FACTORS INFLUENCING REPORTING OF MEDICAL ERRORS AMONGST NURSES IN PEDIATRIC WARDS IN THREE TEACHING AND REFERRAL HOSPITALS IN NAIROBI KENYA.

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE CONFERMENT OF THE DEGREE OF MASTER OF SCIENCE IN HEALTH SYSTEMS MANAGEMENT OF KENYA METHODIST UNIVERSITY.

OCTOBER, 2022

DECLARATION

I declare that this research thesis is my original work and has not been presented for a degree or any other award in any other university.

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APPROVAL BY SUPERVISORS

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DEDICATION

I dedicate this thesis to all healthcare workers who diligently work and support patient safety on a day-to-day basis. Keep up the good work.

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ABSTRACT

Service delivery is among the six health system strengthening pillars. Successful health services bring about effective, quality, safe, personal and non-personal health care actions to those who need them, where they need them and when required with minimal resource wastage. Medical error is an act of commission or omission that either caused, contributed or had potential to cause or contribute to patient harm. It is a leading challenge in service delivery of emerging international concern. Medical errors are underreported both globally and within Kenya (0.03% and 13%), yet reporting helps in implementing measures which help prevent recurrence, enhance safety and reduce harm. This study aimed to determine factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi Kenya. The specific objectives of the study were to determine if nurses' knowledge on medical errors reporting, management support for medical errors reporting, medical errors reporting systems and organizational safety culture influences reporting of medical errors, all these, amongst nurses in three teaching and referral hospitals in Nairobi Kenya. The study was cross-sectional and utilized both quantitative and qualitative approaches in data collection. Target population was 195 nurses in the three hospitals and the sample size was 131 nurses. Response rate was 88%. Quantitative and qualitative data were collected from the nurses using a pretested questionnaire. Key Informant Interview Guide was utilized to collect quantitative data from 3 nurse managers. Data was coded and analyzed using SPSS version 25 and presented in the form of charts and graphs. Results show that nurse knowledge on medical errors $\chi 2$ (1, N =115) = 4.255, p =.039) , management support on reporting $\chi 2$ (1, N =115) = 4.671, p = .043) and medical errors reporting systems $\chi 2$ (1, N =115) = 9.769, p = . 002) had significant association with reporting medical errors.There was no relationship between organization safety culture and reporting medical errors, $\chi 2$ (1, N =115) = 0.242, p = . 623). This study recommends that nurses' knowledge on medical errors reporting be promoted through trainings during college/university and during in-service, management to disseminate policies to staff and ensure the same is well understood. Feedback about changes made based on those errors to be communicated to staff and just culture to be embraced in acting on medical errors. Finally, medical error reporting systems to be simplified and made readily accessible.

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ABBREVIATIONS AND ACRONYMS

AKUH-N	Aga Khan University Hospital Nairobi
GCH	Gertrude's Children's Hospital
KNH	Kenyatta National Hospital
NACOSTI	National Commission for Science, Technology and Innovation
SPSS	Statistical Package for Social Sciences
TPB	Theory of Planned Behavior
UoN	University of Nairobi
USA	United States of America
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

In an effort to improve health outcomes, the World Health Organization (WHO) developed a framework for action to strengthen health systems. This framework has a total of six pillars: Health financing, leadership and governance, service delivery, health workforce, medical products, vaccines and technologies and health Information (World Health Organization [WHO], 2007).

This Research focused on the service delivery pillar. Health service delivery should be safe and of good quality. Acording to the World Health Organization (WHO), good health services ensure the delivery of effective, safe, quality, personal and non-personal health care interventions to those people who need these services, when they need them and where they need them, with minimal resource wastage (WHO, 2007).

Medical errors are a serious problem in healthcare. It is among the leading causes of mortality in the USA (Rodziewicz et al., 2021). Medical error is an act of omission or commissions that was not intended, or that which does not achieve the intended outcome. It is also defined as the failure of an action which was planned not being completed as planned i.e. an error of execution and planning error, which is using wrong plan to achieve an objective. (Makary & Daniel, 2016).

The incidence rates of medical errors are an emerging international concern. The biggest challenge In the management of medical errors however is underreporting (AAnal & Seren, 2016). Reporting of medical errors is basic factor in patient safety improvement. Reporting medical errors creates an excellent avenue for learning from such errors (AAnal & Seren, 2016). Medical error reporting is a very important tool in

the development and maintenance of risk awareness in health care organizations (Pham et al., 2013).

Medical Errors is classified as the third in position on causes of mortalities in United States of America (USA) hospitals. This is after cardiovascular diseases and cancer (Makary & Daniel, 2016). It is estimated that the burden of medical errors is much higher in Africa. Makary and Daniel highlight that if a country like USA with abundant resources channeled towards the medical sector, can record such a high rate of medical errors, then low and middle income countries must be more vigilant and ready to put measures in place to reduce the risk of medical errors (Makary & Daniel, 2016).

Children are affected by medical errors at a greater risk than adults. When it comes to medication errors for instance, children are affected more by these errors than adults. This is largely because of their dependency on care givers and parents. It is also due to their different medical conditions and their age related complexity in dose calculations. Another example is blood stream infections in children. Strategies to reduce this category of medical errors are more tailored towards adults and they are not as effective in children. For medication errors, many medication error computerized systems are more designed towards adults as opposed to children (Mueller et al., 2019).

In the USA, the underreporting of medical errors is between an estimate of 50% and 96% (Archer et al., 2017). Among children in the USA, medication error was up to 2.96% among admitted children (Mueller et al., 2019). In another study, admitted children were found to be at a great risk for adverse events with the incident rate going up to 11% of all admissions (Stroupe et al., 2018). A trigger tool was utilized to

detect medical errors in a pediatric academic medical centre. The tools revealed a medical error rate of 4.8%. This is against a reporting rate of only 1.2% (Stroupe et al., 2018).

In England, medical errors which are perceived as simple are reported in 22% to 39% of the times whiles those which are more serious in many a times usually end up being unreported (AAnal & Seren, 2016). In a study done in Nigeria, only 30% of the participants said they frequently report medical errors (Christopher et al., 2010). According to Jember et al.(2018), reporting of medication error among nurses in an Ethiopian study was at 57.4%. In Uganda, medication errors reporting by nurses, only 47% of participants acknowledged that they had reported medical errors, either committed by them or witnessed being committed by others (Kiguba et al., 2015).

Medical Errors reporting is the starting point of learning from errors (Leistikow et al., 2017). This background information shows that medical errors are a serious health concern globally. If the medical errors are not reported, then no learning will take place, and this will consequently lead to the recurrence of similar errors. Failure to learn from these errors frustrates quality and patient safety initiatives and patients continue to experience preventable harm. To improve service delivery, it is paramount that we report medical errors and thereby learn from them and improve patient safety.

1.2 Statement of the Problem

In Kenya, many medical errors go unreported. In a study done in Aga Khan University Hospital Nairobi (AKUH-N), error rate when calculated using the reported incidents was low at 0.03% however when the researchers did a medical records review to look out for medical errors, the rate was higher at 1.4% showing that some of the errors found on medical record review had not been reported (Macharia et al., 2016). In Gertrude's Children's Hospital (GCH), a report generated in 2017 showed

that 70% of medical errors were being reported by pharmacy staff. Nurses, despite being the bulk of the staff and in direct contact with patients 24/7 reported only 13% of the errors. This means that if Pharmacy staff who are few, and in a small department were reporting up to 70% of the errors, the nurses were not reporting many of the medical errors occurring in their departments. (Gertrude's Children's Hospital [GCH], 2017). Kenyatta National Hospital (KNH) has similarly been in the news for medical errors however there is no data in the public domains on the rate of medical error reporting rate in the facility. The gap is that reporting of medical errors is low, and the factors contriburing to this have not been established.

