3.4.2 Dependent variable

- Administration of medication
- Health messages/instruction on medication

3.4.3 Outcome variable

- Adherence or non adherence to laid down procedures of drug administration.
- Safe drug administration
- Safety and satisfaction of patient.
- Medication errors

3.5 INCLUSION CRITERIA

Participants were included in this study if they meet the following criteria:

- Qualified nurses who had worked in the paediatric ward(s) for more than three months and who consent to participate in the study.
- Were willing to voluntarily participate in the study.
- Caretakers of children less than five years old admitted in a paediatric medical ward and who consent to participate in study.

3.6 EXCLUSION CRITERIA

Participants were excluded from this study if they meet the following criteria:

- Did not consent to participate in the study.
- Student nurses.
- Caretaker of children aged over five years.

3.7 SAMPLE SIZE DETERMINATION

The following formula as per Mugenda and Mugenda (2003) was used to calculate the minimum sample size.

Formula: $n = Z^2 pq/d^2$

n=desired sample size (target pop. $\geq 10\ 000$)

Z=standard normal deviant at 95% confidence interval.

p= expected population correlation coefficient (in this case set at 50 % (large effect size) since no study has been done on these subjects).

$q = 1 - p$

d = precision level set at 0.05

Calculation

$$n = (1.96)^2 (0.5) (0.5) / (0.05)^2$$

$$= 384$$

Since the target population is less than 10 000 an adjustment using the following formula was done as per Fisher's formula.

$n_f = n / (1 + (n/N))$ where ; n_f is the desired sample size when population is less than 10 000.

n is the desired sample size when population more than 10 000.

N is the estimate of population size.

$$\text{Calculation } n_f = 384 / (1 + (384/100)) = 384 / 4.84$$

Desired sample size = 79.33 or = 80 participants

80 nurses sampled.

Sample size calculation for the patients/caregivers.

Since as per KNH records there are an average of 80 patients/ day per ward. The average number of patients in the four wards was taken as 320.

n the desired sample size was calculated using this formula. $n = Z^2 pq/d^2$

$$\text{Thus } n = (1.96)^2 (.5) (.5) / (.05)^2 = 384$$

$$nf = 384 / 1 + (384 / 320) = 384 / 2.2 = 179.5$$

180 caretakers were sampled.

3.4 SAMPLING METHOD

Stratified random sampling method was used. A list of nurses was obtained from the Assistant Chief Nursing Officer (ACNO) in charge of pediatric department and formed the sampling frame. The list was stratified according to each ward (stratum). Since the number of nurses in every ward was known, proportionate allocation was done using the formula:-

$$\left[\frac{n_1}{N_2} \right] nf$$

Where:-

n_1 = number of nurses in each ward

N_2 = Total number of nurses in the Paediatric Wards

nf = minimum sample size = 80

Thus: $25/100 * 80 = 20$

Simple random sampling was used to select nurses using the following criteria from each stratum. Each wards list was numbered from one to twenty five. Small papers with numbers one to twenty five wrapped, put in a container and shuffled. One wrapped paper was picked from the container one at a time without replacement until 20 papers were picked. The corresponding names of nurses to the numbers written on the 20 papers picked randomly were included in the study. All nurse supervisors working in the medical paediatric wards were purposively included in the study.

Caretakers of children admitted in the wards were also stratified according to the wards their children were admitted. The wards were visited after every two days post admission. Admission records from the records office were used. The children were allocated numbers as per the admission register starting from one to the last. All caretakers of children allocated even numbers were purposively selected to participate in the study. The ones who did not meet the selection criteria were replaced. The process was repeated in every ward until the desired number was achieved.

3.9 DATA COLLECTION

3.9.1 Data gathering instrument

A semi structured researcher-administered questionnaire was used to collect data from pediatric nurses (appendix V). A second questionnaire (appendix VI) was used to collect information from care givers. Nurse supervisors were interviewed using an interview guide (appendix VIII). Medication administration review tool (appendix VII) was used to assess environment, policy/guidelines and medication administration procedures and therefore the quality of medication management by nurses in the paediatric department. The medication review tool was

prepared and modified based on the Nursing Council of Kenya (2009) procedure for medication administration

3.9.2 Pretesting the instrument

Study instruments were pretested in KNH surgical paediatric ward among eight nurses and sixteen caregivers. The pretesting was done to check for the tools' validity and reliability. The nurses' and caregivers' comprehension of the questions was also assessed and necessary adjustments made for ease of data collection. Revision and refinement of the tools was done by the principal investigator in consultation with the statistician.

3.9.3 Selecting and training of research assistants

Two research assistants were recruited and taken through two days training which included study protocol, data collection tools, data collection procedures and ethical issues. The research assistants were also trained on how to check tool for completeness. Close supervision and support was accorded to them by the principal investigator to ensure quality data was collected during the period.

3.9.4 Data collection procedure

Data from the nurses was collected through researcher-administered interviews using the questionnaires. For the caregivers, data was also collected using a face- to-face interview and recorded on the semi-structured questionnaire. The principal investigator conducted in-depth interviews with the nurse supervisors. The proceedings of the interview were recorded in writing.

3.10 DATA PROCESSING AND ANALYSIS

Data cleaning was conducted prior to analysis. Any implausible values or data entry errors noted during data cleaning were corrected after validation with the original questionnaire. All questionnaires completed were entered into a Microsoft Access database containing range and consistency checks to reduce errors during data entry. A statistician was engaged in data analysis in consultation with the researcher.

All qualitative interview data was transcribed, and cleaned by the researcher. The data was then coded for themes and analyzed for patterns, similarities and contrasts. These were reported as text narratives.

All quantitative data analysis was conducted using SPSS (version 16). In the descriptive analysis the characteristics of nurses were analyzed separately from those of caretakers and their children. The mean and standard deviation of nurses' age was calculated. Age was also presented in 10-year age categories and presented in frequency tables along with the nurses' gender, professional qualification and years of experience working as a nurse. Caretakers' and children ages were also summarized by calculation mean age and standard deviation. Age distribution for both caretakers and their children were presented along other demographic data including caretakers' marital status, gender, education level and occupations and child's diagnosis.

Following the univariate descriptive analysis of sample characteristics, drug administration practices were summarized. Quality management of drug administration was calculated as a composite measure of adherence to NCK drug administration guidelines and knowledge of drug administration tested using case studies. Nursing factors associated with quality management of medications were identified by comparing drug administration practices with nurse

demographics using Fisher's exact tests to adjust for the cells with expected frequency of five or less. The chi square test was used when all cells in tables had expected frequencies of five or more. A benchmark of 0.05 was used to determine the statistical significance of all examined associations. Open ended questions were summarized based on frequency of responses related to different challenges in administering drugs. Findings of observation of drug administration within the ward environment were also summarized and described across the four paediatric wards.

3.11 PRESENTATION OF RESULTS

The data generated are presented in bar graphs, pie charts, and tables.

3.12 ETHICAL CONSIDERATIONS

Ethical approval to conduct this study was sought and granted by the KNH Ethics and Research Committee (KNH-ERC) and also the Ministry of Higher Education, National Council for Science and Technology (NCST). Permission to carry out the study in KNH was granted by the hospital administration. Confidentiality was ensured by not inserting names of participants on the questionnaires. Paediatric nurses, nurse managers and caregivers involved in the study were informed about the study and asked to give a written informed consent (appendix III or IV) before providing any information to the investigator. Research assistants were trained about ethical issues in research and any coercion or undue inducements to the study participants was not allowed.

3.13 LIMITATIONS OF THE STUDY

This study was carried out in KNH, a teaching and referral hospital may not be reflective of situations elsewhere in the country as circumstances may differ due to availability of resources

and therefore generalizing the findings may not be appropriate. Some parts of the questionnaire contained some information the respondents considered sensitive and may have hesitated to give a true picture for fear of victimization. However this was overcome by ensuring confidentiality as names were not entered in to the questionnaires and any information from the respondents was held in confidence.

3.14 TIME FRAME

The study has taken duration of twelve months from (November 2010 to November 2011)(Appendix 1).

3.15 STUDY BUDGET

The study was conducted at an estimated cost of Kshs. 105,060.00 (Appendix II).

CHAPTER FOUR: RESULTS

4.0 Study sample

This study sample composed of a total of 260 participants (n = 80 nurses, and n = 180 caretakers) and their characteristics are summarized below according to type of participant. All the participants sampled were interviewed.

4.1 Demographic characteristics of study participants

4.1.1 Nurses

Table 4.1 below summarizes the demographic characteristics of the sampled nurses working in paediatric wards at Kenyatta National Hospital (KNH). Out of 80 nurses, 70 (87.5%) were female resulting in a male-to-female ratio of 1 male: 7 female nurses.

The mean age of nurses was 39.4 years (SD +/- 7.7). The modal age group was 30-39 years and accounted for 34 (42.5%) of participants, followed by nurses aged 40-49 years representing 29 (36.25%) of nurses.

Half of the nurses (50%) participating in the study were (Kenya Registered Community Health Nurse (KRCHN) 22 (27.5%) were Enrolled Community Nurse (ECN). Kenya Registered Nurse/ Midwife (KRN/M) and graduate nurses (Bachelor of Science Nursing) each constituted (n = 9, 11.25%) of the participants in this study.

Table 4.1: Demographic characteristics of nurses in paediatric wards

	Frequency (%)
Age (in years)	
20-29	6 (7.5)
30-39	34 (42.5) ⌚
40-49	29 (36.25)
50 and above	11 (13.75)
Gender	
Female	70 (87.5) ⌚
Male	10 (12.5)
Professional qualification	
ECN	22 (27.5)
KRCHN	40 (50.0) ⌚
KRN/ M	9 (11.25)
BScN	9 (11.25)
Years in nursing practice	
Less than 5 years	8 (10.0)
5 to 9 years	14 (17.5)
10 to 15 years	25 (31.25)
Above 15 years	33 (41.25) ⌚
Total	80 (100)

⌚ Modal age group (30-39 years) =34 nurses, 87.5 % female, KRCHN most nurses (50%).

4.1.2 Caretakers'

Table 4.2 below represents the demographic characteristics of the principal caregivers interviewed in this study. Majority 179 (99.4%) of the interviewees were female and only one male caretaker participated in this study. The mean age of the caretakers was 27.7 years (SD = 5.8) with a range of 18 to 47 years. Caretakers 140 (77.8%) were married and 31 (17.2%) were either single or divorced.

