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Factors contributing to medication errors at the Kenyatta National Hospital

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FACTORS CONTRIBUTING TO MEDICATION ERRORS AT THE KENYATTA NATIONAL HOSPITAL

By

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DECLARATION

Declaration by Student

I declare that I have solely composed this proposal and that it has not been submitted, in whole or in part, in any other degree or professional qualifications except where I state otherwise by acknowledgement and reference.

STUDENT'S NAME: RODAH KALONDU

SIGNATURE DATE

Approval by Supervisor

This study proposal has been submitted for appraisal with my approval as university supervisor.

SUPERVISOR'S NAME: DR FRANCIS WAFULA

SIGNATURE DATE

ABSTRACT

Medication errors are among the most prevalent medical errors worldwide. The Institute of Medicine estimates 1.5 million preventable medication errors occur in the united states every year. Health care in Kenya has been largely susceptible to occurrences of medical mistakes and grave errors, some of which may have led to permanent disability and loss of life for the patients. 65% of medication errors detected had meaningful effect on patient's health. Medication related deaths are estimated to be about 7000 each year. Failure to identify errors leads to repetition of mistakes and deteriorating patient safety in healthcare organizations. Although the error reporting system is the most commonly used method for identifying medication errors, there is significant under-reporting. This study aims to explain why under-reporting of medication errors happens and give recommendations on how there can be a shift of this practice so as to improve patient safety. This study sought to examine factors contributing to medication error reporting at the Kenyatta National Hospital's Accident and Emergency department. The study design was cross sectional survey design. The study population included medical officers and nurses. A total of 110 staff were sampled for a self-administered questionnaire survey with a response rate of 96.4%. Survey questionnaire responses was analyzed using Statistical Package for Social Science (SPSS) version 20.0. The study found that both organizational factors and individual factors contribute to underreporting of medication errors. Fear of punishment and being labelled as incompetent influenced individuals decision on not reporting a medication error when it happened. Lack of a clearly defined institutional system for medication error reporting and poor feedback mechanisms also contributed to poor reporting of medical errors in the hospital. Further research should be conducted to assess medication

error rates and severity of the problem in KNH. Data on medical error reporting in various public and private institutions should be assessed in order to give a more generalizable report on medical errors and patient safety in Kenya.

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ABBREVIATIONS AND ACRONYMS

ADE - Adverse Drug Events

CCU - Critical Care Unit

CPOE - Computerized physician order entry

EU - European Union

FDA - Food and Drug Administration

ICU - Intensive Care Unit

IOM - Institute of Medicine

JCAHO - Joint Commission on Accreditation of Health Care organizations

KNH - Kenyatta National Hospital

MoH - Ministry of Health

NCC MERP - National Coordinating Council for Medication Error Reporting and Prevention

SPSS - Statistical Package of Social Sciences

WHO - World Health Organization

OPERATIONAL DEFINITION OF TERMS

Adverse Drug reaction: A response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function

Adverse Event: Medical occurrence temporally associated with the use of a medicinal product, but not necessarily causally related.

Medical error: Any preventable adverse outcome that results from improper medical management.

Medication error: unintentional errors in the prescribing, dispensing, administration or monitoring of a medicine while under the control of a healthcare professional, patient, or consumer.

Patient Safety: Patient safety is the prevention of avoidable errors and adverse effects to patients associated with health care.

CHAPTER ONE

INTRODUCTION

1.1Background to the Study

There is increasing effort to improve the quality of healthcare services globally. Patient safety measures seek to make hospitals safe and harm-free care and create a culture of safety and transparency. Patient safety is the cornerstone of quality healthcare at hospitals. If care is not provided in a safe manner and in a safe environment, the chances of a positive outcome are lessened significantly. Patient safety is therefore an important indicator of health care quality, and in turn the survival of any health care institution (Benjamin, 2003: Khaemba, 2014). The Institute of Medicine (IOM) in its report To Err is Human in 1999 estimated that 44,000 to 98,000 patients die from medical errors annually. The IOM recommends four strategic areas to improve patient safety: leadership and knowledge, identifying and learning from errors, setting performance standards and expectations for safety and implementing safety systems in health-care organizations.

The National Coordinating Council for Medication Error Reporting and Prevention- (NCC MERP) (2001) define medication error as any preventable event that may cause or lead to the use of medicinal products in an inappropriate way subsequently harming the patient while the medication is in the control of a healthcare professional or the patient. Van Den Bos et al. (2011) noted that a medical error is brought about as a result of improper medical management and is therefore a mistake of commission. Preventing medical errors and promoting patient safety and quality is a focus of many organizations including the institute of Medicine (IOM) (Gonzales, 2011; Williams, 2007).

Safety of drug therapy is well thought out as the absence of accidental harm that is as a result of the medication process and involves the prevention and minimization of this harm (Glaucia et al., 2016). In medicine administration procedure for instance, medicine is normally prescribed by the doctor and dispensed by the pharmacist however the responsibility for correct administration falls on the registered nurse (Mohammad, 2011). Some of the nurses' responsibility for correct administration include: preparing, checking and administering medications, updating their knowledge about medications, monitoring the effectiveness of treatment, reporting adverse reactions and teaching patients about their drugs (Mrayyan et al., 2007; Tang et al., 2007). Yet in most cases correct administration of medicine does not take place (Mohammad, 2011). Events that lead to medical errors may be related to professional practice, healthcare products, procedures, or systems (NCC MERP, 2001).

Medical errors comprise of mistakes health professionals make in terms of patients testing, care, or treatment (Raouf, Amani, and Ahmed, 2016). Zhang, Patel, and Johnson (2008) contend that medical errors consist of failure of planned actions and use of wrong plans to achieve outcomes through wrong diagnosis, wrong site, wrong procedure, and incomplete treatment of illness. A major cause of medical errors includes modest experience, poor communication in the organization both horizontal and vertical, and inadequate staffing (Lee and Schniederjans, 2011). Undoubtedly, numerous negative patient safety events relate to systems and how personnel operate within them as thousands of patients die as a result of medical errors which occur in public hospitals, private practices, nursing homes or pharmacies (Raouf, Amani, and Ahmed, 2016).

In the United States of America, analysis of medical death rate over an eight-year period by John Hopkins patient safety experts reveal slightly more than 250,000 deaths per year occur as a result of medical error. The John Hopkins

patient safety experts infer that on a total of 35,416,020 hospitalizations, 251,454 deaths were as a result of medical error translating to 9.5% of all deaths in a year (John Hopkins Medicine, 2016). In Europe, data from most European Union (EU) Member States reveal that medical errors occur in 8% to 12% of all hospitalizations (World Health Organization – WHO, 2018). Whereas 23% of EU citizens claim to have been directly affected by medical errors, 11% claim to have been prescribed wrong medication (WHO, 2018). Never the less 50% to 70% of medical errors can be prevented through comprehensive systematic approaches to patient safety (WHO, 2018).

In Australia, the year 2012 recorded 107 serious medical errors in Australian hospitals all ranging from surgery on the wrong patient or body part, and medication errors, to deaths or serious injuries associated with child birth, and in-hospital suicides (Bourke, 2013; Mousa, 2017; The Conversation, 2017). However, current statistics reveal that out of 53 million patients who visit hospitals each year the chance of a serious medical error occurring is 0.000201% which is incredibly low (The Conversation, 2017). In Saudi Arabia, out of 10,000 patients' files reviewed 2,627 medication errors were identified in the year 2006 (Dibbi, Al-Abrashy, Hussain, 2006). An Abu Dhabi health authority workshop held in 2010 received reports out of which 1380 reports had 40% medication errors. These errors included: improper doses, over, under, or extra dose, wrong drug, wrong duration, or dose omission (Majed, Mohammed, and Hosni, 2017).