1.3 Purpose of the study

The aim of this study was to determining the factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. Focus was on nurses' knowledge of medical errors, management support for medical errors reporting, medical error reporting systems and organizational safety culture and if these four influence medical errors reporting.

1.4 Research Objectives

1.4.1 Broad Objective

To determine factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

1.4.2 Specific Objectives

i. To determine if nurses Knowledge on medical errors reporting influences the reporting of these errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

ii. To determine if management support for the reporting of medical errors influences reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

iii. To determine if medical error reporting systems influences reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

iv. To determine if organizational safety culture influences reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

1.5 Research Questions

i. What is the influence of nurses' knowledge on medical errors reporting, on the reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County?

ii. What is the influence of management support for medical error reporting, on the reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County?

iii. What is the influence of medical error reporting systems on the reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County?

iv. What is the influence of organizational safety culture on reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County?

1.6 Justification of the Study

Service delivery should be safe and of good quality. Patient safety is a human right globally and as per Kenya's constitution, Chapter 4, Bill of Rights (The Constitution

of Kenya, 2010). Medical errors are a serious problem in healthcare, affecting both developed and developing countries and children are more affected than adults (Mueller et al., 2019). In the USA, among the leading causes of mortalities, medical errors comes third, accounting for about 200,000 deaths per year (Makary & Daniel, 2016). Error rates were also higher in children than adults, and teaching hospitals were more affected than the others (Mueller et al., 2019). In a study done in South Africa amongst anaesthetists, 94% indicated having administered incorrect medication to a patient (Nel, 2017). Nel also indicates that underreporting errors is very common amongst healthcare workers in South Africa (Nel, 2017). Globally, underreporting medical errors is estimated to be between 50% and 96% (Holden & Karsh, 2014). In England, medical errors perceived as simple are reported at 22% to 39%, while those which are more serious usually go unreported (AAnal & Seren, 2016).

In Uganda, Kiguda notes that medical errors are largely underreported by healthcare proffessionals, and this undermines quality improvements in healthcare (Kiguba et al., 2015). According to Kiguba, the challenge in African countries is that reporting systems for medical errors have hardly been embraced. There is also the aspect of blame culture, which adversely affects the reporting of errors.

Medical errors have been a big challenge in Kenya, with minimal reporting of the same. In Aga Khan University Hospital Nairobi (AKUH-N), reported errors were 0.03% however when the researchers did a medical records review to look out for medical errors, the rate was higher at 1.4%, showing that some of the errors found on medical record review had not been reported (Macharia et al., 2016). In Gertrude's Children's Hospital (GCH), a report generated in 2017, nurses reported only 13% of the medical errors compared to pharmacy team who had reported 70% of the errors.

There is no information in the public domains showing the factors influencing reporting of medical errors in Kenya.

This study aimed to determine the factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The study findings will be used to inform decision-makers on actions to implement to enhance reporting of medical errors thereby enhance the learning base and reduce patient harm resulting from these medical errors.

1.7 Limitations of the Study

The study participants were nurses working in pediatric wards in three teaching and referral hospitals in Nairobi County. These are busy facilities and it required proper timing for the respondents to avoid low response rate. The questionnaires were made easy to use and administration of the questionnaires was also well timed to capture nurses during breaks and resting periods to avoid disruption of patient care.

Another major limitation was COVID -19 restrictions which posed a risk of low respondents turn out and delayed data collection. The researcher took several months break from data collection during the time when non critical visits to hospitals were completely restricted in line with health guidelines. When the ban was eased, the researcher sort for permission to initiate research in the context of COVID-19 pandemic as was required by the participating hospitals. The researcher also complied with all COVID-19 protocols as was required for each of the study sites.

1.8 Delimitations of the Study

This study was done amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The results may thus not reflect the other cadres like doctors, pharmacists and laboratory technologists.

1.9 Significance of this study

The study was conducted to determine the factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The research findings were expected to utilized by decision makers in the implementation of evidence based measures to improve reporting of medical errors and thereby enable learning from the reported errors. This consequently was to lead to reduction in medical errors, safe and high quality service delivery and improved health outcomes not only in the county, but across the country and beyond. The study was expected to inform policy makers at the Ministry of Health, Ministry of Education, health system leaders, chief executive and nursing officers and directors of quality within the hospitals on evidence based practices for implementation to improve service delivery pillar.

1.10 Operational Definitions of Terms

Adverse Event	Undesirable or unsafe occurrence which was not anticipated, in a health care settings resulting to harm. The patient suffers harm as a result of medical error however the harm does not result to death or any serious physical or psychological injury.
Knowledge of medical errors reporting	This has been used to mean extend to which the nurses know what medical errors are, what medical errors reporting is and entails. Also, nurses training on medical errors and medical errors reporting.

Management Support	This is the extend to which hospital leadership and management supports reporting of medical errors through policy direction, taking the correct actions when medical errors are reported, creating a culture of patient safety and keeping nurses aware of actions being taken to improve safety.
Medical Error	Medical error is defined as an act of commission or omission that either caused or contributed or had the potential to cause or contribute to patient harm. Planned activities fail to be done as planned or fails to achieve the expected results.
Near miss	A medical error that nearly reached patient but an intervention prevented this, or which did not cause illness or Injury but has the potential to do so.
Nurses in Pediatric wards	The qualified nurses working as nurses in the pediatric inpatient sections (all kinds of pediatric wards; general wards, specialized wards, including critical care wards) in the three teaching and referral hospitals in Nairobi County.
Organizational Safety Culture	Organizational Safety culture is defined as the product of attitudes, values both for group and individual, competencies, perceptions and behavior patterns which show the commitment of an organization safety processes

Reporting System	Refers to the tools used in reporting of medical errors. These can be hard copy templates or in form of a software or other computerized tools.
Teaching and referral Hospitals in Nairobi County.	Refers to those hospitals in Nairobi County listed by the Kenya Medical and Dentists Council as Private Internship and Teaching Referral Hospital, or as National Teaching and Referral Hospital under Facility Type Classification 2019.

CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

This chapter presents reviewed literature related to medical errors reporting across healthcare systems. These have been reviewed; Medical error reporting practices, nurses' knowledge on medical error, management support for medical error reporting, organizational safety culture and how it influences medical error reporting, and medical error reporting systems. The chapter also provides the theoretical and conceptual frameworks of this study.

2.2 Introduction to Medical Errors

Medical error is defined as an act of omission or commission that either caused or contributed or had the potential to cause or contribute to patient harm. Planned activities fail to be done as planned or fails to achieve the expected results. There is a deviation in a process, which may or may not cause harm to patients. Example may include deviation from a practice guideline or standard operating procedure. (Makary & Daniel, 2016; WHO, 2019). All medical errors should be reported, investigated, and actions implemented to enhance safety of patients and also to better the quality of care provided.

Some examples of medical errors include communication errors, where there is wrong or missing information. There are also execution-related errors where a correct plan of action does not end up as intended. Medical error can also be judgmental in nature. In this, there is wrong reasoning leading to the error. A medical error can also be due to omission where required intervention is not offered (WHO, 2019).

2.3 Nurses Knowledge and Medical Errors Reporting

2.3.1 Understanding of Medical Errors Reporting

Medical errors prevention is a responsibility of everyone. Nurses need to be trained and made aware of medical errors, including error reporting process (A train education, 2022). For nurses to report medical errors, it is paramount they understand what medical errors are, what errors are reportable and how to report them. A study in Nigeria, 75% of participants termed adverse events as some form of mistakes which a member has made of the healthcare team during patient care or treatment; this is a wrong understanding (Christopher et al., 2010). In another study in Iran, only 39.5% of the physicians were familiar with what errors needed to be reported (Pham et al., 2013).