Approximately half 90 (50.6%) of the caretakers had attained primary level education while a further 64 (35.6%) had secondary level education. Majority of these caretakers were not in employment with 125(69.4%) reporting that they were unemployed and 36 (20%) failing to disclose their occupation status.

Table 4.2: Demographic characteristics of caretakers of children admitted to paediatric wards

	Frequency (%)
Age (in years)	
15-19	7 (3.9)
20-24	44 (24.4)
25-29	63 (35) ®
30-34	40 (22.2)
35 and above	26 (14.4)
Gender	
Female	179 (99.4) ®
Male	1 (0.6)
Marital status	
Married	140 (77.8)
Single/ divorced	31 (17.2)
Other	9 (5.0)
Education level	
No formal education	2 (1.1)
Primary	91 (50.6) ®
Secondary	64 (35.6)
Tertiary	23 (12.8)
Employment status	
Employed	19 (10.6)
Not employed	125 (69.4)
Missing	36 (20.0)
Total	180 (100)

® Caretakers modal age 25-29 (35%), Gender- most female 99.4%, Education level majority primary (50.6).

4.1.3 Children

A total of 178 (98.9%) children had their biological mothers accompanying them. Two children accounting for 1.2% of the sampled population were accompanied by the father and grandmother as shown in table 4.3 below. The children's mean age was 12.3 months (SD = 13.1) and with age range of 6 days to 59 months. A total of 117 (65%) children were infants. Other children (20%) were aged between 12 and 23 months. Majority 144 (80%) of the children stayed in hospitals for a period of between 1 day and 7 days.

Table 4.3: Characteristics of children admitted to paediatric wards

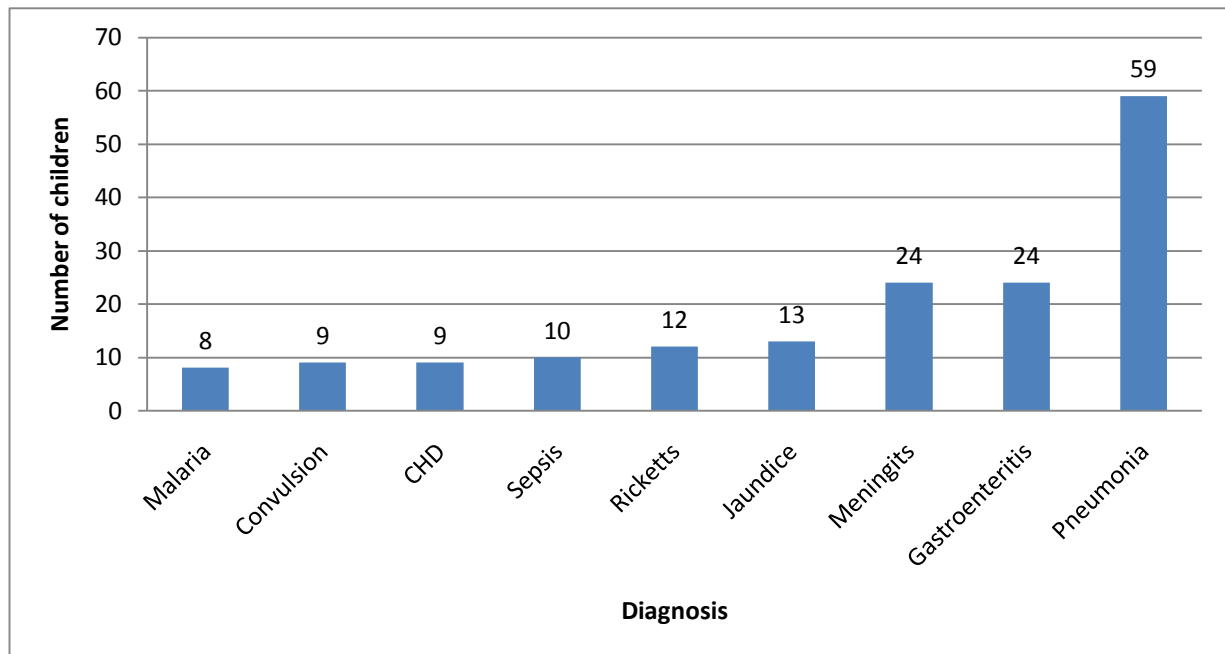
	Frequency (%)
Age (in months)	
0-11	117 (65.0) ®
12-23	36 (20.0)
24-35	14 (7.8)
36-47	7 (3.9)
48 and above	6 (3.3)
Relationship with caretaker	
Mother	178 (98.8) ®
Grandmother	1 (0.6)
Father	1 (0.6)
Length of hospital stay	
1-7 days	144 (80.0) ®
8-14 days	24 (13.3)
15 days and above	7 (3.9)
Missing	5 (2.8)

® age most infants (65%), caretaker mother (98.8%).

4.2 Disease conditions of children admitted in pediatric wards

The commonest diagnosis among the admitted children was pneumonia diagnosed in 59 (32.8%) children. gastroenteritis 24 (13.3%), meningitis 24 (13.3%), jaundice 13 (7.2%), rickets 12 (6.7%), and neonatal sepsis 10 (5.6%). Figure 4.1 below lists the disease conditions.

Fig 4.1: Disease conditions of children in pediatric wards

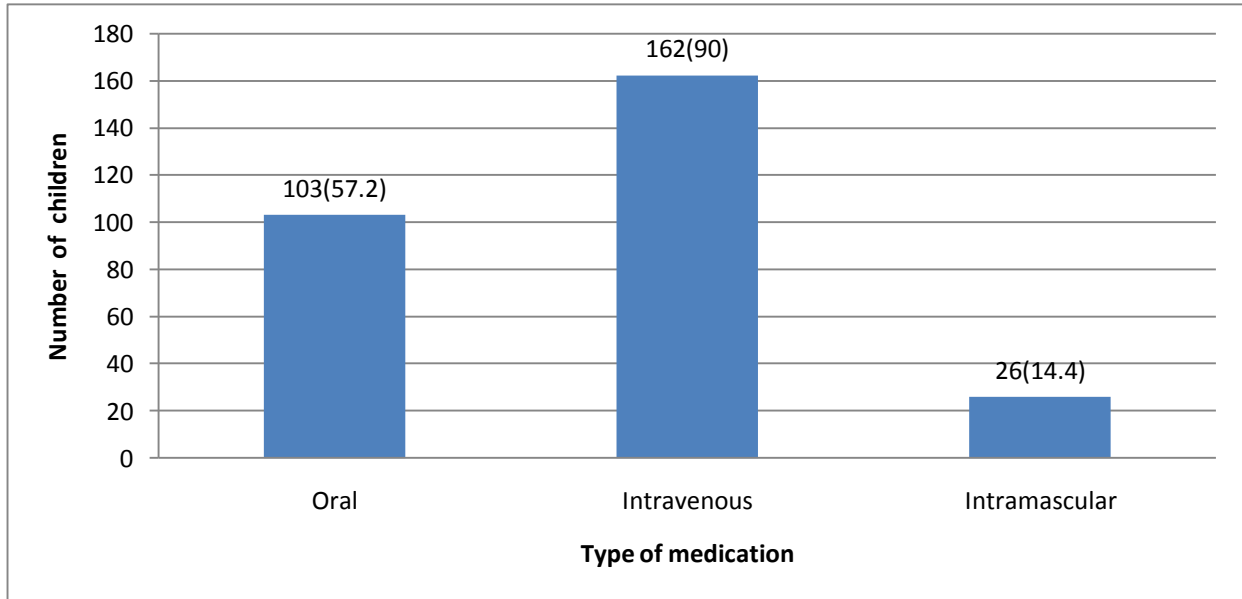


most n=59 children had Pneumonia, gastroenteritis and meningitis was in n=24 children respectively.

4.3 Routes of medication administration to children in pediatric wards

Figure 4.2 below shows most children 162 (90%) were receiving intravenous medication and more than half 103 (57.2%) received oral medication. Twenty six (14.4%) of the children were on intramuscular medication.

Fig 4.2: Routes of medication administration to children in pediatric wards



Majority of children (90%) on intravenous medication while 57.2% on oral medication.

4.4 Nurses characteristics that influence quality medication administration in children

4.4.1 Relationship between nurse factors and rating of Nursing Council of Kenya guideline application.

The nurse factors were compared with nurses own rating of the drug administration procedure using chi square tests. This is presented in Table 4.4 below. There were no statistically significant associations between nurse characteristics and their application of drug guidelines. Half of male 5 (50%) and 54% of female participants reported their application of guidelines as ‘very well done’ or ‘well done’ (Fisher’s exact $p = 0.92$). Regarding age, between 50% and 67% of the participants in the various age groups rated their guideline application as ‘very well done’ or ‘well done’ (Fisher’s exact $p = 0.99$).

As shown in Table 4.4, there was no significant association between professional qualification (Fisher’s exact $p = 0.93$), nursing experience (Fisher’s exact $p = 0.59$) or experience in paediatric

nursing (Fisher's exact $p = 0.73$) and the application of NCK drug administration procedure guidelines.

Table 4.4: Nurses' factors and rating of Nursing Council of Kenya guideline application