Closer home, in Ethiopia, the prevalence of medication errors is at 51.8% attributable to wrong timing, omission due to unavailability, and missed doses (Kimeu, 2015). In Kenya, there exists no published statistics on medical errors however there have been serious reported cases of medical errors. Majority of the cases related to misdiagnosis especially when it comes to cancer patients, other causes relate to unreliable detection gadgets, medics'

complacency or limited knowledge due to under specialization, and insufficient interaction with the patients (Kinuthia, 2015; Technician, 2017).

Accreditation bodies such as the Joint Commission on Accreditation of Health Care organizations (JCAHO) emphasize the importance of adhering to best practices that guarantee patient safety. Accredited organizations must work to prevent medical errors from occurring by developing standards of care and establishing systems of reporting errors. The JCAHO emphasizes the importance of the analyzing mistakes to prevent future errors with the implementation of additional patient safety standards that promote a culture of safety (JCAHO, 2001). Error reporting helps to understand why errors occur and prioritize opportunities for error prevention and generating long term improvements in patient safety (Claudia, Sharon, DeVSP, Merrell, & Gail, 2002). Patient safety incident reports are an invaluable source of learning for hospitals. Higher reporting rates correlate with a better safety culture and risk management ratings; regular reporting of incidents from hospitals is therefore something to be encouraged.

In 1960, Alphonse Chapanis, carried out a study on medication-related errors in a 1,100-bed hospital, and identified seven sources of the errors. These were: medicine omitted, or given to the wrong patient, at the wrong dose, as an unintended extra dose, by the wrong route, at the wrong time, or as the wrong drug entirely. Several decades later, the same exact errors still happen globally. Chapanis gave four recommendations to help prevent harm: written communication, medication procedures, the working environment and training; and education (Safren & Chapanis, 1960). These recommendations have the potential to reduce harm to patients and improve health outcomes.

Carayon (2010) posits that some care situations are mostly prone to hazards, errors and system failures. An example is in intensive care units (ICUs), whereby patients are at all-time vulnerable, and their complex care involved

multiple disciplines and a wide variety of information all of the factors increasing the likelihood of errors. Rothschild et al. (2005) carried out a study on medical errors in a medical ICU and a coronary unit which revealed that about 20% of the patients admitted in the units experienced adverse events of which 45% were preventable. The common errors involved in preventable adverse events included: prevention and diagnostic errors, medication errors, and preventable nosocomial infections (Cimino, 2004; Carayon, 2010). In medication, creation of a prescription is the first step and it calls for a critical review by pharmacists and nurses in order to identify and detect as well as prevent medication errors (Khaemba, 2014).

1.1.1 Overview of Kenyatta National Hospital

Kenyatta National Hospital (KNH) is the oldest and the largest public, tertiary and referral hospital in Kenya. KNH is also a teaching hospital for the University of Nairobi College of Health Sciences department. The hospital has over 5,000 staff and the largest bed capacity of 1,800 in Kenya though due to congestion at times patient numbers rise to 2,500. KNH has the highest number of consultations of about 8.69 million each year for both outpatient and inpatient cases though the hospital is considering stopping outpatient services in the next two years to ease congestion (Ngugi, 2016). KNH has several specialized departments which include medicine, surgery, obstetrics, and gynecology, pediatrics, laboratory, radiology, operating theatre, renal orthopedics, and training. KNH has five critical care units which are the Neonatal CCU, Neurological CCU, Emergency department CCU, Cardiac CCU, and the general CCU (KNH, 2017; Kimeu, 2015). Accident and Emergency department is the entry point of the hospital. It serves approximately 200-250 patients per day. The department has 150 staff and six critical care beds for emergency patients.

1.2 Problem Statement

Anecdotal evidence suggests that medical mistakes may be very common in low- and middle- income countries like Kenya. These mistakes often result in death, disability or financial losses, yet errors are rarely reported and audited. Recognizing medical errors is particularly difficult due to various reasons, including information barriers between clients and providers, and in some cases deliberate effort to cover up. A study by Ndambuki (2012) revealed that The Kenyatta National Hospital (KNH) pediatric ward nurses encountered high work load (90%), language barrier (56%), multiple tasks (21%), lack of support (20%), and limited physical space (19%) which most likely lead to medical errors in the hospital. Due to the numerous cases that medical errors and mistakes that have at some point led to deaths and long-term injuries or disabilities, there exists a need to find out the factors that influence medication error reporting in public hospitals with a focus on KNH Accident and Emergency department.

In Kenya, there is little data on medication error reporting rate at the county and national levels. Many hospitals have no system for recording medical errors which are thus under reported across Health Care organizations.

Extensive variations in reported incidences and categorization of medication errors make it hard to determine the actual prevalence of medication errors. Lack of established definitions, different methods and criteria for measurement of medication errors affect the reliability of assessment thus provide an incomplete image of the actual prevalence of medication errors.

Establishing a system based on spontaneous and voluntary reporting is essential for drug safety surveillance. Nevertheless, there is no established active continuous reporting system for medication errors in Kenya.

A number of studies carried out on health sector such by Agulla (2012); Kimeu (2015); Khaemba (2014); Mohammad (2011); Ndambuki (2012); Gonzales (2011); Omole, Rawlings and Festus (2013); Tshiamo et al. (2015); Wachira (2009) have been general or failed to give insights on the factors contributing to medication errors and medication error reporting at Kenyatta National Hospital. There is scarcity of published work on the factors contributing to medication error reporting predominantly in the setting of developing nations in the African region and specifically in Kenya. This study intends to bridge the knowledge gap that exists.

1.3 Objectives of the Study

The main objective of this study is to identify factors contributing to medication errors and medication error reporting at the Kenyatta National Hospital.

1.3.1 Specific objectives

To identify organizational factors that contribute to medication errors at KNH.
To identify prescriber characteristics which contribute to medication errors at KNH.
To analyze staff perception to barriers to effective medication error reporting at KNH.

1.4 Research Questions

The study seeks to answer the following questions:

What organizational factors influence medication errors at KNH?

What prescriber characteristics contribute to medication error reporting at KNH?

What are staff perception to barriers to effective medication error reporting at KNH?

1.5 Justification of the Study

Medication error is a global health care issue. It is therefore crucial to control medication errors because they are always very costly (Brown 2001, Ovretveit & Sachs 2005). Medication errors adversely influence patient safety which is an indicator of quality health care. Many studies addressed medication errors in different countries; however, in Kenya there is no published study on rate and factors contributing to medication error reporting. Kenya is a developing country that suffers from scarcity of resources, including shortage of health care professionals which has resulted in an increased workload, and in turn an increased risk of committing medication errors. Prevention and reduction of medication errors would reduce the cost of health care expenditure in Kenya.

Clinicians are responsible for prescribing medications, pharmacists are responsible for dispensing and storing medications and nurses are responsible for administering medications. Thus, the prevention of medication errors requires collaboration among all members of the health care team; however, when it comes to medication errors, clinicians' decisions and behaviors related to patient care are not questioned in contrast to nurses' decisions and behaviors. As a result, nurses are frequently blamed when medication errors

occur. This study will investigate the health care worker' recalled committed medication errors, and the rate of medication errors reported using incident reports and the medical error tool. In addition, this paper aims to identify causes of medication errors in KNH Accident and emergency department and health care worker' views on reporting these errors.

1.6 Significance of the Study

The study findings will be useful to both public and private healthcare providers in helping them make informed decisions with regard to medication error reporting. The study will make significant contributions to theory and practice in regard to medication error reporting and bridge the gap between theory and practice. The study is therefore expected to inform decision makers on the strategies to guide the development of an effective quality health care industry. It will form a basis through which both public and private healthcare providers will improve and lower their medication error reporting and techniques. This study will give additional information to the already existing body of literature regarding medical errors and medication errors.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers the theoretical review, empirical literature, and the conceptual framework of the variables. Through pointing out the gaps of previous studies, this study will benefit by showing possible measures of filling them.