In Iran, nurses were noted to have had inadequate knowledge of medical errors and how to report them (Safarpour et al., 2017). According to Safarpour (2017), the greatest hindrance to reporting in this study was inadequate knowledge and nurses feared being punished. In another Saudi Arabian study done amongst nurses, 31.3% of the study participants said their hospitals have in place systems for reporting medical errors and only 8.7% of the health workers indicated that they were knowledgeable on the medical error reporting systems in the hospitals. A study ny Mauti & Githae in Uganda among nurses, 64.6% of them did not know how to report medical errors (Mauti & Githae, 2019).

The study showed poor knowledge across all cadres of staff and 64.7% of the nurses expressed poor knowledge (Abdel-Latif, 2016). This literature shows that understanding medical errors and how to report them is important for any successful

improvement in the medical error reporting process. Hospitals management and nurse leaders should ensure that there is a uniform and clear definition of medical error and that nurses are clear on what needs to be reported and how to report it (Afaya et al., 2021).

2.3.2 Nurses Training and Medical Errors Reporting

The topic of medical errors and patient safety has been greatly ignored in many curriculums for training healthcare professionals (Sultana et al., 2017). According to Sultana, the teachers believed that training students on medical errors while still at school before completing their studies would be more effective and lead to a more focused healthcare provider. Only 12.5% strongly agreed to the question which sort to address how teaching the students was preparing them to understand better what medical errors was all about and 12.5% strongly agreed to the question that sort to address how their teaching prepared students in medical errors prevention (Sultana et al., 2017).

Nursing staff should be trained on medical error reporting to enhance their reporting of medical errors, as noted in a Soudi Arabian study among nurses (Banakhar et al., 2017). In Uganda, a study done among nurses and doctors, 41.7% of participants stated that training of medical error reporting was the key factor in improvement of medical error reporting. 55.4% of the nurses and 66.7% reported that they had been trained on patient safety (Mauti & Githae, 2019). The literature review here shows that it is essential that healthcare professionals are trained on medical errors before graduation and in-service training to enhance their effectiveness.

2.4 Management Support for Medical Errors Reporting

2.4.1 Clear Policies on Medical Errors Reporting

Errors in the healthcare system are at unacceptably high level. In Uganda, organizational leadership and support was critical in improving error reporting according to 82% of the participants (Kiguba et al., 2015). Availability of Clear medical error reporting standards and policies is believed to influence medical error reporting (Kiguba et al., 2015). In another study in Uganda, done among nurses and doctors, 63.1% of nurses and 75% of the doctors reported that they didn't know of any policy in the hospital on reporting of medical errors. 87.7% of the nurses also noted that these medical error reporting policies in hospitals would not influence the reporting of medical errors (Mauti & Githae, 2019).

In Saudi Arabia, 55% of the nurses in a study indicated that there is need to have guidelines and procedures on medical incidents reporting, and that these should be clear and concise (Banakhar et al., 2017). The management has a key role in ensuring policies exist to guide its staff on medical errors reporting. Flexible policies are crucial in creating a safe environment where staff can freely report errors once they occur (Rodziewicz et al., 2021)

The policies have to be well disseminated to all users and there is need for a monitoring process that users are aware of the policy and are implementing is as it should be. There also needs to be a way of ensuring compliance to these policies. Factors hindering compliance especially by nurses need to be looked in to and addressed (Vaismoradi et al., 2020).

2.4.2 Taking Action on Reported Medical Errors

Medical error reporting should lead to improvement in patient safety & good collaboration between nurses and their leaders is an important factor in motivating nurses even in to adherence to patient safety practices (Vaismoradi et al., 2020).

Feedback to reporters that action is being taken on reported medical errors enhance reporting; belief by reporters that the information they report is actually utilized assures them that the time they took to report the error was worthwhile (Holden & Karsh, 2014).

Management need to maintain a feedback loop to ensure people get feedback on how the errors they reported were addressed and show they helped improve the system. In a study done by Banakhar, lack of feedback on reported errors was reported to be a key barrier to reporting by 62% of the nurses in the study (Banakhar et al., 2017). This literature review show that if staff do not get feedback on the errors they report, this discourages them and they are more likely not to report at all in future.

2.4.3 Management Priority for Patient Safety

Management prioritization of patient safety is a key determinant of error reporting amongst staff. In a patient safety culture survey conducted in Nigeria, 82% were in agreement on the role of management in providing a work climate that supports patient safety. In this same study, 84% of participants agreed or strongly agreed that where patient safety is a priority for the hospital management, the staff will be more likely to report an incident and to participate in patient safety initiatives. In this study, 81% gave a positive score on how management supported Patient Safety as a priority (Christopher et al., 2010). To promote a culture of patient safety in healthcare, it is important that this is prioritized. In a study in Ghana, particpants 64.6% of participants agreed that hospital management was providing good working conditions that are conducive to patient safety practices. 66.7% of the responders agreed that the management of the hospital was doing things which indicated that patient safety was a hospital priority (Akologo et al., 2019).

2.5 Organizational Safety Culture and Medical Errors Reporting

Organizational Safety culture is that collection of values both for group and individual, competencies, attitudes, perceptions and behavior patterns which show the commitment of an organization safety processes (Sorra et al., 2016). Where the safety culture is positive, there is trust in all communications within the institution. The perception by all staff within the organization is that safety is of top importance and there is great confidence on all the measures of error prevention which put in place. There is also trust on the efficacy of these measures (Sorra et al., 2016). The culture of the organizations plays a great role on whether nurses will report medical errors or not. A culture which supports blame and punishment of staff whenever there is an error hinders reporting of incidents as staff fear for the consequences which will befall them if they report (Rodziewicz et al., 2021).

In a study in Uganda, 53.8% of the nurses reported that not punishing nurses for reporting medical errors was a key measure for improving medical error reporting among the nurses (Mauti & Githae, 2019). Hospitals should provide enabling environment devoid of blame and punitive measures as a way of reposnding to medical errors. This is because blame culture hinders medical errors reporting (Afaya et al., 2021).

2.5.1 Learning Culture and Medical Errors Reporting

Culture of safety requires all organizational leaders to be committed in detecting errors within the organization and making sure there is a process for learning from each error (Banakhar et al.,2017;Sorra et al.,2016). The willingness of employees to report incidents which occur depends on how they perceive that their facility

leadership will work on the incidents reported and implement required appropriate measures and that the organization has a process of learning from such reported incidents. In a study done in Ghana, 89.1% of respondents agreed that the hospitals were actively learning from reported errors and doing activities which led to improved patient safety. 59.4% of them agreed that implementation of improvement actions from reported errors had led to positive changes within the hospital (Akologo et al., 2019).

In a medication error reporting study in Uganda, 85% of the participants were in agreement that incidents medical errors reported ought to be investigated and the main cause identified and acted upon. In so doing, there should be significant learning from such occurrences (Kiguba et al., 2015). The aim of reporting medical errors is ensure gathering of all relevant information on reported incident so as to enable the leadership understand healthcare system related errors and thereby put in place system modifications which will reduce the chances of similar incidents happening in future (Banakhar et al., 2017). It is important that organizations develop and have a process of ensuring that there is learning and continuous improvement from each and every medical error.

2.5.2 Response to Reported Medical Errors and Medical Errors Reporting

An environment which supports a culture of safety is one which is perceived to be just and fair. Fair treatment of staff in organizations supports a culture of openness and learning (Agency for healthcare research and quality [AHRQ], 2016). Where there is no just culture, then blame dominates and this impairs patient safety initiatives. Blame culture remains a key hindrance in medical error reporting. In a study among nurses in Pakistan hospital, 70% of the nurses felt that there was no support for reporting medical errors. They also felt that they were being blamed whenever they reported the

errors (Jafree et al., 2017). In Uganda, a study done showed that 62% of respondents said that blaming of affected staff occurs in healthcare facilities and systems and this has become a frequent occurance. This becomes a big barrier to reporting of medical errors (Kiguba et al., 2015). Another study in Uganda 76.9% of the nurses reported that the law doesn't protect the healthcare worker in the event of a medical error, and that this poses a barrier to reporting. Up to 64.6 of the nurses who responded believed that reporting would result to some form of punishment, including prosecution (Mauti & Githae, 2019). To enhance error reporting, it is paramount that a culture that supports safety and shuns blame is cultivated. This should be embraced by all, from management to frontline staff inorder to make healthcare safer (Rodziewicz et al., 2021).