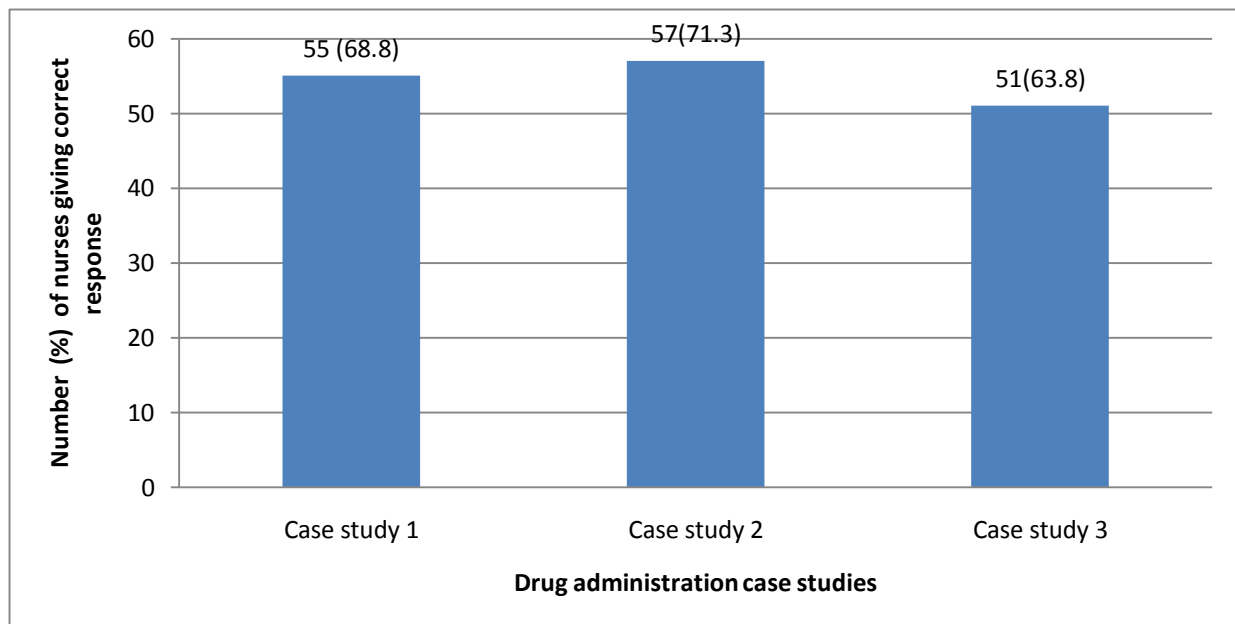
	Very well/ well done	Other rating	χ^2	Fisher's exact p value
Age (in years)	Frequency (%)	Frequency (%)		
20-29	4 (67)	2 (33)	0.62	0.92
30-39	17 (50)	17 (50)		
40-49	16 (55)	13 (45)		
50 and above	6 (55)	5 (45)		
Gender				
Male	5 (50)	5 (50)	0.06	0.99
Female	38 (54)	32 (46)		
Professional qualification				
ECN	13 (59)	9 (41)	0.60	0.93
KRCHN	21 (52)	19 (48)		
KRN/ M	4 (44)	5 (56)		
BScN	5 (56)	4 (44)		
Nursing experience				
Less than 5 years	5 (63)	3 (37)	1.90	0.59
5 to 9 years	7 (50)	7 (50)		
10 to 15 years	11 (44)	14 (56)		
Above 15 years	20 (61)	13 (39)		
Pediatric nursing practice				
Less than 3 years	12 (50)	12 (50)	1.41	0.73
between 3-6 years	14 (48)	15 (52)		
6- 10 years	12 (63)	7 (37)		
More than 10 years	5 (63)	3 (37)		

Reported level of guideline use was not related to nursing characteristics gender, professional qualification, nursing experience p value =0.99, 0.93, 0.59 respectively.

4.4.2 Medication administration case studies and the nurse response scores

Figure 4.3 presents findings of three case studies covering areas of acute treatment of severe malaria (case study 1), intravenous cannula care (case study 2), and nurse attitude (case study 3). Fifty one (63%) of the participants responded correctly in each of the three areas. Thirty-three (41.25%) participants gave correct responses in all three areas and 22 (27.5%) responded correctly to at least two of the three areas.

Fig 4.3: Participants responses on medication administration case studies



Good response scores to the case study scenarios case 1(68.8%), case2 (71.3%), case3 (63.8) responded correctly.

4.4.3 Association between the scores on the medication administration case studies and participants profiles

Nurses' scores of the case studies were compared with the participants' profiles. The association between scores on the medication administration on case studies and the participants' profiles are shown in Table 4.5. High scores on the case studies showed statistically significant association with the number of years that a nurse had worked in the pediatric ward (Fisher's exact $p =$

0.018). One (5%) of the participants who had worked in the paediatric ward for 6-10 years had scored lowly on the medication administration scenarios compared to 12(41%) and 8(33%) of the participants who had worked in pediatrics for between 3-6 years and less than 3 years, respectively. Four (50%) of the participants reporting having worked in pediatrics for over 10 years also scored highly.

The reported frequency of CMEs attendance was also significantly associated with the participants scores on drug administration case studies (Fisher's exact $p = 0.02$). Twenty six (84%) of the participants who reported attending CMEs quarterly had high medication administration case study scores compared to $n=5$ (16%) who scored lowly.

Table 4.5: Nurses' characteristics and responses to medication administration case studies

	High score	Low score	χ^2	Fisher's exact p value
Age (in years)	Frequency (%)	Frequency (%)		
20-29	4 (67)	2 (33)	2.63	0.48
30-39	25 (74)	9 (26)		
40-49	17 (59)	12 (41)		
50 and above	9 (82)	2 (18)		
Gender				
Male	6 (60)	4 (40)	0.007	0.72
Female	41 (70)	29 (30)		
Professional qualification				
ECN	18 (82)	4 (18)	3.53	0.321
KRCHN	24 (60)	16 (40)		
KRN/ M	6 (67)	3 (33)		
BScN	7 (78)	2 (22)		
Nursing experience				
Less than 5 years	5 (62)	3 (38)	1.39	0.71
5 to 9 years	8 (57)	6 (43)		
10 to 15 years	18 (72)	7 (28)		
Above 15 years	24 (73)	9 (27)		
Pediatric nursing practice				
Less than 3 years	16 (67)	8 (33)	8.71	0.018 [Ⓢ]
between 3-6 years	17 (59)	12 (41)		
6- 10 years	18 (95)	1 (5)		
More than 10 years	4 (50)	4 (50)		
CME frequency				
Monthly	4 (44)	5 (56)	7.06	0.02 [Ⓢ]
Quarterly	26 (84)	5 (16)		
Not held	22 (59)	15 (41)		

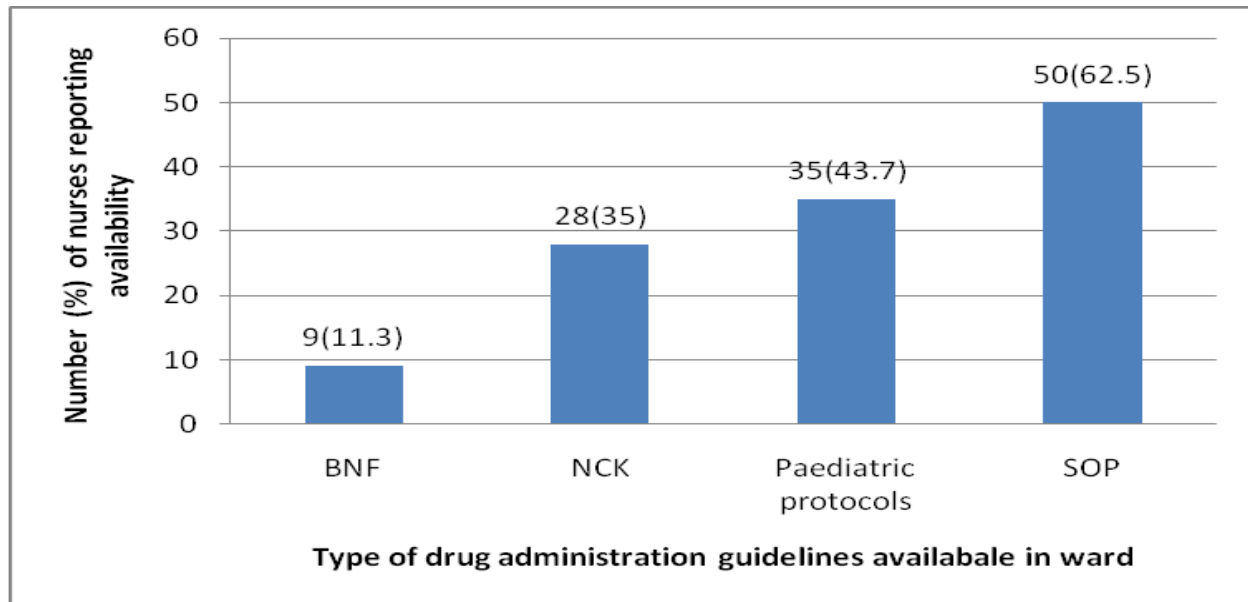
[Ⓢ] Paediatric nursing experience (p <0.018) and CME frequency (p<0.02) associated with quality medication administration.

4.5 Awareness of Standards of medication administration in pediatric wards

4.5.1 Availability of medication administration guidelines in pediatric wards

Nurses 71 (88.7%) reported that medication administration guidelines were available in the wards and 9 (11.3%) nurses reported that the guidelines were not available in their wards. Figure 4.4 below shows the type of guidelines that nurses reported as being available in the wards. The most commonly available medication administration guidelines were standard operating procedures these guidelines designed by the hospital to domesticate procedures whose availability was reported by 50 (62.5%) of all nurses, followed by paediatric protocols (guidelines on management of childhood illnesses) 35 (43.7%) and Nursing Council of Kenya guidelines 28(35%). The guidelines and other reference material were commonly placed in the nurse in-charge's office, drug cupboard or acute room. This means that the guidelines were easily accessible to all the nursing staff.

Fig 4.4: Medication administration guidelines availability in pediatric wards



Availability of guidelines SOP most common (62.5%), NCK reported by (35%)

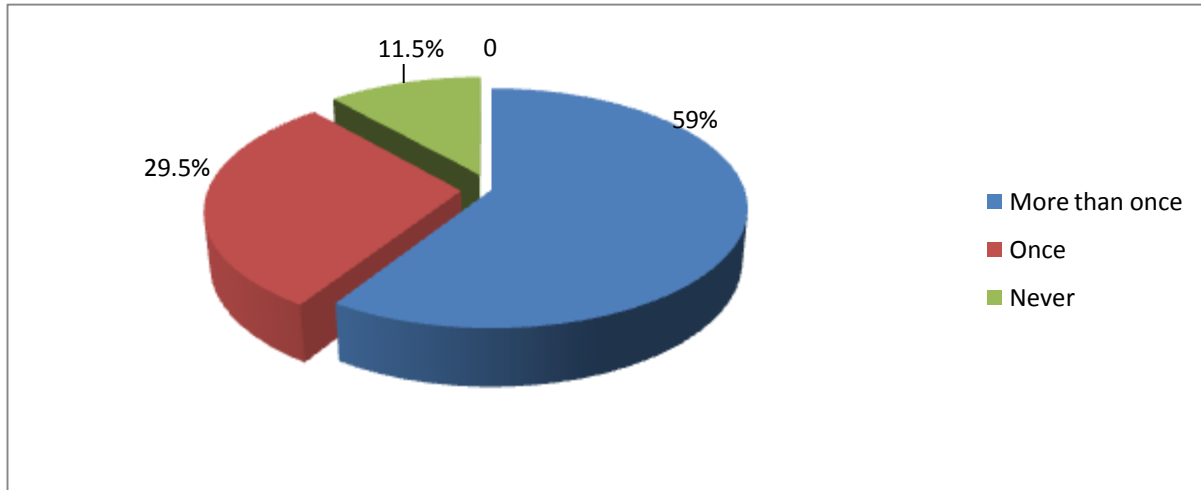
Key:

- I. BNF-British national formulary
- II. NCK-Nursing Council of Kenya
- III. SOP-Standard Operating Procedure

4.5.2 Utilization of medication administration guidelines by study participants.

Figure 4.5 below shows 47(59%) nurses reported that they had referred to the medication administration guidelines more than once in the past three months while 9 (11.5%) had not made any reference during the same period.