2.2 Theoretical Framework

This section presents the theory upon which the current study is grounded on. This study is grounded on the human error theory, Reason's model of accident causation, and is applied to medication administration errors in hospitals (Reasons, 2000).

Reason's model of accident causation focuses on the system, the person and procedures such as administrative controls. Systems may have many defensive layers such as alarms, physical barriers, automatic shutdowns while others rely on people and others depend on procedures and administrative controls. The function of systems is to protect potential errors/ hazards but there is always a weakness.

The model explains that systems such as health care have in place barriers/safeguards for example counterchecking and double checking that protect a particular process or task for example medication administration from errors. However, these defensive barriers can be weakened by: (1) decisions made during the design of the barrier like a work instruction or

policy that may not be effective, and (2) the wider system in which they lie (The health care system).

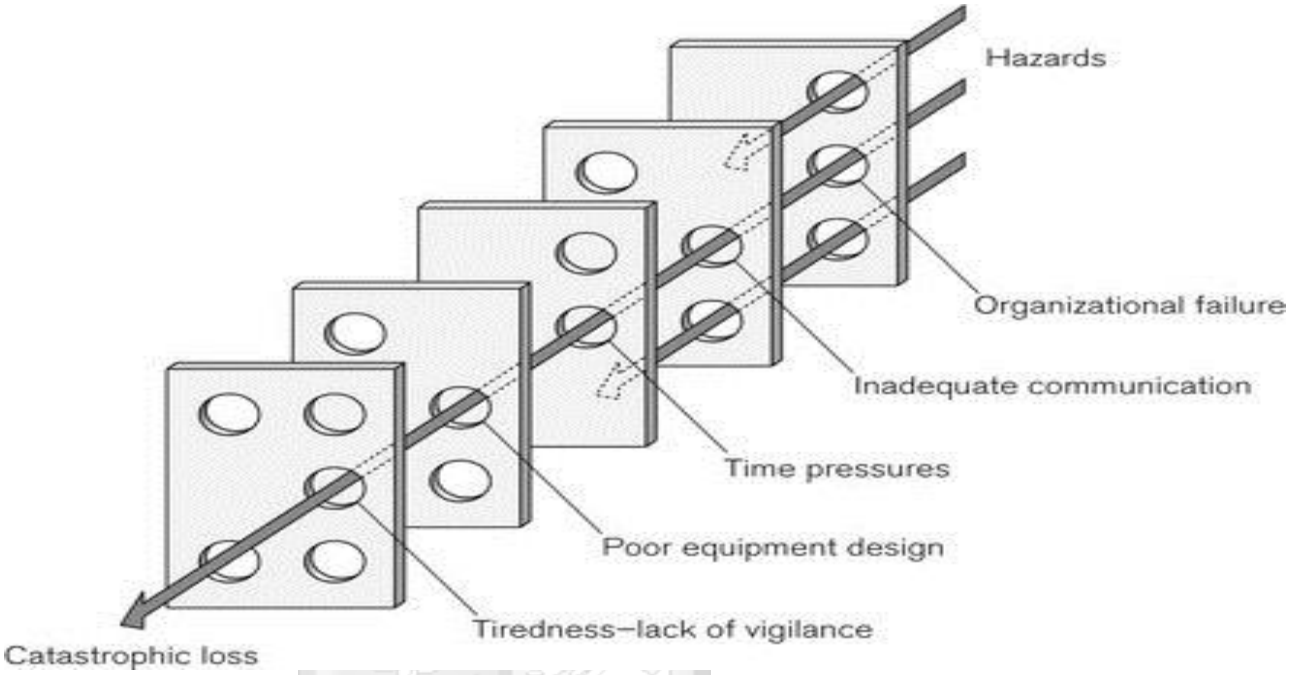

Figure 2. 1 swiss cheese accident causation model (James Reason, 1970-77)

In an ideal system, barriers/ safeguards would be intact. In the real world, systems are more like slices of swiss cheese having many holes which open, shut and shift their location. When the holes in many layers line up to permit a trajectory of accident/ hazard opportunity, catastrophic loss occurs. Holes in the defenses can be due to active or latent failures. Active failures are unsafe acts committed by people who are in direct contact with the patient or system. They could be in form of mistakes, lapses, violation of procedures and slips.

Latent failures arise from decisions made by management, designers and producers of the system. Decisions made by top- level management can lead to error-provoking conditions in the workplace for example understaffing, time pressures, inadequate equipment, lack of experience and fatigue. These decisions can create weaknesses in the defenses leading to unworkable

procedures, deficiencies in design and construction and untrustworthy alarms and indicators.

Reason's model of accident causation demonstrates the multifactorial nature of a sample 'accident' and explains how latent conditions for an incident may lie dormant for a long time before combining with other failures to lead to an accident. Errors in prescribing, as in any other complex and high-risk procedure, are caused by and depend on failure of individuals, but are facilitated by failures in systems. It might therefore be expected that the larger the number of prescriptions, and the more steps in the prescribing procedure, the higher the risk of error.

The person approach in Reason's model of accident causation focuses on unsafe acts of people on the front line like doctors, nurses, pharmacists etc. It views these unsafe acts as arising from aberrant mental processes such as forgetfulness, inattention, carelessness, lack of morale or poor motivation, negligence and recklessness. Human beings are prone to making errors thus errors are to be expected even in the best organizations. In this model, errors are viewed as consequences of the system and not so much as human nature.

2.3 Empirical Literature

Wachira, (2009) assessed physicians' and nurses' attitude towards pharmacists in KNH and found that nurses and physicians recognize the pharmacist's knowledge on drugs and would like them to be readily available to give the necessary information as well as train nurses more about drugs. This would be achieved more effectively by pharmacists holding joint ward rounds with other professionals but not on their own. Medical services delivery can be improved if pharmacists are involved in treatment plans and are available in the wards. And this will favorably improve therapeutic outcomes in the hospital.

Antonow, Smith, and Silver (2000) found that the likelihood of preventing a medication error from reaching the patient declined in the later stages of the medication process, the likelihood of a formal written incident report increased in the later stages of the medication process. It was found that out of the medication errors that were not prevented and actually reached the patient, just 38% of the medication errors that occurred during the ordering/prescribing phase were reported, 36% of the medication errors that occurred during the transcription/verification phase were reported, 47% of the medication errors that occurred during the dispensing/delivery phase were reported, and 65% of the medication errors that occurred during the administration phase were reported (Antonow, Smith, and Silver, 2000).

In their study, Stratton et al. (2004) found that pediatric nurses estimated that only 67% of medication errors on their patient care units are actually reported. This study asked for reasons as to why medication errors were underreported, and both individual/personal and management-related reasons were selected by the participants, suggesting the need to develop a unit/hospital culture supportive of error reporting (Stratton et al., 2004). Another study compared survey results with written incident reports and found that of the 89 medication errors observed by the nurses, the respondents indicated that only 17 of the medication errors resulted in completion of an incident report (Ryan, 2007).

Ghaleb and colleagues (2006) summarized the suggestions they found in their systematic review to prevent medication administration errors, which include checking the name and dose of the medication and verifying the patient identity prior to administration. Additionally, it is advised to double-check with the provider should anything arise that causes concern, including unusual volumes or doses, or concerns from the parent and/or patient (Ghaleb et al., 2006).

A culture of change is needed with regard to reporting systems for medication errors (Cadwell, 2008). Reporting systems need to be non-punitive so that individuals feel comfortable reporting medication errors. Additionally, an analysis of each reported error and potential errors need to occur so that the underlying cause of the error within the context of the entire system can be altered (Cadwell, 2008). To summarize, the studies found that medication errors tend to be under-reported, often due to fear of punishment. The studies also found that voluntary reporting provided greater insight into system failures that lead to the error.