2.5.3 Team Work and Medical Errors Reporting

In a study done in Korea, 91% of the nurses in the study reported to having had at least one medical error related incident within a span of 6 months; of these, only 53% agreed to reporting such incidents always or usually. In this study, teamwork scored moderate (Hwang & Ahn, 2015).

Akologo looked at team work among healthcare workers in Ghana. On team work across units, 78.1% agreed that hospital units collaborate well in patient care, and 70.6% agreed that cooperation among the various hospital units was good. While looking at team work within units, 87% agreed that healthcare workers within departments supported each other, and 90.9% of the respondents said that team members usually work together whenever there is high workload which require to be done within a short period of time (Akologo et al., 2019).

Where teamwork among nurses was high, it was also noted that incident reporting was also high (Hwang & Ahn, 2015). Leaders and managers of healthcare facilities

need to ensure teamwork is enhanced as this supports reporting of incidents and medical errors. This also improves patient safety in the organization (Hwang & Ahn, 2015).

2.6 Medical Error Reporting Systems

2.6.1 Medical Errors Reporting System Availability and Medical Error Reporting.

Electronic companies have claimed that electronic error reporting systems will enhance medical error reporting. This however needs to be coupled with ease of use for them to be effectively utilized (Lederman et al., 2013). Lack of effective medical error reporting systems was reported as the leading cause of underreporting of medical errors in a study done in Iran (Poorolajal et al., 2015). In this same study, lack of proper medical error reporting forms and templates was reported as a cause for underreporting by 51.8% of the participants (Poorolajal et al., 2015). Availability of a system, either be in form of a software or hard copy format determines how well healthcare workers will report medical errors. In a study conducted in Uganda among nurses and doctors, 64.5% of study participants agreed that there were systems in place for reporting medical errors within their hospital (Mauti & Githae, 2019).

2.6.2 Acceptance of the Medical Error Reporting System

An effective medical error reporting system should be be anonymous and able to protect the privacy of the staff raising the report, should be able to be utilized by a wide range of people, should be able to disseminate the report in a timely manner and lastly, it should have a mechanism for viewing the reports and developing improvement actions (Agency for healthcare research and quality [AHRQ], 2019).

Any reporting system used should be perceived as useful and easy to use by the users. It should also not be time consuming to report a medical error.

A study conducted in Saudi Arabia amongst nurses, 20% of the nurses were in strong agreement that not having enough time was a leading barrier in medical errors reporting (Banakhar et al., 2017). In another study in the USA in one of the emergency departments, there was improved medical error reporting when a system for the reporting of medical errors was put in the website for the team to easily access it and use. Key features of this process which were attributed to its high acceptance and improved use were user friendliness, the fact that it was voluntary and also non punitive. The percentage of members reporting medical errors in the department improved from a baseline of 33% to 76% in a span of 3 years (Okafor et al., 2015). In Australia in a study amongst nurses, computer based medical error reporting processes were found to have accessibility problems which were unique and time demanding which made nurses look for other alternatives of reporting incidents (Lederman et al., 2013).

2.6.3 Anonymity of the Medical Error Reporting System

Systems for the reporting of medical errors should allow for error reports to be filed anonymously (AHRQ, 2019). In a study by Afaya, Nurses believed that reporting of errors had a negative impact on their future jobs and development due to punitive actions. Afaya recommends that reporting systems should be devoid of implicating the reporter and of blame. He also reports that the reporting systems should beb readily accessible to the nurses, noting that these are the staff at the frontline when it comes to patient care (Afaya et al., 2021).

Nurses prefer a reporting system which is well designed and where they can report without being known. I a study by Banakhar, 48.8 % of the study participants strongly agreed that computerized systems should be utilized for medical error reporting. They also reported that the leading barrier to medical errors reporting by nurses was that the design of the reporting system was poor, and it lacked anonymity (Banakhar et al.,2017).

2.7 Reporting of Medical Errors

2.7.1 Frequency of Reporting Medical Errors

A study by poorolajal in Iran, 50.26% of the participants reported to having committed medical errors and not reporting them (Poorolajal et al., 2015). In another study which focused specifically on medication errors, the rate for medication errors was at 19.5%. The reporting for this was however found to be as low as 1.3%, meaning that many of these errors had not been reported (Bayazidi et al., 2012).

In a study done in Ethiopia, the rate of medication error reporting by nurses was at 57.4% (Jember et al., 2018). In Uganda, 47% of participants in a medication error study acknowledged that they had reported medical errors, either committed by them or witnessed being committed by others (Kiguba et al., 2015). Reporting medical errors is very key and important factor for better quality of care and improved patient. The willingness of healthcare workers to report medical errors, of any magnitude, is largely determined by the level of safety within the organization, including psychological safety.

2.7.2 Type of Medical Errors Reported.

Medical errors underreporting in the United States of America (USA) is estimated to be between 50% to 96% (Archer et al., 2017). In a study on medical errors in England, 22% to 39% of the errors which were simple in nature were reported. Those errors perceived to be serious most a times remained unreported (AAnal & Seren, 2016). Lee reports that 76.5% of nurses did not report medical errors classified as near misses, and this was because they perceived them as simple and harmless to patients. (Lee, 2021).

In a Saudi Arabia study amongst nurses, 51% of the participants reported that they did not report an incident which they perceived to be minor and also not causing harm. 41% also believed that there was no need to report near misses (Banakhar et al., 2017). There was another study conducted among nurses in Uganda. In this study, 64.6% of the nurses said that would not report a medical error where they were involved (Mauti & Githae, 2019). Organizational leaders should put systems in place which promote reporting of medical errors, and these should include trainings on medical errors to enhance nurses understanding (Afaya. et al., 2021).

2.8 Theoretical Framework

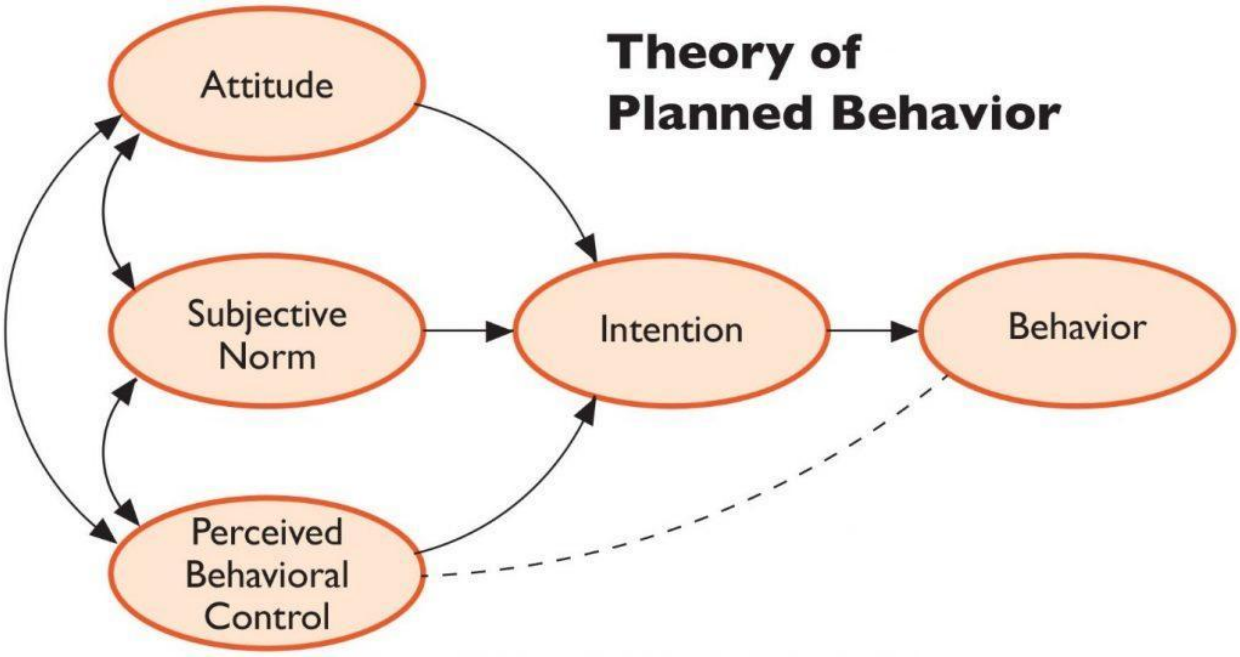
This study is anchored on the theory of planned behavior (TPB), which is a psychological model for understanding and predicting human behavior. Icek Ajzen developed this theory in the year 1985. It ia a very key pyscho-social theory being utilized these days when it comes to behavior prediction. TPB addresses not only the attitudes but also looks in to the behaviors, looking at how these affect how people behave and also their (Wayne, 2019).