Fig 4.5: Self-reported frequency of guideline use in the past 3 months by participants' in paediatric wards



59% use of guidelines reported.

4.5.3 Relationship between medication administration guidelines use and participants' paediatric nursing care experience

The medication guideline use was compared with nurse paediatric experience. Use of medication administration protocols was found to be significantly associated with the length of nursing experience in paediatric care ($p = 0.015$). The more recently recruited nurses were less likely 5 (14%) to use protocols compared to those who had stayed in paediatrics for longer (Table 4.6).

Table 4.6: Relationship between use of medication administration guidelines and participants’ pediatric nursing experience

Type of guideline	Experience in years <3yrs	Experience in years 3-5yrs	Experience in years 6-10yrs	Experience in years >10yrs	χ^2	P value
NCK						
Yes	9(32)	9(32)	8(29)	2(7)	1.04	0.816
No	15(29)	20(38)	11(21)	6(12)		
SOP						
Yes	11(22)	23(46)	11(22)	5(10)	6.51	0.084
No	13(43)	6(20)	8(27)	3(10)		
Protocols						
Yes	5(14)	14(40)	13(37)	3(9)	10.08	0.015 [†]
No	19(42)	15(33)	6(13)	5(11)		
BNF						
Yes	1(11)	4(44)	4(44)	0	4.23	0.27
No	23(32)	25(35)	15(21)	8(11)		

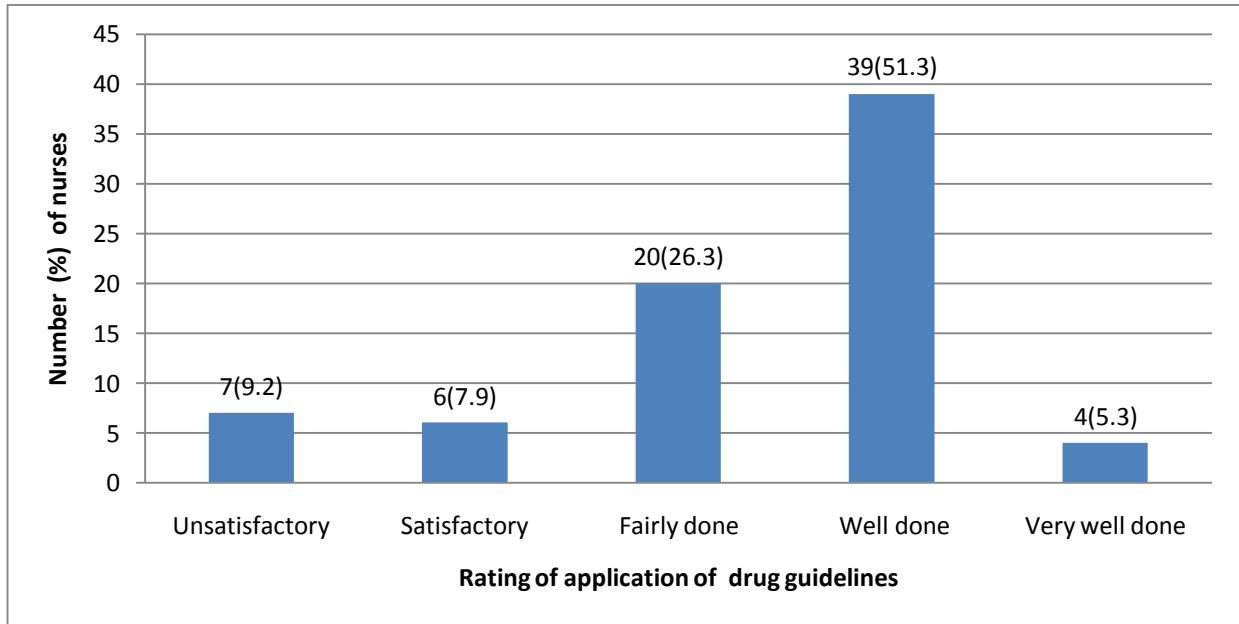
[†] Protocol use associated with length of pediatric nursing experience (p<0.05).

4.5.4 Rating of nurses’ application of Nursing Council of Kenya (NCK) medication administration guidelines

Figure 4.6 below shows participants’ self reported level on their application of medication administration guidelines based on a Likert scale. Participants were asked to report their application of medication administration procedure in relation to the NCK guidelines as unsatisfactory, fairly done, satisfactory, well done and very well done. Approximately half (n=39) of all the participants reported that they applied the NCK guidelines as ‘well done’ during

routine medication administration. Twenty participants (26.3%) said that they applied these guidelines ‘fairly well’ and less than 10% reported ‘unsatisfactory’ adherence. Only four participants (5.3%) rated themselves very highly (as very well done).

Fig 4.6: Self rating of nurses’ application of NCK medication administration guidelines



Self reported level of NCK medication guideline use ‘well done’ n =39, ‘very well done’ n=4.

4.5.5 Quality of Medication administration by study participants in the paediatric wards

Throughout the period of data collection the principal investigator was an engaged observer of nurses’ roles, attitudes, and practices, while keeping detailed field notes to supplement data collected through study questionnaires based on the medication review tool (appendix VII). The medication review tool was prepared and modified based on the Nursing Council of Kenya 2009 procedure for medication administration. A convenient sample of two participants in each ward was observed while administering medication to children. The two sampled participants were observed either administering oral or parenteral medications.

Ten areas were used to assess the process of medication administration based on the medication review tool. None of the ten areas were implemented consistently across all the four wards. The indicators implemented in at least three of the wards were: treating patients and caregivers with respect at all times, getting consent before administering medication, recording medication immediately after administration.

However, the following practices were not adhered to: documenting reasons for withholding or discontinuing drugs and other difficulties followed by communication of the same to other members of the health care team. The exact time during which treatment was given was not commonly recorded and treatment plans were not incorporated into nursing care plans. Lastly, patient privacy was also not observed during treatment procedures.

4.5.6 Nursing care model use during medication administration by nurses

Majority 49 (61.25%) of the participants utilized primary nursing care while 18 (22.5%) used team nursing when administering medication. Functional nursing was reported to be used by only 3 (3.75%) participants as illustrated in table 4.7 below. Most of the participants (90%) thought that primary nursing was the most appropriate care model when administering medication to children. Six (7.8%) participants preferred team nursing and only one reported preference for functional nursing.

Table 4.7: Nursing care model use during medication administration at KNH paediatric wards.

	Frequency (n)	Percent (%)
Nursing care model		
Primary nursing care	49	61.25
Team nursing	18	22.5
Functional nursing	3	3.75
None	10	12.5

Usage of care model: 49 nurses used primary nursing while 10 reported nil usage or left it blank

4.6 Environment within which drug administration was taking place in the pediatric wards

The environment within each of the four wards was inspected for its adequacy for drug administration. A medication administration review tool (appendix VII) which had been prepared by the researcher for the purpose of this study after literature review was used. The findings of these observations showed the following:

4.6.1 Physical environment, equipment and supplies

Findings on physical environment, equipment and supplies were validated by comparing them to responses from 4 nurse managers in charge of the four wards which are the subject of this study. The nurse managers had worked in the paediatric wards for an average of 3.1 years. Thus their responses were considered reliable. Ward space in all the four wards was insufficient for the number of admissions, and space was also inadequate for specific treatment procedures as also reported by nurse managers. With the exception of one ward, there was no reasonable space for receiving visitors. Across all the wards, basic drugs were available but not at all times. The equipment used by nurses during medication was noted not to be adequate across the wards. These included trays, trolleys, drip stands, nebulization kits, drug measures and infusion sets. All the nurse managers reported that there was inadequacy of space for the high number of patients/caregivers and this hindered the administration of medication appropriately. The nurse managers reported that the wards were designed to accommodate forty two patients going by the bed capacity. Most of the wards according to hospital documents reviewed by the researcher had over eighty patients each day. The managers also reported the supply of some essential drugs was erratic; some drugs were even missing. Medication equipment was said to be inadequate, of concern to all was lack of a refrigerator for storage of drugs and trolleys for medication administration were reported as missing. Nurse Managers were of the view that if resources were available the work would be simplified. “Our nurses are adequately prepared on medication administration given the opportunity and resources they can be able to deliver the best”

All the wards were found to be clean. The wards also had secure and ideal storage for medication and potentially dangerous drugs were stored safely out of patients’ reach under lock and key.

4.6.2 Policy and guidelines

There were major deficiencies observed with regard to policy implementation and drug guidelines within the paediatric wards at KNH. This was also reported by nurse managers. Out of the nine indicators of policy and guideline implementation considered by the researcher, six were missing across all the four wards. These missing items were: written step-by-step directions for drug administration, guidelines on management of drug side effects, written policy on continuing staff education, internal audits of medication use, guidelines on treatment administration documentation and reporting of medication errors or unsafe medication.

The aspects of policy which were partially implemented included: unusual incident reporting in three out of the four wards, nurse manager also reported discussing with the nursing staff any difficulties encountered in the course of drug administration.

4.7 The role of caretaker in medication administration practice

4.7.1 Nurse - Caretaker interaction during medication administration

Participants(93.8%) commonly reported that they involved caretakers in the medication administration process mainly through instructing them on medication and at times involving them in identifying the child, ensuring patients take and retain drugs, and monitoring for side effect of medications. Most participants 75 (93.8%) reported that they gave instructions concerning medication to caretakers. The frequently reported areas of instruction were: side effects of treatment reported by 50 (62.5 %), oral drug administration 15 (18.8 %) and compliance 9 (11.3 %).

4.7.2 Role of caretakers in drug administration

Nurses and caregivers were asked to report on what they perceived to be the role of the caregiver in medication administration as illustrated in Table 4.8 below. Both caretakers and nurses mentioned that caretakers' roles included actual oral drug administration, encouraging child to take medication and monitoring for side effects. The table also shows that there were differences in nurses' and caretakers' perceptions of the role of the caretaker during medication administration. Most 134 (74.4%) caretakers considered administration of drugs based on nursing instruction as their key role while majority 45 (56.3%) of nurses reported that the main role of caretakers in drug administration was encouraging the child to take medication.