Medication administration is a complex process influenced by the number of medications in the market, the number of medications prescribed for patient, and policies and procedures created for their administration (Kimeu, 2015). Yu- chuan (2005) reported that medication errors and adverse drug reactions are the main causes of adverse events leading to disability and death in up to 6.5% of hospital admissions. Patient safety has therefore become an important aspect of health care. High work load, insufficient nurse patient ratios, stress, illegible hand writing of physicians in the patient's records and shortage of time were reported as the most common factors affecting the medication administration error in an Iranian study (Pazokian & Zagheri, 2014).

Medication errors can occur at any step of medication process, from drug prescription to drug administration by the nurse or patient. Common causes of medication errors include prescription errors, dose miscalculations, poor drug distribution practice, incorrect drug administration, failed communication and lack of patient education (Pazokian & Zagheri, 2014). Medication errors reported to FDA may be related to handwriting, drug name confusion, drug labels, labeling, and packaging, lack of employee knowledge, lack of patient understanding (Food and Drug Administration - FDA, 2009).

2.3.1 Organizational Factors and Medication Error Reporting

Kimeu (2015) contends that medication administration is a difficult and complex task. Nurses do not always enjoy the working conditions under their daily work. Fogarty & Mckeon (2007) posit that nurses have similar safety consciousness like any other workers in high risk industries, organizational conditions may force nurses to cut corners or work outside the regulations. Staffing levels, skills mix of the prescribers, Shift length, patient acuity, and organizational climate/ favorable working conditions, policies, and procedures, technology influence the way in which medication are administered.

In a national survey by Rogers and colleagues, self-reported errors by nurses found that the likelihood of a medication error increased by three times once the nurse worked more than 12.5 hours providing direct patient care (Hughes & Blegen, 2007).To continually improve health systems in promotion of patient safety, management needs to broaden its focus on employees. Regular monitoring of organizational climate and level of individual distress and morale can help activate better health outcomes for every one (Forgarty & Mckeon, 2007).

Institution based strategies such as automation play a major role in the prevention of occurrence of medication errors (Leonard, 2010). Computerized physician order entry(CPOE) refers to a broad spectrum of electronic prescribing systems that have been shown to decrease medication errors and adverse drug events. Automation of drug ordering systems eliminates issues of illegibility(Bates et al, 1999). For most Kenyan institutions, cost and change of culture and processes of a hospital are hindering factors to adopting such systems in the near future.

2.3.2 Prescribers Characteristics and Medication Error Reporting

To implement successful medication therapy nurses must have clinical skills, possess necessary medical information about the patient, and knowledge about mechanisms and adverse reactions of medication, as well as basic treatment protocols to handle complications from medication (Pazokian & Zagheri, 2014). Consideration should be given to developing additional safeguards against CCU errors, particularly during drug administration, and elimination barriers to error disclosures. Prescribers who include nurses are discouraged by the complexity and frequency of order change, and number of policies and procedures that they must learn continuously, also they are discouraged by their inability to know everything about the variety of dosages of medication they administer and technologies (Garret & Grag, 2005).

Individual factors may affect the way medication are administered, these include: in experience, rushing, doing two things at the same time, interruptions, fatigue, boredom, failure to check and double check, poor team work and or communication between colleagues, reluctance to use memory aids (Garret & Grag, 2005). Poor communication among healthcare workers, lack of appropriate technologies such as CPOE, lack of systematic handing over procedures and illegibility of prescriber's handwriting are contributing factors to medication errors.

Identification of medical errors and adverse events heavily relied on incident reports. Reporting of incidents presumes that an individual recognizes a medical error when it occurs. Taylor et al (2004) contends most staff who take time to report events rarely receive feedback thus they may not see their efforts resulting in noticeable improvement which is a disincentive for reporting subsequent events.

Fear of being labelled incompetent and a reluctance to point out other's mistakes for fear of being labelled a whistleblower leads to a natural hesitancy in reporting errors (Leonard, 2008). Fear of discipline by institution or licensing body, fear of litigation and culture of blame in organizations are major deterrents to medication error reporting.

2.4 Conceptual Framework

Mugenda and Mugenda (2003) defines a conceptual framework as a hypothesized model identifying the concepts under study and their relationships. In this framework, there are certain factors contributing to medication error reporting at the Kenyatta National Hospital. These factors include but are not limited to organizational factors and prescriber characteristics.

Medication error reporting at the Kenyatta National Hospital is the dependent variable that is affected by the independent variables. The study will be guided by the conceptual framework as shown in Figure 2.2 relating the dependent and independent variables.

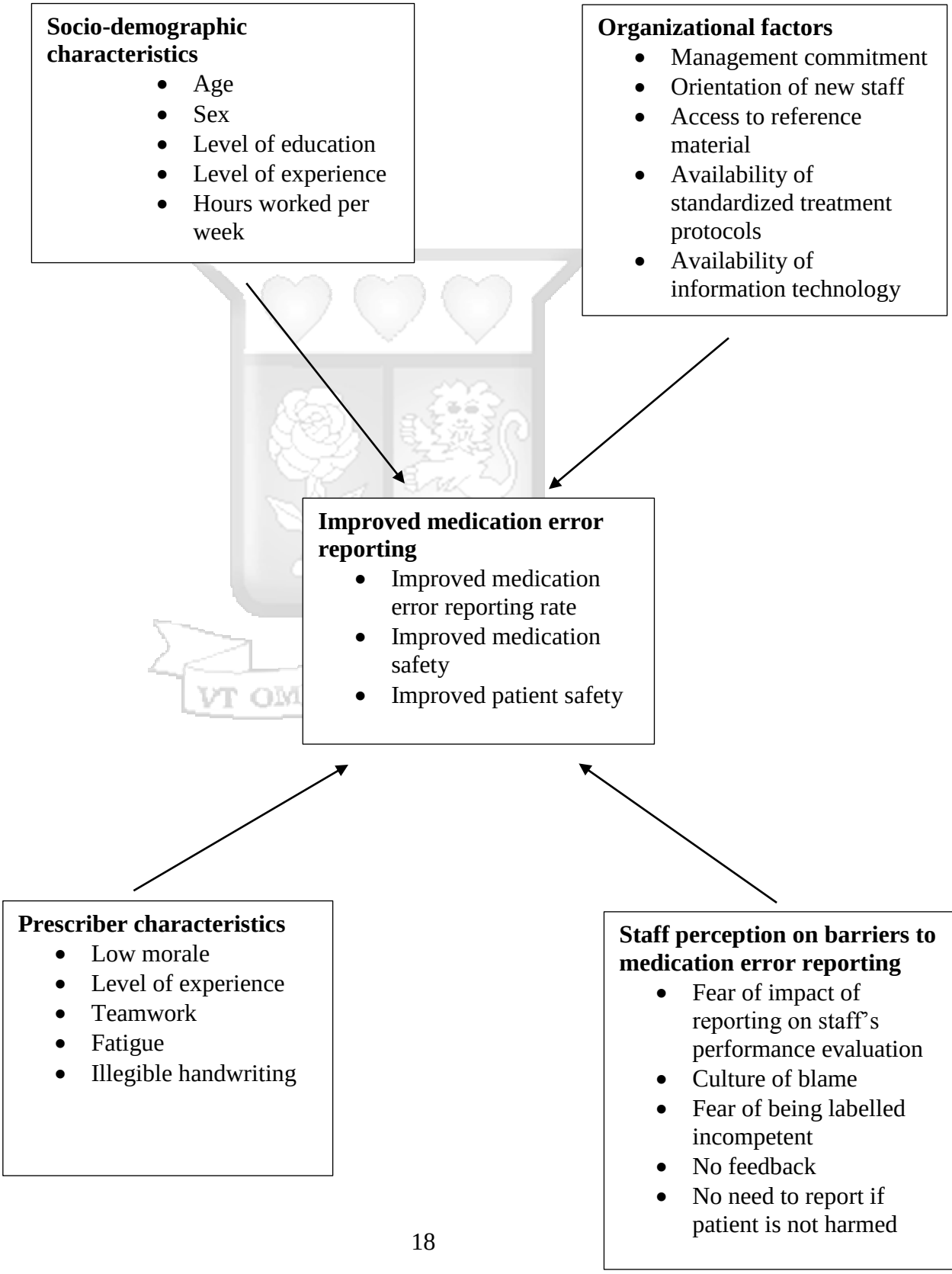
Socio-demographic characteristics
Age
Sex
Level of education
Level of experience
Hours worked per week
Organizational factors
Management commitment
Orientation of new staff
Access to reference material
Availability of standardized treatment protocols
Availability of information technology
Improved medication error reporting
Improved medication error reporting rate
Improved medication safety
Improved patient safety
Prescriber characteristics
Low morale
Level of experience
Teamwork
Fatigue
Illegible handwriting
Staff perception on barriers to medication error reporting
Fear of impact of reporting on staff's performance evaluation
Culture of blame
Fear of being labelled incompetent
No feedback
No need to report if patient is not harmed

Fig 2:2 : Conceptual framework of factors contributing to medication errors and medication error reporting (Author's composition)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology used. It covers the following sections: research design, study population, sampling design and procedure, data collection procedures, analysis, research quality and ethical issues in research.