This theory looks at three belief areas; how the behavior impacts outcomes either in a good or bad way, what other peoples expectations are and how they affect the way

one behaves and those factors or issues which may support or hinder the way the behavior is done. TPB main assumption is that the way humans behave is reasoned or planned. A person considers the possible outcomes or impact of a certain behavior before or even when engaging in it (Wayne, 2019). The TPB has been found to be a useful theory in examining incident reporting amongst pharmacists (Williams et al., 2015). The theory has also been effectively used in predicting nurses patient safety behaviors (Javadi et al., 2013).

Figure 2.1:

Theory of Planned Behavior



Source: Ajzen, I. & Madden, T. (1985). Prediction of Goal-Directed Behavior Relation:

Reasoned and Automatic Processes. European Review of Social Psychology, 11(1), 1-33.

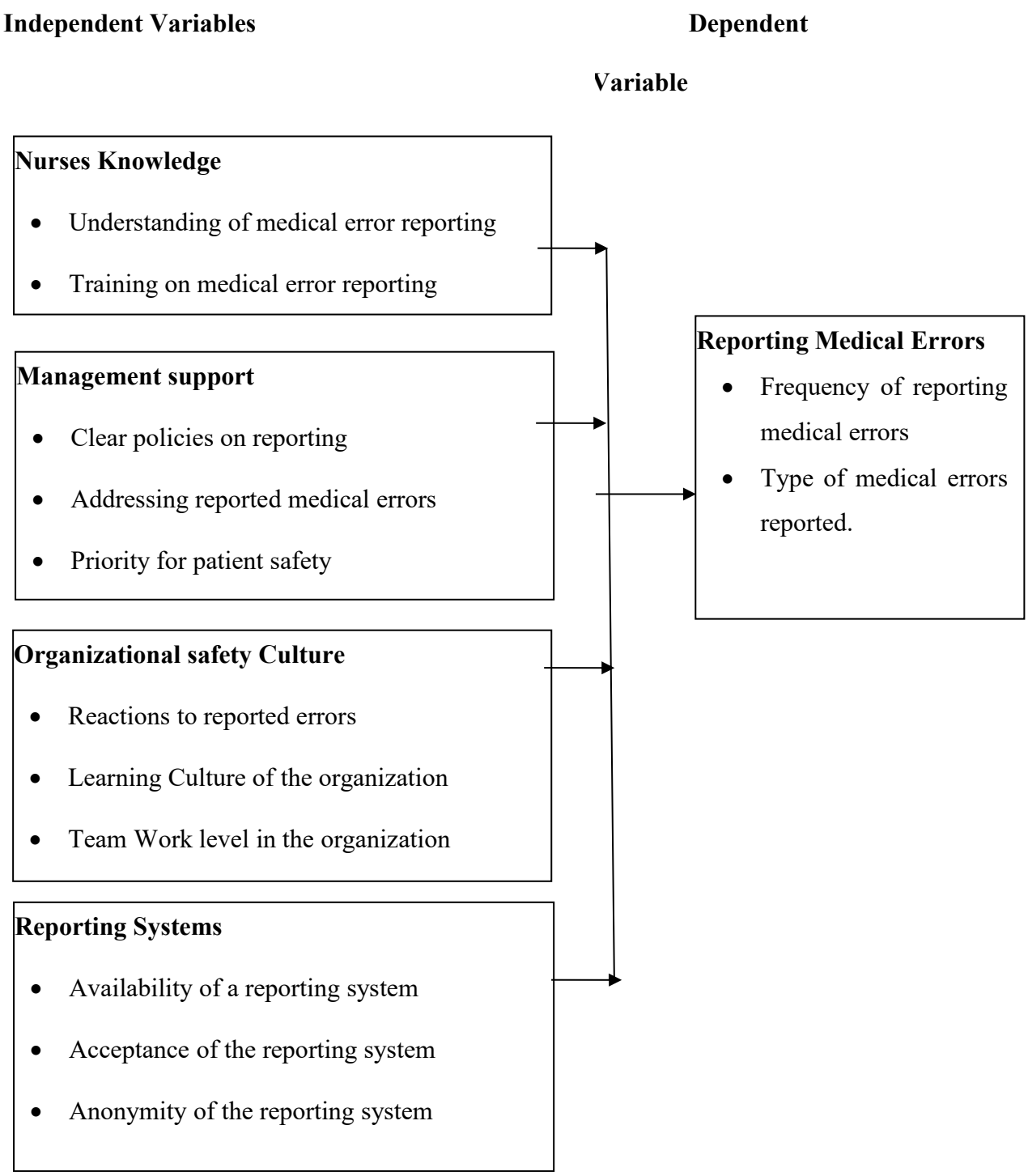
2.9 Conceptual Framework

The conceptual framework for this study anticipates that independent variables; Nurses knowledge on medical errors reporting, Management support for medical errors reporting, Organizational safety culture and Medical errors reporting systems influence the Reporting of medical errors which is considered the dependent variable.

The knowledge nurses have on medical errors will influence how and if they will report the medical errors. On Management support for medical error reporting, how management has set policies on medical error reporting and how they respond to the errors reported by nurses will influence the level of reporting by the nurses. Organizational culture of safety is the compination of the group and individual perceptions, values, competencies, attitudes, the way people behave or act to show their effectiveness or their commitment to the safety within the organization. This directly influences medical error reporting pattern by nurses within the facility. Medical error reporting systems also influence reporting of medical errors by nurses. A system for medical errors reporting which is readily available, useful to the users according to their perception, and one which can be used easily without many complex steps is more likely to result to more error reporting than one which is cumbersome to use.

Figure 2.2

Conceptual framework



2.1 Knowledge Gap

The literature review outlined above shows that underreporting of medical errors is a big problem. Several factors have been reviewed and on how they have influenced medical error reporting in other countries. There is, however, no literature in the public domains on the exact factors influencing reporting of medical errors in the country, particularly in Nairobi County. This study aimed to discover these factors and help implement measures that will facilitate improved reporting and hence improved learning base from reported errors. This will consequently lead to the implementation of actions that will prevent or eliminate medical errors, thereby contributing to improved service delivery, a key pillar of health systems strengthening.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter looks at the stages and steps that were followed in carrying out this study. It outlines the design of the study, targeted population of the study, the site or location of the study, the techniques which were utilized in sampling participants, how the sample size was calculated, the study instruments utilised, methods utilized in collecting data, eithical considerations of the study and the data analysis and presentation methods.