The second most important role according to majority 116 (64.4%) of caretakers was encouraging children to take medication followed by keeping medication for the child 36(20%), a role which was not mentioned by the nurses. Although 14 (17.5%) nurses expected caretaker roles to include monitoring for adverse drug effects, only 3 (1.7%) caretakers considered that to be their role.

Table 4.8: Reported roles by caretakers versus nurses perceptions on caretaker role

Caretaker's role in drug administration	Frequency as reported by:	
	Caretaker	Nurses
	(n = 180)	(n = 80)
Administering oral drugs after instruction from nurse	134 (74.4)	19 (23.7)
Encouraging child to take medications	116 (64.4)	45 (56.3)
Keeping medication for the child	36 (20)	-
Monitoring child for side effects	3 (1.7)	14 (17.5)

Major caretaker role reported by nurses (56.3%) encouraging child to take medication. Majority (74.4%) of caretakers reported administering oral drugs after instruction from the nurse.

4.7.3 Caretakers' satisfaction with drug administration

Thirty-seven (19.6%) caretakers reported that nurses sought consent from them prior to administering medication to their children. Overall, majority 131(81.4%) of the caretakers reported that they were satisfied with the way nurses administered medications to their children. The specific reasons that caretakers reported as having satisfied them included the sensitivity of nurses to their childrens' problems 124(68.9 %), clear medication instructions 60(33.3 %) and nurses politeness 46 (25.6 %).

4.8 Challenges in medication administration in KNH paediatric wards

Participants frequently reported encountering various challenges during drug administration (Figure 4.7). The most common challenge reported by the majority 72(90%) of all the participants was workload related to high number of admission in the ward followed by language

barrier 45(56%). Absence of paediatric drug formulations posed a significant challenge to majority 44(55%) of participants in their efforts to administer medications. Other reported challenges were multiple tasks 17(21%), lack of support 16(20%) and limited physical space 15 (19%).

Fig 4.7: Challenges in drug administration reported by nurses in paediatric wards

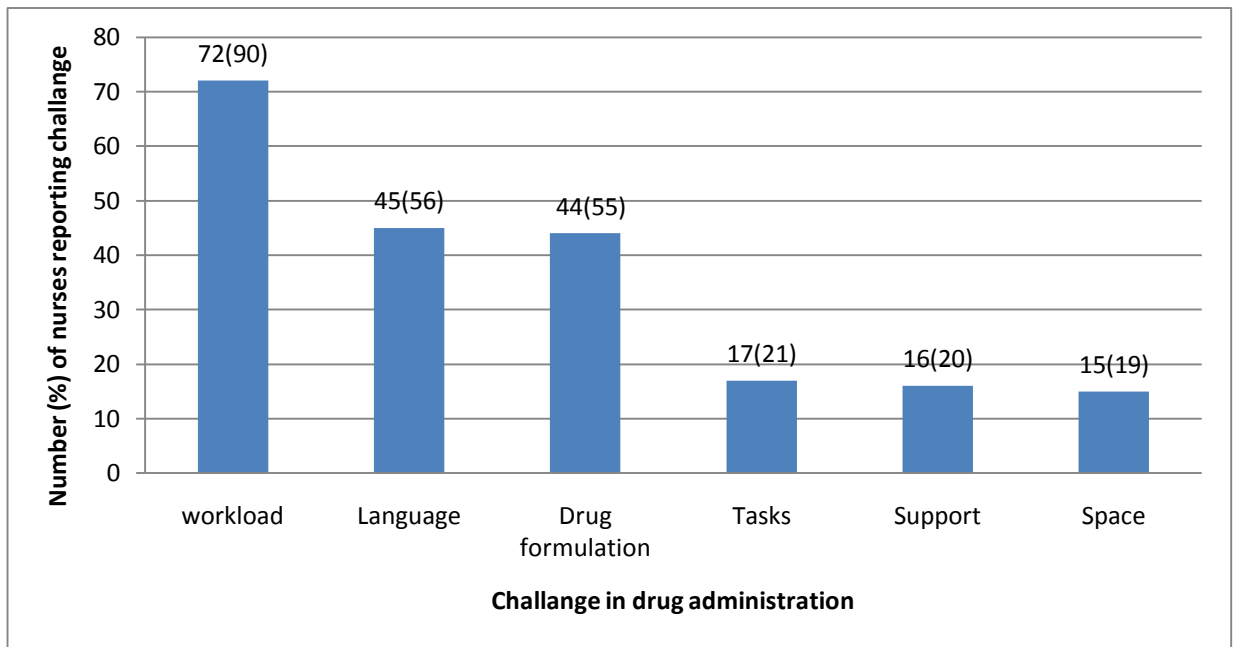


Figure 4.7 represents challenges to quality medication administration, majority (90%) reported workload, 56% language barriers and 55% paediatric drug formulation..

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This chapter discusses the main findings of the study whose main objective was to determine the factors influencing quality management of medication to children aged 0-5 years by nurses at Kenyatta National hospital medical paediatric wards. Casey's partnership model was adopted as a framework within which factors that influence quality medication management could be understood and identified. The model as applied in this study identifies concepts of environment, child, family, health and nurse interplay as they influence quality medication management.

Results of the study showed quality of medication management was influenced by nurse characteristics of paediatric experience and attending Continuous Medical Education (CME) on medication management. Challenges to quality medication administration were reported to be workload, language barriers and paediatric drug formulations availability. The major role of the caretaker/family was identified as encouraging the sick child to take medication.

5.1 Demographic characteristics of the respondents

5.1.1 Nurses characteristics

In any profession, the blending of different ages across the spectrum is important as it ensures continuity of service provision. According to the findings of this study, the age was not normally distributed. The mean age for the nurses who participated in this study was 39.4 years (SD =7.7). The modal age was 30-39 years. This indicates a bias towards the older age in the Kenyan nursing profession suggesting need for employment of more nurses who are being trained to ensure that the profession is perpetuated across the age spectrum and thus guarantee continuity.

This finding is not different from what Riley et al, (2007) found in their report on developing a nursing database in Kenya, where it was reported that most of the nurses were between 30 and 49 years. In addition it is not lost on the fact that the profession of nursing is dominated by female nurses as attested by the findings of this study. Of the nurses recruited to this study (87.5%) were females and the rest male resulting in a male to female ratio of 1:7. Riley et al, (2007) also found out that the ratio of male to female nurse in Kenya compared favorably with the findings of this study. In the United States of America (USA) the male nurses' population is estimated to be 5.9% (Schoffner 2006). These paltry male nurse populations have been attributed to stereotypes associated with nursing being perceived as female work. These barriers should therefore be addressed to check the trend.

This study found out that Fifty percent of the participants were KRCHN and (27.5%) were ECN. This contradicts what Riley et al, (2007) found indicating significantly higher number of the ECN nurses than that of KRCHN nurses. However, the insignificant number of ECN nurses in this study could be explained by the fact that Nursing Council of Kenya the body that regulates nursing in the country has been advocating for holders of certificate in nursing (ECN) to upgrade to diploma certification and this could be bearing fruit. In addition, this could be explained by institutions adopting a policy of only employing diploma nurses to avoid incurring more expenses in facilitating conversion of certificate nurses to diploma through the nursing upgrading programmes.

5.1.2 Caretakers characteristics

Out of one hundred and eighty caretakers interviewed for this study, there was only one male. This implies that the mothers of the children are the primary caregivers and the need for fathers to be involved in the family centered care still needs emphasis. Fathers' role has traditionally

been associated with being the sole provider of the family as breadwinner but this preoccupation is shifting making them more accountable to the family's health. Furthermore, fathers' involvement in childcare has been shown to have a positive influence on child social behavior, psychological outcome and general wellbeing (Ball, Mossele & Pedersen 2007). In the case of this study the father's role seems to have been downplayed in healthcare provision. The presence of one father in the care of these children is a worrying trend. Fathers' involvement in the care of the child can therefore be probably described as the missing link between healthcare improvement and the disappointing statistics of child morbidity and mortality in the country. This is informed by the fact that both parents are supposed to be involved in the positive reinforcement of good health habits in the family as envisaged in the partnership model the theory on which this study was based. The emphasis on the involvement of the male care giver however cannot be the only way to improve health care and therefore the role of the mother in child care should not be negated. The high number of mother caregivers can be taken as a positive implication on medication education by nurses to the caregivers and the likelihood of continuity of care at home upon the child's discharge is almost guaranteed. Further, Studies have also consistently indicated a positive correlation between education attainment and health behavior and attitudes (Nuru et al, 2010). In this study 86.2% of the caretakers had attained primary education, an indication of fairly literate group of caretakers as they compare favorably with the national statistics which are reported in Kenya Demographic Health Survey (KDHS 2008/09). This shows that the nurses can easily engage the mothers in a positive health behavior change for the benefit of the child.

Lack of employment has a lineage to poverty and has a negative influence on child health and development (Aber & Benette 1997, Malat & Hyan 2005). Majority of caretakers (69.4%) in this

study reported that they were not employed. The correlation between health and poverty brought about by unemployment could therefore negatively influence the health of the children. However, this high level of unemployment contradicts KDHS (2008/09) report which reported that majority of females in urban areas as being in employment. The high level of unemployment which corresponds to lack of resources therefore calls for the pediatric nurse to be vigilant and advocate for prescription of affordable drugs to children especially if the hospital /institution is unable to provide for the medication.

5.1.3 Childrens' characteristics

The population targeted by most of the Kenya Ministry of Health children's programmes is 0-59 months. The children sampled in this study were within the range 6 days to 59 months, a more or less similar group as targeted by the Ministry of Health in Kenya. This study can therefore be taken as an audit to some of the ministry's initiatives. For example, the most common diagnosis of the admissions was Pneumonia (32.8%) of the children. This might have informed policy in Kenya's Ministry of Public Health and Sanitation to start the pneumococcal vaccine for children less than one year in February 2011. The gains though might not yet be deduced from this study owing to the short duration of time the vaccination has been ongoing. Further Pneumonia and gastroenteritis feature prominently in the Integrated Management of Childhood Illnesses (IMCI) strategy as the leading causes of mortality among children less than five years of age (WHO 2005). This study has shown that pneumonia and gastroenteritis are the leading causes of morbidity among children admitted in KNH pediatric wards. Findings on the common diagnosis are also supported by previous studies. Mengei et al, (1995) found that malaria, pneumonia, gastroenteritis and measles mostly afflicted children admitted to Eldoret District Hospital. This study also agrees with Muluneh et al, (2007) who also found out that most of the admissions to

Tikur Anbessa Hospital in Ethiopia were due to pneumonia while other admissions were mainly due to Meningitis, Sepsis, and Heart disease. Quality management of medication is important in order to reduce morbidity and mortality due to these diseases.