3.2 Research Design

This study was conducted using cross sectional survey design. This was preferred because it can compare different population groups at a single point in time. Information can be collected without manipulating the study environment. Cross sectional research design facilitates gathering of reliable and accurate data that would clearly describe barriers to medication error reporting in KNH. Sampling technique used to select the study participants was simple random sampling technique.

3.3 Study Setting and Population

The study was conducted at the Accident and Emergency department in Kenyatta National Hospital. Accident and emergency department is one of the

busiest entry points into the hospital which provides both emergency and non-emergency outpatient and inpatient services. Approximately 200-250 patients seek healthcare services from the department on a daily basis, this indicates roughly 6000 patients are seen on a monthly basis.

Due to the extremely busy nature of the department, medical errors especially medication errors are highly likely to occur. The hospital has a medical error reporting tool but medical errors are poorly reported. High workload, interruptions due to emergencies, fatigue, lack of motivation and lack of experience are likely to lead to medication errors in the department.

The study population included medical officers and nurses at the Accident and Emergency department of KNH who were willing to participate in the study. The exclusion criteria for the study was unwillingness to participate in the study and any other hospital staff who was not from Accident and Emergency department.

3.4 Sampling and sample size determination

Accident and emergency department has 150 healthcare staff of which 24 are medical officers and 91 nurses employed on permanent/contract basis. The department also has 10 medical officers and 25 nurses who frequently work in the department on locum basis.

Table 3. 1 Composition of doctors and nurses in Accident and Emergency department

	Permanent/ contract basis	Locum basis
Medical officers	24	10
Nurses	91	25

Slovin's formula was used to calculate the sample size;

$$n = \frac{N}{1+Ne*2}$$

Where n is the sample size

N is the population size

e is the margin error (0.05)

1 is a constant value.

$$n = \frac{150}{1+ (150)(0.05)*2}$$

n= 109

From the calculation above, the sample size for the study was 109.

3.5 Data Collection Methods

Questionnaires were used for data collection. Questionnaires are the most preferred method as they capture large amounts of data. Questionnaires save time and uphold confidentiality of the respondent. There was no opportunity for interviewer bias and it was also convenient for the respondent. The questionnaire was divided into two sections; the first section delved into demographics data of the respondents while the rest of the sections focus on factors contributing to medication error reporting presented as per the objectives of the study.

Two research assistants were recruited to assist with the questionnaire distribution and collection. The research assistants were trained before they study was conducted. The training included brief introduction to the study, discussion on the questionnaire and how to administer the questionnaire.

Data collection procedure- A letter of introduction from Strathmore University and ethical approval from KNH-UON ERB was sought in order to get authorization from the management of KNH to collect data from the respondents in the institution.

The research assistants explained to the respondents the aim of the study, confidentiality of the respondents, the risks and benefits involved and the right to withdraw from the study. After informed consent, the respondent completed the self-administered questionnaire. The respondents were assured by use of a verbal consent that the information obtained from them would be treated with ultimate confidentiality and were therefore requested to provide the information truthfully.

Data handling procedure- all completed questionnaires were stored safely in a locked cabinet accessible to the researcher only. The respondents did not use any names or symbols to ensure confidentiality. Once data was entered into an electronic system, it was stored in a password protected computer with access limited to the researcher only.

3.6 Data Analysis

Data collected from the completed questionnaires was summarized, coded, tabulated and checked for any errors and omissions. Responses in the questionnaires were processed by use of Statistical Package for Social Science (SPSS) version 20.0. Frequencies and cross tabulations were used to summarize descriptive statistics and tables were used for data presentation. Binary logistic regression was used to identify factors associated with medication error reporting and then the variables were checked for significant association using p-value and 95% confidence interval.

3.7 Measures of Reliability and Validity

Reliability describes how far a particular test, procedure or tool, such as a questionnaire, will produce similar results in different circumstances i.e. if it is used by different users and at different times (Roberts, 2006). Cronbach's alpha methodology which assesses internal consistency of individual questions in a questionnaire was used.

Validity describes the extent to which a measure accurately represents the concept it claims to measure (Punch, 1998). External validity addresses the ability to apply with confidence the findings of the study to other people and other situations. It is ensured by drawing representative sample of the population of interest and in reference to relevant variables such as age and gender. Internal validity helps to reduce unanticipated reasons for different outcomes than those expected. Internal validity can be ascertained through use of literature review to develop the questionnaires and pilot testing the questionnaire with people who are similar to the study respondents (Punch, 1998).

The questionnaire was based on the research questions and the conceptual framework of the study that was informed by literature review. The study selected a pilot group of 10 individuals from the target population to test the reliability of the research instrument. The pilot study enabled the researcher and research assistants to be familiar with the questionnaire and its administration procedure as well as identifying items that required modification to enhance its validity and reliability. To minimize response bias, research assistants were trained prior to administering the questionnaire. Respondents were informed that their responses were anonymous and would not in any way be used to victimize them. In addition, respondents were encouraged to seek clarification for whatever was not clear.

Reliability analysis was subsequently done using Cronbach's Alpha which measures internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. Frankfort-Nahmias (2012) established for the Alpha value threshold at 0.7, thus forming the study's benchmark. Cronbach's Alpha was established for every objective which formed a scale. . According to the study findings, the Cronbach Alpha for process of reporting was reported as 0.806, organizational factors 0.711, prescriber characteristics 0.838 and barriers to reporting 0.7818. In view of this, it was imperative to use the survey tool for data management with no amendments.

3.8 Ethical Consideration

Respondents were given free will to participate and contribute voluntarily to the study. Written consent was sought from the respondents before being interviewed. In addition, the study ensured that necessary research authorities were consulted and consent approved and appropriate explanations specified to the respondents before commencement of the study. Plagiarism was avoided through proper referencing of all sources used.

There were no anticipated risks for participants in the study. The participants were informed they would not directly benefit from the study but the results would be disseminated to KNH management to inform medication use and management. The risks and benefits of the study to the participants were explained on the consent form. Identifiable respondent's data was removed prior to data analysis. The questionnaires were coded and stored securely in a lockable cabinet accessible to the researcher only. Soft copies of the data were stored in a password protected computer only accessible to the researcher.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction

This chapter discusses the study findings from data collected at the Kenyatta National Hospital on factors contributing to medication error reporting. The aim of the study was to identify factors contributing to barriers to effective medication error reporting. It further sought to determine the association between prescriber characteristics and medication error reporting and examine barriers to effective medication error reporting.

4.1 Key findings

4.1.1 Response rate

Table 4. 1 Response rate

Response	Frequency (n)	Percent (%)
Returned questionnaires	106	96.3
Unreturned questionnaires	4	3.7
Total	110	100

As indicated on table 4.1 above, out of 110 semi-structured questionnaires distributed, 106 were fully filled and returned, giving a good response rate of 96.3%.