3.2 Research design

The study utilized cross-sectional descriptive design aimed at determining the factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The study utilized qualitative and quantitative designs. Quantitative primary data was generated using a questionnaire. A Key Informant Interview Guide was utilized to collect qualitative data from the nursing heads of departments; one nursing head of department per hospital. Some questions in the questionnaire for the nurses were also qualitative in nature.

This study design was chosen because it is snap shot in nature and does not require observation of the participants over a period of time. Cross sectional study designs are ideal in studies like this one, where one wants to look at the study elements at that point in time.

3.3 Study Site

The study was carried out in three teaching and referral hospitals in Nairobi County. The hospitals were; Gertrude's Children's Hospital (GCH) Muthaiga, Kenyatta

National Hospital (KNH), and The Aga Khan University Hospital Nairobi (AKUH-N). Kenyatta National Hospital is Kenya's largest teaching and referral hospital, based in Nairobi County. It is a state corporation, with a bed capacity of 2,400 and attends to 949,000 inpatients and 800,000 outpatients each year. It is classified as a state corporation, (Kenyatta National Hospital [KNH], 2022). AgaKhan University Hospital Nairobi is a teaching a referral hospital found in Parklands area, Nairobi County. It is a private, not-for-profit institution and has a bed capacity of 254 beds (The Aga Khan University Hospital Nairobi [AKUHN], 2022). Gertrude's Children's Hospital is a private hospital based in Muthaiga in Nairobi County and attends only to children. It has 100 bed capacity and attends to about 9000 inpatients annually (Gertrude's Children's Hospital [GCH], 2022).

These three hospitals were selected because they are teaching facilities where student nurses and nurse interns are attached as part of their learning. They were also selected because they have established pediatric departments. The pattern of medical error reporting among the licensed nurses working in these pediatric wards will impact on the type of nurses we get tomorrow. This is because they will learn the practices currently being practiced by the nurses working in these wards (Safarpour et al., 2017). The barriers to effective service delivery at this level is unique hence the need to address them separately from the other lower level facilities.

The study population comprised nurses working in Pediatric wards, both general and critical care pediatric wards in Gertrude's Children's Hospital (GCH), Kenyatta National Hospital (KNH), and The Aga Khan University Hospital Nairobi (AKUH-N). These study sites were selected because they are teaching and referral hospitals in the county and have well-established and dedicated pediatric wards. The study targets

were nurses working in these pediatric wards. The total study population was 195 nurses.

3.4 Sampling

3.4.1 Sampling techniques

The study utilized multi-stage sampling technique to obtain nurse participants. First, the three target hospitals namely Gertrude's Children's Hospital (GCH), Kenyatta National Hospital (KNH), and The Aga Khan University Hospital Nairobi (AKUH-N) were purposively selected, and sample size proportionally assigned to each. The next step involved purposively selecting nurses working in pediatric wards in these hospitals. In each facility, the next stage in sampling was simple random sampling to randomly select the study participants. This was done to ensure that all the nurses in the pediatric wards in these hospitals had an equal chance of being selected in to the sample.

For the Key Informant Interview Guide, target was to interview the heads on nursing at the pediatric departments, one from each study site. These were purposively selected for the study.

3.4.2 Sample size calculation

The calculation of the size of the sample was done using the Yamane formula (2008). This formula was selected because the study population was less than 10,000 and this formula is good for such population sizes. Sample size was calculated as follows:

Mathematically derived Yamane formula

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

Where:

n = sample size

e = is represents the desired precision level, ie the sampling error, 5% = 0.05

N = Target population (161 nurses)

$$n = \frac{195}{1 + 195\,(0.05)^2}$$

= **131 respondents.**

Table 3. 1:

Study Population and Sample Size Distribution

Hospital	Population; Number of Nurses in Pediatric wards at the time of study	Proportional sample size
1. Kenyatta National Hospital	90	61
2. Gertrude's Children's Hospital, Muthaiga.	73	49
3. The Aga Khan University Hospital Nairobi (AKUH-N)	32	21
Total	**195**	**131**

3.5 Data collection instruments

To collect this data, a structured questionnaire was used to collect data from nurses. Questions were derived from literature review and in line with the study objectives. The questionnaire was constructed in a Likert scale and was administered by the researcher. Key Informant Interview Guide was also utilized to interview one head

nurse in the pediatric departments of each of the three participating facilities. These interviews were conducted by the researcher researcher conducted these interviews.

3.6 Pretest study

A pretest was was done, and the aim was to test the data collection instruments reliability and also validity. This pretest study was carried out at MP Shah Hospital. This hospital was selected because it is also a teaching and referral hospital in Nairobi County and has well-established pediatric units. A total of 15 pretest questionnaires was administered to nurses working in the pediatric ward in the facility during this exercise. This comprised 50% of the total nurses in the pediatric wards, and 85% of those who were present during the pretest period. One head nurse key interview was also done to test the Key Informant Interview Guide.

3.6.1 Validity

Robson defined validity as that extend to which a study instrument is able to measure measures that which it was meant to measure. It is also the extend of the study results truthfulness (Robson, 2016). Validity expects that the study instrument to be able to accurately bring out the study concepts (Robson, 2016). To ensure the validity of the questionnaire, the researcher incorporated changes in line with feedback received from research supervisors. This was done to ensure that the outlined questions in the study questionnaire answer the research questions of this study.

3.6.2 Reliability

Reliability is the extent to which a study instrument are able to bring about results which do not differ whenever it is utilised in similar setting where the subjects of the study are similar or the same (Sullivan, 2014). Reliability looks at the repeatability, precision, trustworthiness and consistency of research. A reliable study is free of any bias or error. In this study, the researcher used the Cronbach's alpha to test the

instrument's reliability. Cronbach's alpha looks at the consistency of how the study participants are responding to the items being researched on. The range is usually between 0.0 to 1.0. This stuidy achieved an alpha score of 0.88 was achieved. A score of 0.7 or higher is an acceptable score and shows that the tool is reliable.

3.7 Data analysis

Data for this study was coded, and then entered into SPSS version 25. It was then cleaned and analysis undertaken. Descriptive analysis was done for the demographical data and the study variables. Bivariate analysis and multivariate Analysis was also done on the study variables.

3.8 Ethical considerations

Ethical approval to undertake this study was obtained from the research and ethics committee of the Kenya Methodist university. Ethical approval was also obtained from National Commission for Science, Technology and Innovation (NACOSTI), KNH-UoN Ethical Review Council, GCH Ethical Review Board and The AKUH-N Ethical Review Board. Consent forms were also administered to all study participants prior to their participation in the study and no participant was coerced in to this study. Confidentiality shall be observed throughout the research process.

3.9 Data Confidentiality

Confidentiality was observed throughout the research process. Names of study participants was concealed and not used anywhere in this study. Research data was stored in locked cabinets accessible only by the researcher and the safeguarded the collected data from any unauthorized access or use.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This study sought to determine factors influencing reporting of medical errors amongst nurses in three teaching and referral hospitals in Nairobi County. The specific objectives were to determine if nurses' knowledge of medical errors reporting, management support for the reporting of medical errors, medical error reporting systems and organizational safety culture influence the reporting of these errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The results presented here are; demographic characteristics of the respondents, there is then the descriptive statistics which looks at the study variables, there is then the response to the research questions using bivariate and multivariate analysis.

Data for this study were collected using a structured a five-point Likert scale questionnaire (See Appendix 1) and a Key Informant Interview (KII) guide (See appendix 2). Responses from the five-point Likert scale were recoded into binary variables. Responses on strongly agree and agree or often and always were recoded as (1) indicating an agreement to medical error reporting. Responses of disagree, strongly disagree, not sure ,never, rarely, and no comment were recoded as (0), indicating no reporting of medical errors. The binary coding was guided by the dependent variable which was reporting of medical errors amongst nurses in pediatric wards. This is because nurses can be deemed to either report or not to report medical errors.