5.2 Medication administration mode

The fact that most of the medication errors are reported to occur during intravenous drug administration (Husch et al 2005, Feleke & Girma 2010) could be explained by the fact that most paediatric inpatients are on parenteral drugs. This agrees with findings of this study as most children (90%) were receiving drugs through the intravenous route. Slightly more than half of the children (56.2%) were receiving their drugs orally. Only (14.4%) children were receiving their drugs intramuscularly. The insignificant number of intramuscular injection augurs well with the principle of atraumatic care. Atraumatic care advocates for the minimization of the child separation from family, identification of child/family stressors, minimization/prevention of pain, and promoting parent-professional partnerships (Whaley & Wong1995). In regard to pain minimization, the hospital has adopted this philosophy in the management of pediatric patients by advocating for intravenous and oral routes of medication. These findings however contradict Furdon, Pfeil & Snow, (1998) finding in a review of pain management practices in Albany Medical Center, New York Neonatal intensive care unit which demonstrated underutilization of atraumatic care philosophy in the care of the neonates. This shows the advocacy for this philosophy as a way of minimizing stressors to children should be encouraged and continued as shown by results of this study.

5.3 Nurse factors influencing quality management of medication

5.3.1 Association between nurse characteristics and guideline application

There were no statistically significant associations between nurse characteristics of age, gender and professional qualification in relation to the application of medication guidelines according to the findings of this study. Of interest, use of paediatric drug administration protocol was found to be significantly associated with the length of nursing experience in pediatric care ($p = 0.015$). Recently recruited nurses were less likely to use the protocol compared to those who had stayed in pediatrics for longer. The apparent association between experience and protocol use could be explained by the fact that the more experienced nurses were more familiar with the guidelines or that older nurse conform to norms more aptly. The newly recruited nurses could also have assumed that they were well versed with the guidelines as they had recently learned their use in school.

The findings of this study agree with those reported by Togan and Imam, (2000) who showed that there was a correlation between experience and application of quality standards among neonatal nurses. This indicated that those with more years experience applied standards of quality care more aptly than the newly qualified nurses. Conversely findings of this study point to a more complex approach to the application of the guidelines in drug administration. Implications from this study are that the application is not just based on nurse characteristics but rather on a host of other issues including system issues of availability of the guidelines and appropriate support systems like training and proper communication.

5.3.2 Association between (scores of) the drug administration (case studies) and nurse characteristics

This study hypothesized that quality management of medication is not related to nurses' demographic characteristics of age, experience and level of education. However, high scores on the case studies showed statistically significant association with the number of years a nurse had worked in the paediatric ward (Fisher's exact $p=0.018$). This finding therefore enables the rejection of null hypothesis to the extent of experience and adoption of the alternative hypothesis. Working in an area for a significant period of time creates interest and expertise in the area of operation and increases competence in delivery of care. Among the nurses who participated in this study, one nurse (1.25%) was found to have been trained in paediatric nursing. Further, the one nurse who had been trained in paediatric nursing had significant high score in the case studies presented in this study. The indication here is the emphasis on specialization and deployment of nurses in their area of specialization. Nurses should be left to choose the areas they want to work in and allowed to remain in their area of expertise as this can improve on the quality of care given to the patients.

Reported frequency of CMEs attendance was also significantly associated with participants high scores on drug administration case studies (Fisher's exact $p= 0.02$) despite the study findings showing a moderate uptake of CMEs. These study findings emphasize the importance of refresher courses in medication administration. If medication administration CMES were fully embraced, patients would benefit immensely from improved delivery of care. This finding agrees with Koren (2002), Bertshe et al, (2010), who reported that a combination of several initiatives including training of personnel concerned with medication reduced system and human errors occurring in the paediatric department.

5.4 Awareness of the standard drug administration procedures among paediatric nurses

Though majority of the nurses (88.7%) reported medication administration guidelines were available, slightly more than half of the participants reported reference to the drug administration guidelines more than once in the preceding three months. The use of drug administration guidelines according to the findings of this study was therefore moderate. This finding concurs with the report on a study conducted among neonatal nurses in West Bank Palestine where it was reported that the overall applications of standards of quality care on medication management and use were moderate among neonatal nurses (Togan and Imam 2011).

Participants working in the same ward appeared to give different reports on availability of guidelines in the wards which showed some inconsistencies pointing to likelihood that there was lack of proper communication regarding their availability and storage. A small number of participants (11.5%) had not made any reference during the same period probably the number that was not aware of the availability of the guidelines. This study did not look at the reasons why there was this discrepancy although it could be explained by either the nurses' apathy or disinterest in what was happening in the wards. Andersen, (2002) reports that unawareness of procedures, insufficient dissemination of knowledge, and insufficient cooperation and skepticism among those who put drug handling into practice is likely to have an impact on the quality of health care. Nurse Managers should therefore be encouraged to keep on sensitizing nurses on current trends and information necessary to facilitate the delivery of quality care through proper communication channels especially regarding quality medication management, the subject of this study.

Half of the participants rated their application of the NCK guidelines on a scale as ‘well done’ with (5.3%) nurses choosing the highest score ‘very well done’ to the NCK drug administration guidelines. The researcher has used report of the highest score, in this case ‘very well done’ as the benchmark for the best practice in drug administration. It is therefore the researchers thinking that the participants felt generally inadequate in the way they administered the drugs when they rated themselves against the requirement by the Nursing Council of Kenya. Nurses have been shown not to follow medication guidelines during drug administration. In Australia , a study done showed that nurses deviated from best practice guidelines during medication guidelines(Popescu, Currey and Botti ,2011) and that this was a contributing factor to medication errors. It can thus be deduced from these findings that lack of adherence to drug administration guidelines could potentially lead to medication errors in KNH paediatric wards a feature that should be investigated.

5.5 Environment and drug administration

The environment within which medication administration occurs is crucial in determining the safety and therefore quality of medication management. Furthermore, WHO reports that more than three million children less than five years die each year from environment related causes and conditions (WHO 2005). The environment within which medication is administered can be a source of contamination and consequently a source of infection if the principles of infection prevention are not observed. The founder of modern nursing Florence Nightingale believed that healthy surroundings were necessary for proper nursing care (Tomey & Alligood 2002). The environment within which the drugs were prepared agreed with the requirement by the Nursing Council of Kenya as it was clean and drugs were kept in the right place under the right conditions. These findings are not in line with De oliviera and De bortoli, (2007) findings who

found environment within which medication was prepared in two Brazilian hospitals to be in disagreement with the legislation.

A balance has to be struck between resource utilization especially in hospitals where facilities are strained and prioritization of the needs. The findings in this study point to strained facilities with moderate availability of resources (manpower, money and materials) as in most resource constrained settings especially in sub-Saharan Africa. According to Ondimu, (2000) Kenyan hospitals are faced with lack of equipment, drugs and staff. Findings in the current study reemphasize the need to guard against poor quality management of medication through adequate resourcing of the healthcare sector. In that sense, these findings can be generalized to any health region where budget constraints might force less than optimal resourcing especially in Africa.

5.6 Role of caregiver in medication administration procedure

Nurses commonly reported that they involved caretakers in the drug administration process mainly through instructing them on medication. The reported areas of instruction on medication administration were side effects (62.5%), drug administration (18.8) and compliance (11.3%). Findings by Latter et al, (2000) differ from the findings of this study. Latter et al, (2000) describe medical education to patients by nurses as commonly limited to giving simple information as the name, purpose, and colour, number of tablets, time and frequency of administration. The import here is that the caretaker should be presented with information on medication management that helps to ensure that the safety of the patient is upheld.

It can be deduced from this study that most of the interaction between the patient /caretaker and nurses during medication are based on routines rather than individualized patient assessment and management as the patients were on different drugs and their medication needs were obviously

different. This compares well with Bolster and Manias(2010) findings who reported in their study that interactions between nurses and patients during medication was based on what the nurse perceived to be important for the patient and opportunities for the patient participation were not provided. They continued to conclude that for person centered care to be applied in medication activities, nurses should take ongoing assessment of patient needs in relation to their medication and encourage opportunities for increased patient participation.

5.7 Challenges in medication administration

The shortage of nursing staff has been reported as being a hindrance to quality provision of nursing care. Higher nurse staffing is associated with less hospital-related mortality and other adverse events and generally with better patient outcomes (Kane et al 2007, Sasichay, Scalzi & Jawad 2003). In this study the challenge of heavy workload related to high number of admissions in the ward was reported by 90% of all the participants as affecting quality management of medication. This is in line with previous research showing that workload affects safe medication administration (Mohammed & Gabr 2010, Tang et al. 2007). The reasons for the severe shortage of nurses need to be addressed to improve quality in medication management. Kenya as a country suffers from brain drain , loss of revenue and poor quality care in hospitals as a result of nurses going away from the public health sector due to lack of resources which constrains the facilities (Kirigia et al.2006). Nurses' migration to other countries also strains the workforce leading to poorly equipped health facilities unable to offer quality services (Brush & Sochski 2007, Mc Elmurry et al. 2006). Conversely language barrier (56%) and absence of paediatric drug formulations (55%) were also identified by nurses in this study as posing a challenge to safe medication administration. The interpretation here is that the more nurses were busier the more likely they had less time to address the issues of language barrier and hence the challenge. In

addition, adjusting adult drug formulations to fit the children in the face of heavy workload also posed a challenge to the nurses. Previous studies support these results. For example, Skwierczynski & Conroy (2008) reported that the need to manipulate drug to administer to children was common in paediatric wards and that it increased the time taken to administer drugs and this had a likely significant impact on nursing staff resources.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

On the basis of the study findings, the followings conclusions were drawn:

Nurses' paediatric experience (number of years), and relevant continuous medical education attended influence quality in medication administration.

Most (61.25%) of the nurses were aware of the NCK standard administration procedure.

The environment within which medication was administered was not conducive to allow for quality medication administration. This was attributed to overcrowding in the wards outweighing the wards capacity.

The caretakers' role in the paediatric wards is not clear to both the nurses and primary care givers.

Nurses in KNH paediatric wards face various challenges that can affect the quality administration of medication among children which include high workload, language barrier and lack of paediatric formulations among others.

It can be concluded that the environment within which paediatric nurses work while administering medication to children is a complex environment. However nurses should strive to maintain quality by attending relevant training in drug administration. Further, nurses should be trained in pediatric nursing and deployed in pediatric departments. Challenges encountered should be addressed by the hospital administration to ensure quality medication administration is maintained.