4.1.2 Social-demographic characteristics

This set of data describes the demographic characteristics of the sample and assesses for any influence on the research findings. According to the study findings, the percent of male respondents was almost similar to the female respondents. Seventy-seven of the one hundred and five respondents(72.6%) were below forty years of age with 6.6% of respondents being above fifty years of age. Majority of the respondents were graduates with 1.9 % of the respondents having master's level of education. Staff on permanent terms of engagement who worked approximately forty hours a week represented half of the respondents. 57% of staff interviewed have worked in Accident and Emergency department for less than five years. Level of experience and training is key in medication error prevention. In the absence of formal education, doctors and nurses have to learn "on-the-job" thus making level of

experience in medical field very crucial in reduction of medication errors.

Table 4. 2 Socio-demographic characteristics

Variables	Frequency(n)	Percentage (%)
Sex		
Male	57	53.8
Female	49	46.2
Age (years)		
Below 20	-	-
21-30	40	37.7
31-40	37	34.9
41-50	22	20.8
Above 50	7	6.6
Highest education level		
Certificate	7	6.6
Diploma	32	30.2
Undergraduate	43	40.6
Post Graduate	22	20.8
Masters	2	1.9
Job title		
Medical officer	34	32.1
Nurse	72	67.9
Terms of engagement		
Permanent	54	50.9
Contract	35	33.0
Temporary short-	17	16.0
Contract(locum)	-	-
Number of years worked		
Less than 1 year		15.1
1-3 years		21.7
4-6 years		21.7
7-9 years		6.6
10-12 years		6.6
13-15 years		7.5
Number of hours worked		
Less than 20 hours	9	8.5
20-30 hours	35	33
30-40 hours	52	49.1
Over 40 hours	10	9.4

4.2 MEDICATION ERROR REPORTING

4.2.1 Awareness of Medication Error Process reporting in KNH

Majority of the respondents were not aware if there was a standardized definition of a medication error or there being a clear system of reporting occurrence of a medication error in Accident and Emergency department. Most staff think that the system for reporting medication is not anonymous and this can contribute to under-reporting. Despite most of the respondents (35.6%) strongly agreeing there were benefits to reporting medication errors, majority were uncertain on whether they were happy with the reporting system also if the system was effective. Sensitization through continuous medical education forums and supervisor's support were cited as factors which encourage staff to report medication errors.

Process of Reporting	**SA %(n)**	**A %(n)**	**Uncertain %(n)**	**D %(n)**	**SD %(n)**	**Mean(SD)**
There is a clear definition of medication error	7.8(8)	33(34)	35(36)	17.5(18)	6.8(7)	3.2(1.0)
There is a clear system of reporting medication error	10.4(11)	28.3(30)	42.5(45)	9.4(10)	9.4(10)	3.2(1.1)
Process of reporting is not anonymous	11.4(12)	27.6(29)	30.5(32)	17.1(18)	13.3(14)	3.1(1.2)
There are benefits to reporting medication	35.6(36)	25.7(26)	24.8(25)	10.9(11)	3.0(3)	3.8(1.1)

errors						
Do you think the process/ system of reporting works	16.2(16)	28.3(28)	32.3(32)	19.2(19)	4(4)	3.3(1.1)
Are you happy with the reporting system	11.4(12)	31.4(33)	33.3(35)	16.2(17)	7.6(8)	3.3(1.2)
Have you been oriented/ taught	14.4(15)	35.6(37)	23.1(24)	17.3(18)	9.6(10)	3.3(1.1)
Does your immediate supervisor/	26.7(28)	38.1(40)	22.9(24)	7.6(8)	4.8(5)	3.7(1.1)
Do you have CMEs on medication errors and medication error	13.6(14)	28.2(29)	22.3(23)	19.4(20)	16.5(17)	3.0(1.3)

4.2.2 Organizational factors influencing medication error reporting

Majority of respondents felt the organization's systems and processes contribute significantly to poor medication error reporting. Lack of standard treatment protocol or reference material, lack of hospital management commitment and poor orientation of new staff as shown below in table(----) plays a role in poor medication error reporting. access to reference material, use of information technology in medication use management and availability of standard treatment protocols in the hospital reduce the likelihood of medication errors occurring.

Organizational factors	**SA %(n)**	**A %(n)**	**Uncertain**	**D %(n)**	**SD %(n)**	**Mean(SD)**
Lack of hospital management	17(18)	32.1(34)	23.6(25)	15.1(16)	12.3(13)	3.3(1.3)

commitment influences medication error reporting						
Lack of orientation of new staff contributes to medication errors	19(20)	30.5(32)	24.8(26)	15.2(16)	10.5(11)	3.3(1.2)
Do you have access to reference books e.g. drug index, BNF?	12.5(13)	30.8(32)	25.5(26)	14.4(15)	16.3(17)	3.1(1.3)
Lack of standard treatment protocols contribute to medication errors	16(17)	24.5(26)	32.1(34)	24.5(26)	2.8(3)	3.3(1.1)
Lack of information technology (IT) in medication management influences medication error	8.7(9)	31.7(33)	21.2(22)	23.1(24)	15.4(16)	2.9(1.2)

4.2.3 Prescriber characteristics and occurrence of medication errors

Majority of the respondents felt level of prescriber experience does not play a key role in medication errors as anyone is prone to making errors. Fatigue due to long working hours and low staff morale significantly contribute to

occurrence of a medication error. 55% of staff felt absence of teamwork increases the chance of a medication error occurring.

Prescriber characteristics	SA %(n)	A %(n)	Uncertain %(n)	D %(n)	SD %(n)	Mean(SD)
Low morale/ lack of motivation influences medication error reporting	21.2(22)	26.9(28)	26.9(28)	15.4(16)	9.6(10)	3.4(1.3)
Prescribers level of experience is a key contributor to medication errors	9.7(10)	29.1(30)	34(35)	22.3(23)	4.9(5)	3.2(1.0)
Lack of teamwork leads to medication errors	16.3(17)	39.4(41)	21.2(22)	17.3(18)	5.8(6)	3.46(1.3)
Fatigue due to long working hours contributes to medication errors	23.3(24)	34(35)	15.5(16)	19.4(20)	7.8(8)	3.4(1.3)

4.2.4 Reasons for poor reporting of medication errors at KNH

Most of the respondents perceived that reporting medication errors would influence their annual performance evaluation. A similar percent of respondents felt that the individual was most likely to be blamed for the error than the system thus face punishment and their colleagues would express negative attitude or associate them with being incompetent.

Despite the poor reporting of medication errors being experienced in the hospital, 56.6% of the respondents felt that medication errors were important and influenced patient outcome. A significant number of staff felt there was need to report errors whether patient was harmed or not.

Reasons for poor reporting of medication errors	**SA %(n)**	**A %(n)**	**Uncertain %(n)**	**D %(n)**	**SD %(n)**	**Mean(SD)**
Fear of impact of reporting of medication errors on the staff's annual evaluation	19(20)	33.3(35)	18.1(19)	23.8(25)	5.7(6)	3.4(1.3)
Blaming the individual instead of the system	21.9(23)	33.3(35)	24.8(26)	16.2(17)	3.8(4)	3.4(1.2)
Fear of being labelled as incompetent doctor/ nurse	27(25.5)	28.4(29)	22.5(23)	18.6(19)	3.9(4)	3.4(1.2)
Fear of punishment	22.1(23)	24(25)	24(25)	23.1(24)	6.7(7)	3.4(1.2)
Colleagues expressing negative attitude towards doctor/ nurse making the error	20.4(21)	30.1(31)	10.7(11)	25.2(26)	13.6(14)	3.5(1.1)
Perceiving medication errors as not important	2(2)	7.1(7)	7.1(7)	27.3(27)	56.6(56)	3.2(1.1)
No need to report if patient is not harmed	3.8(4)	8.6(9)	20(21)	21(22)	46.7(49)	2.0(1.2)

No feedback after reporting	19(20)	10.5(11)	25.7(27)	28.6(30)	16.2(17)	2.9(1.3)

4.2.5 Correlation between organizational factors, prescriber characteristics and process of reporting and medication error reporting

Organizational factors, prescriber characteristics and awareness of process of reporting can be used to predict medication error reporting in KNH. The P-value is < 0.05(0.005) hence the model is statistically significant. The adjusted R2 is 34.7% thus it can be concluded that 34.7% of the variance in barriers to medication error reporting can be explained by three parameters i.e. organizational factors, prescriber characteristics and awareness of process of reporting.