4.2 Study Response and Reliability Rate Results

In total, 131 questionnaires were issued, and 115 were received. The response rate was therefore 88%. To ascertain the internal consistency of the research instrument, Cronbach's Alpha reliability test was done. A score of 0.88 was achieved. A coefficient score of 0.7-1.0 is usually considered acceptable. The reliability results are captured below; Table 4.1.

Table 4. 1:

Reliability Results

	Cronbach's Alpha	**No of questions**
Nurse knowledge (Xi)	.717	13
Management Support (Xii)	.810	11
Organization Safety (Xiii)	.729	11
Reporting systems (Xiv)	.704	7
Reporting Medical Errors (Y)	.799	6
Overall Reliability	**.880**	**48**

These results show that the data collection tool for the four objectives achieved internal consistency and was reliable.

4.3 Nurses' Social Demographic Characteristics

This study involved nurses in pediatric wards. The majority 60(52%) were from KNH, female 88(76%), were aged 40 years and below 95(83%), and had worked at the facility for less than 5years 69 (60%). See Table 4.2. Studies have shown that the nursing profession has gender imbalances with most nurses being female than male,

(Kearns & Mahon 2021). The results show that majority of nurses had worked in their respective facilities less than five years and this may be explained by the fact that majority are less than 35 years of age implying that this could be their first job or second since completing college. There was positive feedback that nurses have been trained on medical errors reporting during in service and at the time of hire at orientation.

Table 4. 2:

Social Demographics Characteristics

	Frequency (n)	**Percentage (%)**
Hospital of Work		
GCH	35	30
AKUH	20	18
KNH	60	52
Gender		
Male	27	24
Female	88	76
Age Bracket		
<30years	44	38
31-35years	31	27
36-40years	20	18
41-45years	8	7
46-50years	3	3
50> years	9	7
Years worked at the hospital		
<1year	12	10
1-5years	57	50
6-10years	19	17
11-15years	12	10
16-20years	8	7
21years & more	7	6
Total	**115**	**100**

4.4 Nurses Knowledge on Medical Errors Reporting

Nurses Knowledge on medical errors reporting was the first study objective and the first independent variable (Xi). Nurse knowledge was measured using two indicators: nurses' understanding of medical error reporting and training on medical error reporting. The results are shown in Table 4.3.

Table 4. 3:

Descriptive Statistics on Nurse Knowledge (n=115)

Statements		Agreed n(%)	Disagreed n(%)
i.	Medical errors are mistakes made by healthcare practitioners due to carelessness or failure to be keen.	59(51)	56(49)
ii.	Medical errors reporting is reporting colleagues who make mistakes so that actions can be taken against them	20(17)	95(83)
iii.	In medical error reporting, one should report the serious errors which lead to serious harm or death, the mild errors which cause minor harm and even the errors which are minor and which don't lead to harm.	75(65)	40(35)
iv.	Nurses in my department know what medical errors are.	102(89)	13(11)
v.	Nurses in my department have a clear understanding on what medical errors reporting is.	99(86)	16(14)
vi.	I personally have a clear understanding of how to report medical errors	99(86)	16(14)
vii.	I received training on Medical errors when I was a student during my college/ university studies.	67(58)	48(42)
viii.	In my place of work, I have been taken through medical errors and how to report them.	90(78)	25(22)
ix.	Nurses are routinely trained on medical errors and error reporting as part of their induction upon hire.	72(63)	43(37)
x.	Refresher trainings for nurses on medical errors and error reporting are routinely done in my hospital.	66(57)	49(43)
xi.	I have personally been trained on medical errors and error reporting process.	76(66)	39(34)
xii.	There is adequacy of nurses' training on medical errors	63(55)	52(45)
xiii.	Nurses' training on medical errors is relevant	112(97)	3(3)

Nurses seemed to understand medical errors well, this is because the majority agreed that nurses in their department knew what medical errors are 102(89%) and had a clear understanding on what medical errors reporting is 99(86%). This was supported

by majority 75(65%) who said that one should report the serious errors which lead to serious harm or death, the mild errors which cause minor harm and even the errors which are minor and which don't lead to harm. It was clear that reporting medical errors is not reporting their colleagues neither were errors mistakes made by healthcare practitioners due to carelessness or failure to be keen.

Nurses' training on medical errors was seen to be very relevant 112(97%). Indeed, majority said that they had been taken through medical errors and how to report them at their places of work 90(78%) more so during orientation 72(63%) and not necessarily during their college training. Slightly more than half 66(57%) said refresher trainings for nurses on medical errors and error reporting are routinely done at their health facilities, with slightly more than half 63(55%) indicating that this training on medical errors was adequate.

These results agree with the KII respondents who stated that their nurses' managers had knowledge on management of reported medical errors and the managers are trained on how to report medical errors.

A KII responded had the following to say:

"…in a scale of 1-5, I would rate nurses' knowledge on medical error reporting at 4…"

(KII, 003, Male)

Another KII respondent stated:

"… they are trained and there is a process to guide them…"

(KII, 002, Female)

From the open ended questions, results show that out of 115 respondents, 93 responded and indicated that reporting of medical errors is important and gave various

reasons, 32(34%) said that the reporting is important to prevent future recurrence of errors, 32(34%) mentioned that reporting aids in promoting patients' safety, 22(24%) mentioned that reporting would help in improving service delivery and take corrective action, 4(5%) said that reporting is important for undertaking investigations, legal action and seeking justice for patients, and 3(3%) said it would be used for learning purposes.

For nurses to report medical errors, it is paramount they understand what medical errors are, what errors are reportable and how to report them. These results are agreeing with Afaya, (2021) & A train education, (2022) who report that nurses need to be trained and made aware of medical errors, including error reporting process and that there should be a uniform and clear definition of medical error which nurses are clear on what needs to be reported and how to report it (Afaya. et al., 2021). Unlike a study done amongst nurses in Iran which showed that nurses had inadequate knowledge on medical errors and on how to report them (Safarpour et al., 2017), this study demonstrated that nurses had understanding of reporting medical errors. According to Safarpour (2017), the greatest hindrance to reporting of medical errors was the fear of punishment and the lack of knowledge on medical errors reporting. In another Saudi Arabian study done amongst nurses, 31.3% of the study respondents said that their hospitals had systems for medical error reporting. It is only 8.7% of the health workers who indicated that they were knowledgeable on the medical error reporting systems in the hospitals. The study showed poor knowledge across all cadres of staff and 64.7% of the nurses expressed poor knowledge (Abdel-Latif, 2016). This shows that understanding of medical errors and how to report them is important for any successful improvement in the medical error reporting process.

This study found that slightly more than a half were trained on medical errors during college/ university studies (58%). This is in agreement with Sultana et al. (2017) who mentioned that the topic of medical errors and patient safety has been greatly ignored in many curriculums for training healthcare professionals. The authors recommended training of students on medical errors while still at school before they complete their studies as this would be more effective and would lead to more focused healthcare providers. The current study shows that most respondents are trained on medical error reporting at their places of work, this is in agreement with Afaya. et al.(2021) who noted that hospital leaders and nurse managers should ensure that there is a uniform and clear definition of medical error and that nurses are clear on what needs to be reported and how to report it. In another study done in Saudi Arabia, majority of the nurses in the study agreed that staff should be trained on medical error reporting in order to enhance their reporting of medical errors (Banakhar et al., 2017). This study therefore shows that it is important that healthcare professionals are trained on medical errors, before graduation and also in-service training to enhance their effectiveness.