6.2 Recommendations

The findings in the study indicate a need for a concerted effort between the stakeholders (nurses, patients/caregivers, hospital management and Ministry of Health) in enhancing quality medication administration in the paediatric wards; this will boost the nurses' professional confidence in delivery of care and minimize errors in drug administration ensuring patient safety and quick recovery from ailments.

The following recommendations stem from the research findings:

1. More nurses be trained in paediatric nursing and deployed to their area of specialization. This will decrease the heavy workload and ensure quality medication administration.
2. Standards of quality care and procedure manuals on medication management should be availed to staff and sensitization seminars held importance of usage regularly. This should also be made available for training in nursing schools.
3. Guidelines on the role of caregivers in the ward and during drug administration should be developed and sensitization done. Nurses should avoid use of medical jargons when passing information to caregivers.
4. A research is necessary on the incidence and implications of medication errors in KNH paediatric wards

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8.0 APPENDICES

APPENDIX I: TIME SCHEDULE FOR THE STUDY

TIME FRAME														
Activity	Month													
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Concept paper	xxx													
Literature review and proposal draft		xxx	xxx											
Forwarding proposal for approval				xxx	xxx									
Correction and forwarding final proposal to KNH-ERC					xxx	xxx								
Questionnaire pretesting						xxx								
Data collection							xxx	xxx						
Data processing and analysis									xxx	xxx				
Report writing										xxx				
Draft report presentation and correction											xxx			
Final report presentation and submission											xxx	xxx		
Thesis defense													xxx	

APPENDIX II: BUDGET

COMPONENT	ACTIVITY	ITEM	UNIT OF MEASUREMENT	UNIT COST(Kshs)	TOTAL AMOUNT(Kshs)
literature review	Library/internet	Transport /lunches	20 days	@250	5000
		Internet charges	30 days	200 /day	6000
	stationery	Foolscaps	2 reams	500	1000
		Pens	30	15	450
		Notebook	5	120	600
		Pencils	6	30	180
		Rubbers	3	10	30
proposal writing		Proposal typing	3 drafts	500	1500
		Printing cost	3 drafts	500	1500
		Photocopy cost			500
Research	Pre-testing	Transport/lunch	2days	250 x3	1500
		Typing and printing	30 copies	50/ copy	1500
	questionnaires	Photocopying	200	15/copy	3000
	Data collection	Transport /lunch	20 days	250 x 3	15000
		2 research assistants	14 days	600	16 800
	Processing/analysis				20 000
Report	Draft	Typing /printing	300	20/copy	4000
		Photocopying	5 copies	300/ copy	1500
	Final report	Corrections/printing	300 pages	10/page	3000
		Photocopy	6 copies	500/copy	3000
		Binding	6 copies	500/ copy	3000
		Transport	30 days	200/copy	6000
Contingencies					10,, 000
Grand Total					105 060

APPENDIX III: CONSENT FORM FOR PARTICIPANTS

I, James Ndambuki, wish to invite you to participate in this research study which seeks to determine how medication administration to children at KNH how can be improved. Over the next month 80 nurses will be included in this non-therapeutic study without discrimination with regards to ethnicity, professional status, socioeconomic status and gender. Since you are already working at this hospital, you have been selected as a possible participant. As a benefit, the environment within which care is provided and the medication care given will be assessed and will provide information that might improve the working environment and improve paediatric nursing care in future.

If you were to participate in the study, you will be required to complete a questionnaire that asks you (1) your demographic data (2) specific questions on issues concerning medication administration and the challenges faced while administering medication to children in the ward.

There is no physical risk associated with this study Participation in the study will be approximately 15-30 minutes. You are free to ask any questions about the study at any time. For any questions on the study, please contact principal investigator on mobile no. 0722653023 or the secretary KNH/UON-ERC on 020-726300-9

Your participation in this study is voluntary (.You are under no obligation to participate). You have the right to withdraw at any time without any victimization. There is no financial cost for participation or non-participation .The study data will be coded so they will not be linked to your name. All information obtained in the course of this study will be held in confidence. Copy of this consent form will be given to you.

I have read this consent form and understood its content. I understand am to rely on the investigator for any information I need concerning the study. I have been given an opportunity to discuss all my concerns with the investigator and therefore accept to participate in the study

Subject's signature Date.....

Investigator.....Date.....

**APPENDIX IV: MAELEZO YA MSHIRIKI KABLA YA KUKUBALI KUSHIRIKI
UTAFITI**

KWA MSHIRIKI,

Kwa majina naitwa James Ndambuki mwanafunzi katika chuo kikuu cha Nairobi na ninasomea digrii ya masta katika uuguzi wa watoto . Kama moja wapo ya mahihitaji katika hii digrii ni kufanya utafiti . Utafiti ninaofanya ni kuhusu namna ya kuboresha njia zinazotumika na wauguzi wanapopeana madawa ya kumeza kwa watoto kwenye wadi za watoto katika hospitali kuu ya kenyatta.

Utafiti huu umeruhusiwa na kamati ya adili na utafiti ya Hospitali ya kenyatta'. Usimamizi wa hospitali ya Kenyatta umepeana ruhusa ya kufanya huu utafiti. Utafiti wangu unahusu kukusanya habari itakayo nakiliwa kwa fomu iliyotayarishwa kulingana na huu utafiti. Hautahitajika kuandika jina lako kwa hii fomu. Mawazo yako yatawekwa kwa siri na haitafichuliwa.

Kushiriki kwako katika huu utafiti ni kwa hiari yako na waweza kuacha kwa hiari bila majuto. Matokeo ya utafiti yatatolewa kwako baada ya kumalizika kwa utafiti iwapo utayaitaji.

Iwapo utahitaji kuuliza maswali yoyote inayohusu huu utafiti utaweza kuwasiliana nami kupitia.

Simu: 0722 653023 Barua pepe [jmutua2005j@ yahoo.ca](mailto:jmutua2005j@yahoo.ca)

Ahsante kwa kukubali kushiriki utafiti huu. Tafadhali nakili sahihi yako kwa nafasi iliyoachwa kama ishara ya kukubali kwako.

Mshiriki – Sahihi..... Tarehe

Mchunguzi- Sahihi..... Tarehe.....

APPENDIX V: QUESTIONNAIRE FOR NURSES

Social Demographic factors

101. Gender

1. Male.....

2. Female...

102. Age (Years).....

103. Professional qualification

1. ECN.....

2. KRN.....

3. KRN/M.....

4. KRCHN.....

5. BScN.....

6. MSCN.....

104. How long have you practiced nursing?

1. Less than 5 years...

2. 5-10 years.....

3. 10-15 years...

4. More than 15years....

105. How long have you worked in this ward?

1. Less than 3 years....

2. between 3-6 years....

3. 6- 10years....

4. More than 10 years....

107. Are you trained in paediatric nursing?

1. Yes...

2. No....

Nursing care and drug administration.

108.1. What nursing care model is practiced in your ward when administering oral medications?

- 1. Primary nursing care...
- 2. Team nursing.....
- 3. Functional nursing...
- 4. Modular nursing.....

Mixture (explain)

108.2. Which nursing care model do you consider as the most appropriate when administering medication to children?

Please explain your option above

.....

109.1 What is the patient - nurse ratio in your ward?

- 1. 1 nurse: 6 patients...
- 2. 1 nurse: 8 patients...
- 3. 1 nurse: 10 patients...
- 4. 1 nurse: 12 patients...
- 5. 1 nurse: 20 patients...

Others (specify)

109.2. Does the patient –nurse ratio affect the way medications are administered to children in your ward?

- 1. Yes
- 2. No.....

Please explain

.....

110.1 Are there guidelines and/or other reference materials on drug administration in the ward?

- 1. Yes
- 2. No.....

If yes, which ones?

- 1. Nursing Council of Kenya procedure manual....
- 2. Standard Operating Procedures (SOPs)
- 3. Basic Paediatric Protocols....
- 4. British National Formulary (BNF) for children....
- 5. Others (specify)

110.2 Where are the drug administration guidelines and/or other reference materials placed?

.....

110.3. How many times have you made reference from the guidelines in the last 3 months?

1. Once...
2. More than once...
3. None...

110.4. How would you rate your individual application of the oral drug administration procedure as outlined in the Nursing Council of Kenya procedure manual?

1. Very well done...
2. Well done....
3. Fairly done....
4. Satisfactory....
5. Unsatisfactory....

110.5. If in the above (No.110.4) the choice is below fairly done, what would you attribute this to?.....

110.6. How often does your ward hold Continuous Medical Education (CMEs) sessions on drug administration?

1. Weekly....
2. Monthly....
3. Quarterly....
4. Not held....

111. What is the caregiver or patients role in the drug administration process? Give brief explanation

.....

112. What messages/instructions do you give to the caregivers regarding the medications the child is receiving?

113. Do caregivers freely seek clarifications from nurses?

1. Yes....
2. No....

If no, what are the reasons?

1. Impoliteness of the nurse...
2. Language barrier/illiteracy...

Others (Specify)

.....

114. Do you encounter any challenges during drug administration?

1. Yes....

2. No....

115. What kind of challenges do you encounter in relation to administration of drugs to children?

1. Inadequate or lack of necessary supplies and equipment ...

2. High workload/staff shortage ...

3. Competing tasks...

4. Lack of teamwork from other health care professionals...

5. Unavailability of some paediatric drug formulations...

6. Language barriers/Caregiver illiteracy...

7. Lack of caregiver/family support...

8. Lack of space to ensure quality management of medication...

Any other.....

Case studies

116. Mike is a 3-year old boy who has been admitted to the pediatric ward. He has been diagnosed with severe malaria. He has a Hb of 3g/dl. The prescription includes IV quinine in 10% dextrose and paracetamol 10mls PRN. Nurse Phoebe has commenced the treatment and has also instructed Mike's mother to expose him in order to reduce the fever.

To what level do you agree with nurse Phoebe's management of Mike?

1. Strongly agree...

2. Agree...

3. Disagree...

4. Not sure...

5. Don't know...

117. Nurse Juliet has received a report from nurse John at the end of his shift about patient Doreen, a 4-year old who has been admitted in the ward for the last 6 hours. Nurse John is in a dilemma because he has not been able to administer Doreen's IV medication because the doctor has not fixed a cannula yet. Nurse Juliet tells him not to worry and that she will fix the cannula to commence the medication, which she does, to the relief of Doreen's mother.

How often have been in Nurse John's situation?