$Y=B_0+B_1X_1+B_2X_1+B_3X_3$

$Y=8.414+0.093X_1+0.836X_2+(-)0.01X_3$

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change

1	.605[a]	.366	.347	4.81632	.366	19.627	3	102	.0005
a. Predictors: (Constant), Process of Reporting, Organizational factors, Prescriber characteristics									

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	8.414	2.849		2.953	.004	2.763	14.065
Organizational factors	.093	.124	.065	.750	.455	-.152	.338
Prescriber characteristics	.836	.127	.575	6.583	.000	.584	1.087
Process of Reporting	-.010	.071	-.011	-.144	.886	-.151	.131

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter summarizes findings from the study conducted on factors contributing to poor medication error reporting in Kenyatta National Hospital and its association with other studies done in other settings. The objective of the study was to identify organizational factors that contribute to medication error reporting and analyze staff perception to the barrier to effective medication error reporting in Kenyatta National Hospital.

5.1 Factors contributing to poor reporting of medication errors

Medication errors can lead to severe and preventable adverse consequences for patients. Error reporting systems help institutions identify patterns and problem areas enabling them to prevent future errors and thus reduce patient harm. Previous studies done do not show any statistical differences related to age, years of experience or level of education in health workers' perception of medication errors. The research findings echo findings in previous studies. There was no statistical difference relating staff social-demographic characteristics to medication error reporting.

Level of experience, number of hours worked, heavy workload, distraction and work interruptions during patient care have been shown to be major causes of medication errors in hospitals. Rogers et. Al (2004) conducted a study to examine the work patterns of hospital staff nurses in various hospitals in USA. The aim of the study was to identify possible relationship between hours worked and frequency of errors in hospitals. The study

findings indicated that the likelihood of making an error was three times higher when nurses worked for longer hours in a shift.

The researcher was not able to draw any significant statistically relationship between social-demographic findings and medication error reporting. Although 90% of staff work for 40 hours a week or less, the study findings were not able to relate the working hours to medication errors at Kenyatta National Hospital. Level of education and terms of employee engagement did not significantly contribute to medication error reporting. 65% of respondents have worked in KNH for less than ten years while 35% have more than ten years' experience at the hospital. Staff who have worked in the institution for longer period of time are likely to be more aware of the hospital procedures and protocols including medical error reporting systems. Awareness of medication errors reporting processes could not be linked to staff's level of experience and education level.

5.2 Awareness of Medication Error Process reporting in KNH

Confusion among healthcare workers on definition of medication errors and the process of reporting was found to be affecting medication error reporting (Gladstone, 1995). Confusion among nurses regarding definition of medication errors, when such errors should be reported to supervisors and fear of disciplinary action upon reporting medication errors were identified as areas of concern. Other studies replicated Gladstone's work (Mayo & Duncan, 2004; Osborne, Blais, & Hayes, 1999; Ulanimo et al., 2007). These studies demonstrated continuing confusion among staff about what constitutes a medication error.

Lack of clear definition of medication error in Kenyatta National hospital was demonstrated in this study. Only 40% of respondents were aware of clear definition of medication errors. A similar number of staff felt the medication reporting system was clear and were happy with the system. Confusion in medication error definition and lack of clear reporting systems contribute to poor reporting of errors in the hospital. With clear definition of medication errors and an appropriate working reporting system it is expected that reporting of errors would be help the hospital develop effective strategies for a safer healthcare system.

Sensitization of staff about medication errors and regular departmental continuous medical education on errors plays a role in demystifying medication errors to staff and outlining the process of reporting. Managerial support cannot be overlooked in error reporting. 38.1% of the respondents agreed their immediate supervisor encouraged them to report medication errors. This finding does not support the under-reporting of medication errors noted in the hospital thus the need to find out why staff are not reporting perceived or noticed medication errors.

5.3 Organizational factors influencing medication error reporting

Hospital management commitment is critical to promoting patient safety practices such as medication error reporting. Homsma G. J et al, (2009) contends that improved medication error reporting occurs in an environment that encourages and supports reporting of errors. Similar study done by Kim K.S et. Al (2011) recommended that hospital administrators should organize regular measurement of the organization's safety culture as it affects staff error reporting.

The current study seems to echo the need for leadership and management support with 49% of respondents agreeing that lack of hospital management commitment and proper orientation and induction of new staff contributed to medication errors and medication error reporting. Orientation of new staff should encompass hospital patient safety measures and protocols used in management of patients. The hospital management should create an environment conducive to reporting medication errors in a non-blaming and fair organizational approach.

Non- adherence to clinical protocol, staffing levels, lack of reference materials, inexperience and lack of regular updates of clinical knowledge were found to be common causes of medication errors in a study conducted by Carlton and Blegen (2006). Majority of study respondents (30.8%) were uncertain if lack of clinical protocols in the hospital contributed to medication errors. These findings negate the widely expressed view that adherence to clinical protocols had a positive impact on medication error rate reduction.

31.7% of respondents felt that lack of information technology in medication management influenced medication errors in the hospital. Automation of drug prescribing and dispensing system eliminates issues of poor handwriting by prescriber and issuance of over and under-dose for patients. Most CPOE systems are able to flag discrepancies in doses and drug interactions which are likely to lead to medication errors in the hospital. Implementing CPOE system requires change in the hospital's culture and is an expensive process for the hospital in terms of training of staff on use of the system, procuring the system and implementing it.

5.4 Prescriber characteristics and occurrence of medication errors

Halbach J. and Sullivan L.(2003) found that insufficient knowledge and skills of personnel contributed to occurrence of medication errors. Lack of knowledge about medication, patient's diagnosis, patient name, method of operating infusion pumps and not knowing side effects of medicine were found to be common causes of medication errors. 34% of respondents in this study were not certain if level of experience contributes to medication error. Level of experience in healthcare workers is crucial in medication error prevention and reduction.

Knowledge and level of experience are key in medication error prevention. Healthcare is a complex field with evolving technology and innovations. Procedures or processes taught in medical or nursing school evolve with time, some are learned and others unlearned. This necessitates the need for continuous updating of knowledge and where there is no formal education, "on-the-job" training is embraced. Procedures such as administration of medication are taught in nursing school but lack of experience may contribute to medication errors especially among junior nurses.

Lack of motivation, lack of teamwork and fatigue also contribute to mediation errors. Fatigue is defined as a condition in which the person is unable to detect the continuous feeling of physical and mental performance analysis, capacity for work and reduced efficiency of accomplishment is experienced (Franklin N., 2010). Staff who work for long hours (more than 12 hours a day) ,heavy workload and reduced ratio of healthcare worker to patients lead to fatigue which is likely to result in increased medical error rates (Robert A.E, et. Al, 2004).

More than half of the respondents agreed fatigue due to long working hours contributed to medication errors. These findings are consistent with previous researches conducted on causes of medication errors.

5.5 Staff perception of barriers to medication error reporting at KNH

Chiang and Pepper(2006) conducted a study on Taiwanese nurses' perceptions of barriers to reporting medication errors and to examine the relationship between the barriers, cultural factors and work environment in Taiwan. The study and the findings showed fear of being blamed, fear of being labelled incompetent, fear of consequences of reporting errors and administrative barriers such as no positive feedback, focus on individual not system were the major perceived barriers to medication error reporting.