1. Very often...

2. Often...

3. Rare...

4. Never...

118. Baby Brian's mother reports to Nurse David that Brian has fever. Nurse David who is at the desk finalizing the night shift's report responds promptly and gives Brian's mother 5 mls of paracetamol and reassures her. After a while Brian's mother comes back to say the fever is not subsiding. Nurse David explains the need to give the medication time to take effect and tells her to return to her room. When Brian's mother returns for the third time, Nurse David dismisses her saying that he has to complete writing the report and that he is confident the drug will work. Brian's mother gives up but the fever eventually subsides.

Having had multiple tasks needing his attention, Nurse David handled the situation adequately.

1. Strongly agree...
2. Agree...
3. Disagree...
4. Not sure...
5. Don't know...

APPENDIX VI: QUESTIONNAIRE FOR CAREGIVERS.

Demographic data

- 101. How old are you (years)?
 - 1. 15-20 years
 - 2. 20-25 years
 - 3. 25-30 years
 - 4. 30-35 years
 - 5. Over 35 years
- 102. Gender
 - 1. Male
 - 2. Female
- 103. What is your marital status?
 - 1. Married
 - 2. Single
 - 3. Divorced
 - Others
(specify).....
- 104. What is your level of education?
 - 1. Not gone to school
 - 2. Primary (indicate class)
 - 3. Secondary (indicate class)
 - College
(specify).....
- 105. Employment status.
 - 1. Employed
 - 2. Not employed
- 106. Number of children

Information about the child

- 107. Age of child (years).....
- 108. Relationship of child with care giver
 - 1. Mother....
 - 2. Father....
 - 3. Grandmother....
 - Other (specify).....
- 109. Length of stay in ward (days).....

Drug administration practice

- 110. What illness is your child suffering from?.....
- 111. What type of medication is your child on?

- 1. Oral....
 - 2. Intravenous injection....
 - 3. Intramuscular injection....
 - Others (Specify)
112. Did the nurse give you any information regarding the medication your child is receiving?
- Yes....
 - No....
- If yes, what kind of information?
- 1. Name of drug....
 - 2. Purpose of the drug....
 - 3. Possible side effects....
 - 4. Frequency....
 - 5. Drug interactions and dietary implications....
 - 6. Cannula care....
113. Do nurses ask for your consent before giving medication to your child?
- Yes
 - No
114. What is your role during drug administration to your child?
- 1. Encouraging child to take medicines
 - 2. Keeping medication for the child
 - 3. Administering oral drugs after instruction from nurse.
 - 4. I have no role
 - 5. Others
(specify).....
115. Are you satisfied with the way your child is handled during drug administration?
- 1. Yes....
 - 2. No....
- If yes, state why?
- 1. The nurse is polite....
 - 2. The nurse gives clear instructions....
 - 3. The nurse is sensitive to the child's needs....
 - 4. Others.....
- If no, state why

APPENDIX VII: MEDICATION ADMINISTRATION REVIEW TOOL

Physical environment, Equipment and Supplies	Yes	No	Remarks
1. The ward space is sufficient for the number of patients admitted			
2. There is adequate space for specific treatment procedures			
3. There is reasonable space for receiving visitors			
4. The ward is clean			
5. Adequate supply of basic/general drugs available at all times (if no indicate approx duration of lack)			
6. Medication storage is secure and under the right conditions			
7. The medication preparation and administration area/equipment clean and orderly (To include a brief description of area)			
8. All potentially dangerous drugs are stored safely from patient's reach			
9. The ward has adequate trays, trolleys, drip stands, nebulization kits, saucers and spoons, drug measures, infusion sets, for drug administration procedures.(If no, specify)			
Policy and Guidelines			
1. There are written, step-by-step directions/wall charts available for staff for medication administration			
2. Guidelines on management of side effects of specific drugs available			
3. Written policy on continuing staff education			
4. Opportunities are provided for nurses to discuss with their superiors any difficulties experienced in the course of drug administration			
5. Nurses conduct an internal audit to identify strengths and weaknesses in medication use process in the ward.			
6. Universal precautions/infection control, disposal of sharps are observed .Evidence of guidelines.			

7. Unusual Incident (UI) reporting guidelines available. Indicate which ones.			
8. Guidelines on Treatment Administration Record (Treatment sheets) documentation available			
9. Reporting/documentation of medication error or unsafe medication administration done.			
Medication administration			
1. Treatment plans are in-cooperated in the nursing care plans for all patients and followed by all nursing staff			
2. Patient's privacy is observed during all treatment procedures			
3. Caregivers/Patients are treated with respect at all times. Nurse speaks in a friendly, positive and courteous manner.			
4. The nursing personnel observed following the provider's/agencies step-by-step procedure during the administration of parenteral/oral/topical medications?			
5. By what method is the child identified prior to administering parenteral/oral/topical medications? Comments: six rights of medication observed?			
6. Informed consent is obtained prior to starting a planned treatment			
7. Medication Administration Records (Treatment sheets) are filled immediately after administration of medication for all the patients			
8. Medication Administration Records (Treatment sheets) clearly indicate when doses were given, missed, withheld, refused or discontinued (Review 10 treatment sheets per ward).			
9. Reasons medications were missed, withheld, refused or discontinued or other difficulties clearly documented in the cardex.			
10. Was there communication with others (health care team) concerning the issue(s) above No.9? Please comment on what other steps were taken to rectify the situation.			

END

APPENDIX VIII: INTERVIEW GUIDE FOR THE NURSE WARD IN CHARGES.

101. Period of service and specialty

1. How long have you been a manager in the ward?
2. What is your area of specialization?

102. Work environment

1. What challenges do nurses in your ward face during drug administration?
2. Are there enough resources to enhance safe drug administration?
3. What would you suggest should be provided to enhance the delivery of nursing care services with emphasis on safe drug administration?
4. Does the ward have adequate space for the quality management of medicines in paediatric patients?
5. What challenges do you face in drug storage?

103. Policies and procedures

1. In your opinion do you think nurses are adequately prepared to handle all aspects of safe drug administration?
2. Do you have enough staff to handle medication to children adequately?
3. Does the hospital offer any training on patient safety?
4. Are there guidelines on reporting of medication errors?
5. What would you suggest as the best way to minimize errors in medication?

104. Supervision

1. Do you normally do nursing rounds when medication is being administered?
2. How do you enhance the medication use process in your ward?
3. As a ward manager, how do you ensure drugs are administered as required?
4. Are you ever involved in administration of medication in the ward?
5. What role if any can the other support systems (doctors and pharmacists) play to enhance safe drug administration?

**APPENDIX IX: LETTER OF REQUEST FOR APPROVAL BY ETHICS AND
RESEARCH COMMITTEE**

**James Mutua Ndambuki
Po box 314 -0090125
Kikima.**

**The Secretary,
Ethics and Research Committee
P.O Box 20723-00202
Nairobi-Kenya**

Dear Sir/Madam

Re: Authority to carry out research at K.N.H paediatric medical wards (3A, 3B, 3C, 3D).

I am kindly requesting for your permission to carry out a research on ‘**factors influencing quality management of medication by nurses at KNH medical paediatric wards**’

The research seeks to determine how administration of medication to children at KNH can be improved through assessing the factors that collectively contribute to the overall quality of medication management. The recommendations will aim at improving the process of medication administration to patients and consequently, strengthening the quality of health care delivery to children.

Your consideration will be highly appreciated.

Yours faithfully,

James M. Ndambuki,
MScN student,
School of Nursing Sciences,
University of Nairobi.

**APPENDIX X: LETTER OF REQUEST FOR APPROVAL BY MINISTRY OF
HIGHER EDUCATION**

**James Mutua Ndambuki
Po box 314 -0090125
Kikima.**

**Ministry of higher education
National Council for Science and Technology.
P.O Box 30623-00100
Nairobi-Kenya**

Dear Sir/Madam

Re: Authority to carry out research at K.N.H paediatric medical wards (3A, 3B, 3C, 3D).

I am kindly requesting for your permission to carry out a research on ‘**factors influencing quality management of medication by nurses at KNH medical paediatric wards**’.

The research seeks to determine how administration of medication to children at KNH can be improved through assessing the factors that collectively contribute to the overall quality of medication management. The recommendations will aim at improving the process of medication administration to patients and consequently, strengthening the quality of health care delivery to children.

Your consideration will be highly appreciated.

Yours faithfully,

James M. Ndambuki,
MScN student,
School of Nursing Sciences,
University of Nairobi.

APPENDIX XI: LETTER OF CLEARANCE FROM THE KNH ETHICS AND RESEARCH COMMITTEE



KENYATTA NATIONAL HOSPITAL

Hospital Rd. along, Ngong Rd.

P.O. Box 20723, Nairobi.

Tel: 726300-9

Fax: 725272

Telegrams: MEDSUP, Nairobi.

Email: KNHplan@Ken.Healthnet.org

20th May 2011

Ref: KNH-ERC/ A/113

Mr. James Mutua Ndambuki
School of Nursing Sciences
University of Nairobi

Dear Mr. Ndambuki

RESEARCH PROPOSAL: "FACTORS INFLUENCING QUALITY MANAGEMENT OF MEDICATION BY NURSES AT KENYATTA NATIONAL HOSPITAL PAEDIATRIC WARDS" (P51/02/2011)

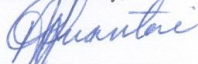
This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed and **approved** your above revised research proposal. The approval periods are 20th May 2011 to 19th May 2012.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimens must also be obtained from KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely,



PROF A N GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
The Director, School of Nursing Sciences, UON
The HOD, Records, KNH

Supervisors: Mrs. Eunice Odhiambo, School of Nursing Sciences, UON
Dr. Waithira Mirie, School of Nursing Sciences, UON
Dr. Chege, School of Nursing Sciences, UON

**APPENDIX XII: RESEARCH PERMIT FROM MINISTRY OF HIGHER EDUCATION,
SCIENCE AND TECHNOLOGY**

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref:

NCST/RRI/12/1/MED-011/80

Date:

15th June, 2011

James Mutua Ndambuki
University Of Nairobi
P.O Box 30197
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on **"Factors influencing quality management of medication by nurses at Kenyatta National Hospital Paediatric wards "** I am pleased to inform you that you have been authorized to undertake research in **Kenyatta National Hospital** for a period ending **30th April, 2012**.

You are advised to report to **the Chief Executive Officer of Kenyatta National Hospital** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

A handwritten signature in black ink, appearing to read 'P.N. Nyakundi'.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:

The Chief Executive Officer
Kenyatta National Hospital