Several studies indicate healthcare workers often feel incompetent, guilty, worried and afraid of co-workers' reactions after making a medication error (Fry & Dacey, 2007; Mayo & Duncan, 2004 ; Tang et al., 2007). Fear of supervisor's reaction to medication errors and fear of what co-workers will say or think makes staff to be less likely to report medication errors (Fry & Dacey, 2007; Gladstone, 1995; Mayo & Duncan, 2004; Osborne et al., 1999; Rassin et al., 2005; Stetina et al., 2005).

According to the study findings, most respondents strongly agreed that fear of impact of medication error on staff's performance evaluation, fear of punishment, fear of being labelled incompetent by other staff and focusing blame on individuals instead of the system were barriers to reporting of

medication errors. The study findings support previous studies on reporting of medication errors done in other institutions.

5.6 Limitations of the Study

The study was primarily concerned with factors contributing to medication errors and medication error reporting in KNH. However, the study did not assess the medication error rate at the hospital or the current medication error reporting rate. The study was limited to Accident and Emergency department and may not be a reflection of other departments in the hospital.

5.7 Conclusion

Medication delivery is a complex, multi-disciplinary process. Errors can occur at any step of the medication delivery process. Errors must be reported in order to identify system failures and individual causes leading to the errors. Medication error reporting helps prevent error recurrence and thus reduces rate of medical errors that will occur in the future.

System factors such as lack of hospital management support, unavailability of reference material, lack of clinical protocols etc. and human factors such as level of experience, low morale, illegible handwriting, lack of teamwork and fatigue contribute to medication errors. These factors must be addressed in a nonpunitive manner that encourages staff to embrace a culture of reporting.

Leadership and managerial support plays a critical role in increasing the rate of medication error reporting. Fear of repercussion, damage to an individual's reputation, fear of punishment, lack of feedback mechanism and fear of being

blamed if medication error is reported prevents many staff from reporting. Error reporting is closely related to quality improvement in hospitals thus all staff should be encouraged to voluntarily report errors.

5.8 Recommendations

The results of this study can be used to carry out further research on medical errors. It is suggested further review should be carried on medication error rates and their severity in public hospitals and suggestions on reducing them be provided. A detailed review on barriers to reporting medication errors and providing solutions to reduce these barriers should be done.

Staff perception to poor medication error reporting should be addressed through training and continuous sensitization on importance of reporting errors. Voluntary self- reporting of errors is the best method of collecting data related to errors but with poor reporting of errors it might be necessary for the hospital to design an instrument for measuring medication errors in the hospital. Close monitoring and evaluation is necessary in the field of medical errors.

Future research should examine healthcare workers in various public and private institutions in Kenya in order to deliver comprehensive results in medication error reporting and patient safety in the country.

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APPENDICES

APPENDIX A: CONSENT FORM

Title of the study:

Principal investigator/ and institutional affiliation:

Introduction

I would like to tell you about a study being conducted by the above researcher. The purpose of this consent form is to give you information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign this form.

Your decision to participate is entirely voluntary. You may withdraw from the study at any time without necessarily giving a reason for your withdrawal. There are no anticipated risks or benefits to participating in this study.

This study has been approved by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee protocol No. **P195/03/2018**

If you have further questions or concerns about participating in this study, please call or send a text message to either Rhoda Kyalo 0720 818 611 or Dr. Frank Wafula 0722 679 467.

For more information about your rights as a research participant you may contact Prof. M.L. Chindia of Kenyatta National Hospital- University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44355 email uonknh_erc@uonbi.ac.ke.

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM (STATEMENT OF CONSENT)

Participant's statement

I have read this consent form or had the information read to me. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study.

I understand that all efforts will be made to keep information regarding my personal identity confidential.

Participant's signature: Date:

APPENDIX B: STRUCTURED QUESTIONNAIRE

Instructions: Please respond to the following questions and where applicable, mark the relevant box with a tick (√).

Confidentiality: The responses you provide will be strictly confidential. No reference will be made to any individual(s) in the report of the study.

PART A: BACKGROUND INFORMATION

1. What is your gender?

[ ] Male [ ] Female

2. In which of the following age brackets do you belong?

[ ] Below 20 years [ ] 21-30 years [ ] 31-40 years

[ ] 41-50 years [ ] Above 50 years

3. What is your highest education level (kindly state the highest level?)

[ ] Certificate [ ] Diploma [ ] Undergraduate

[ ] Post Graduate Diploma [ ] Masters [ ] Other _____

4.(a) What is your job title?

[ ] Medical officer [ ] Nurse

(b). What are your terms of engagement?

[ ] Permanent [ ] Contract [ ] Temporary short-term contract(locum)

5. How many years have you worked in the above job at the hospital?

[ ] Less than 1 year [ ] 1-3 years [ ] 4-6 years [ ] 7-9 years

[ ] 10-12 years [ ] 13-15 years [ ] Over 15 years

6. How many hours do you work at the hospital per week?

[ ] Less than 20 hours [ ] 20-30 hours [ ] 30-40 hours [ ] Over 40 hours

7. In your opinion, what is the overall patient safety perception in KNH?

[ ] Extremely safe

[ ] Very safe

[ ] Somewhat safe

[ ] Unsafe

[ ] Not safe at all

8. In your opinion, what is the overall patient safety grade in KNH?

[ ] Excellent

[ ] Very safe

[ ] Acceptable

[ ] Unsafe

PART B: MEDICATION ERROR REPORTING

Rate your agreement with the following statements on a scale of 1-5 where: 1= Strongly disagree, 2= Disagree, 3= Uncertain, 4= Agree and 5= Strongly agree.

	1	2	3	4	5
AWARENESS OF PROCESS OF REPORTING **This section focuses on the medication error reporting system in the department.**					
Is there a clear definition of medication error in the department?					

Is the medication error reporting system clear?					
Process of reporting is not anonymous.					
There are benefits to reporting medication errors.					
Do you think the process/ system of reporting works?					
Are you happy with the reporting system?					
Have you been oriented/ taught on/about the medication error reporting process?					
Does your immediate supervisor/ manager/ in charge encourage you to report medication errors?					
Do you have CMEs on medication errors and medication error reporting in your department?					
ORGANIZATIONAL FACTORS **This section looks into factors in the hospital which influence medication errors in the department.**					
Lack of hospital management commitment influences medication error reporting.					
In your opinion, does lack of orientation of new staff contribute to medication errors in the department?					
Do you have access to reference books e.g. drug index, BNF?					
In your opinion, does lack of standard treatment protocols contribute to medication errors in the department?					

Does lack of information technology (IT)in medication management influence medication errors in the department?					
PRESCRIBER CHARACTERISTICS **This section focuses on staff characteristics such as level of experience, motivation levels, teamwork and fatigue/ stress.**					
Low morale/ lack of motivation among staff influences medication error reporting in the department.					
Is Prescribers level of experience a key contributor to medication errors?					
Lack of teamwork leads to medication errors in the department.					
Fatigue due to long working hours contributes to medication errors in the department.					
STAFF PERCEPTION TO BARRIERS TO REPORTING ERRORS **This section focuses on the reasons why people fail to report medication errors in the department.**					
Fear of the impact of reporting of medication errors on the staff's annual performance appraisal.					
Culture of blaming the individual instead of the system.					
Fear of being labelled as an incompetent doctor/ nurse.					
Fear of punishment by supervisors.					

Fear of colleagues expressing negative attitude towards doctor/ nurse who made the error.					
I feel medication errors are not important.					
There is no need to report if patient is not harmed.					
There is no feedback after reporting an error.					

Please give suggestions/recommendations for enabling a positive culture of medication error reporting at the Kenyatta National Hospital

_____

_____

_____

_____

VT OMNES
VNVM SINT