4.5 Management Support for the Reporting of Medical Errors

Management support for the reporting of medical errors was the second study objective and the second independent variable (Xii). Management support was measured using three indicators that is clear policies on reporting, mechanisms for addressing reported medical errors and priority for patient safety. The results on management support are as per Table 4.4 below.

Table 4.4:

Descriptive Statistics on Management Support for Medical Error Reporting (n=115)

Statements		Agree n(%)	Disagree n(%)
i.	Policies and procedures on medical error reporting exist in this hospital.	104(90)	11(10)
ii.	I have access to the hospital's medical error reporting policy and procedure.	89(77)	26(23)
iii.	Medical error reporting policies and procedures are readily accessible to nurses in this hospital.	93(81)	22(19)
iv.	Medical error reporting policies and procedures are well understood by nurses in this hospital.	84(73)	31(37)
v.	When medical errors occur, we are given feedback about the improvement actions based on those errors.	85(74)	30(26)
vi.	We are usually informed about medical errors that happen in my department.	93(81)	22(19)
vii.	In my department, we discuss ways to prevent medical errors from happening again.	101(88)	14(12)
viii.	When medical errors are reported, the management promptly acts on it to implement corrective measures.	88(77)	27(23)
ix.	Hospital management provides a work climate that promotes patient safety.	107(93)	8(7)
x.	The actions of hospital management show that patient safety is a top priority.	105(91)	10(9)
xi.	Hospital management seems interested in patient safety only after patient harm happens.	51(44)	64(56)

Results on medical error reporting policies show that majority 104(90%), said policies and procedures on medical error reporting exist in their hospitals, that nurses have access to these policies 89(77%), and these policies are readily accessible to nurses in their health facilities 93(81%). It is clear that the medical error reporting policies and procedures are well understood by nurses in the hospitals 84(73%).

On ways of addressing reported medical errors, majority 88(77%) said that when medical errors are reported, the management acts promptly to implement corrective action. In addition, the management usually informs the nurses about medical errors in their department ,93(81%). Majority 85(74%) also said they are updated and informed about the improvements the hospital puts to address the medical errors reported. Majority 101(88%) said that they hold talks and discussions where they address how to prevent recurrence of the reported medical errors.

On patients' safety priority, majority 107(93%) agreed that the management of the hospital has been ensuring the working environment is conducive and upholds patient safety. They also agreed that safety patient was leading and key priority for the hospital management 105(91%). These results support why majority 64(56%) disagreed with the statement that hospital management seemed to be showing interest in safety of patients when harm happens to the patient.

The results above are in agreement with KIs who mentioned that the hospitals have policy and procedures for reporting medical errors, and these policies are disseminated to nurses for use. Compliance to policies is ensured through audits and surveys by the quality assurance department.

One KII respondent said as follows:

"...there are policies and procedures which are disseminated, including reporting

forms. These policies are even accessible in clinical areas..."

(KII, 003, Male)

From the open ended questions, respondents were asked on existence of medical errors reporting policies in their health facilities, 68 out of 115 respondents responded

to this question. Out of 68, majority 46(68%) mentioned that the policies were in existence, well defined, helpful, simple to understand, robust for both clinical and non-clinical areas and very elaborate, 3(4%) said the policies are on intranet. 17(25%) mentioned that the policies were not straight forward, not well understood, they are biased and leads to victimization. However, 2(3%) had no idea on medical error reporting policies.

Further respondents were asked what their views were on the role of policies in medical error reporting, 70 respondents out of the 115 responded to this question. Out of 70, 46 (66%) mentioned that policies were guides to reporting which enhanced standardization and promoted clarity and uniformity of the reports generated, 18(26%) said it was important to have them readily available, 2(3%) said policies promote continuity of care ,2(3%) said policies prevent recurrence of medical errors,1(1%) said policies prevents bias in reporting, while 1(1%) had no idea on the role of policies in medical error reporting.

When respondents were asked on what actions are taken when medical errors are reported in their organization, 79 out of the 115 responded to this question. 46(59%) responded that the action taken is root cause analysis and evaluation of way forward to prevent recurrence of the errors, 19(24%) mentioned that staff are informed and corrections are done, 6(8%) said victimization which leads to disciplinary actions such as suspension against the staff involved, 5(6%) said that medical education on medical errors is done, while 3(3%) responded that no action is normally taken.

Respondents were also asked how patient safety concerns were handled in their organizations and out of the115, 69 responded to this question. Majority of them, 35(51%) felt that patients' safety concerns are handled according to the laid down

policies, 22(32%) said that patients' safety concerns are prioritized, acted upon immediately and very seriously, 9(13%) indicated that there are routine checks and continuous education to ensure patients safety, and 3(4%) said that disciplinary action is normally taken on the staff involved whenever there is an occurrence of patient safety issues.

The management has a key role in ensuring policies exist to guide its staff on medical errors reporting. Flexible policies are crucial in creating a safe environment where staff can freely report errors once they occur (Rodziewicz et al., 2021). These study findings are agreeing with Kiguba et al. (2015) who said that organizational leadership and support was critical in improving error reporting. Further this study finding agree with a study done in Saudi Arabia, where 55% of the nurses in the study indicated that there is need to have guidelines and procedures on medical incidents reporting, and that these should be clear and concise (Banakhar et al., 2017). From this study finding its clear that the policies are easily accessible to all nurses in the facilities. This is in agreement with Vaismoradi et al. (2020) who said that policies have to be well disseminated to all users and there is need for a monitoring process that users are aware of the policies and are implementing the policies as it should be.

Management need to maintain a feedback loop to ensure people get feedback on how the errors they reported were addressed and show they helped improve the system. This study established that management acts promptly to implement corrective action for medical errors and that management usually informs the nurses about medical errors in their department. It is clear that nurses are informed on the corrective actions being implemented to address reported medical errors and that they are also involved in coming up with solutions to prevent recurrence of the reported medical errors.

These findings are in agreement with Holden and Karsh, (2014) who belief that feedback to reporters that action is being taken on reported medical errors enhance reporting. This is because reporters believe that the information they report is actually utilized and this assures them that the time they took to report the error was worthwhile. Banakhar et al. (2017) recognize that lack of feedback on reported errors was a key barrier to reporting medical errors. This shows that if staff do not get feedback on the errors they report, this discourages them and they are more likely not to report at all in future.

On patients' safety priority, it is clear that the work climate provided by hospital management is one that promotes safety of patients. It is also clear that management of these hospitals prioritises patient safety. Management prioritization of patient safety is a key determinant of error reporting amongst staff. The results of this study agree with Christopher et al. (2010) who reported that management should support and prioritize patients' safety and therefore ensure errors are reported.

4.6 Organizational Safety Culture

Organizational safety culture was the third study objective and the third independent variable (Xiii). Organizational safety was measured using three indicators that is reactions to reported errors, learning culture of the organization and team work level in the organization. Find results in Table 4.5.

Table 4.5

Descriptive Statistics on Organizational Safety Culture (n=115)

Statements		Agree n(%)	Disagree n(%)
i.	Staff here feel like their mistakes are held against them.	46(40)	69(60)
ii.	Staff here are punished whenever they make medical errors	29(25)	86(75)
iii.	In this hospital, we are actively doing things to improve patient safety.	113(98)	2(2)
iv.	Medical errors made here in the past have led to positive changes in the hospital processes.	108(94)	7(6)
v.	In my hospital, we discuss ways to prevent medical errors from happening again.	107(93)	8(7)
vi.	People support one another in my department.	106(92)	9(8)
vii.	When a lot of work needs to be done quickly, we work together as a team to get the work done.	103(90)	12(10)
viii.	In my department, people treat each other with respect.	106(92)	9(8)
ix.	When one area in my department gets really busy, others help out.	100(87)	15(13)
x.	There is good cooperation among hospital departments that need to work together.	91(79)	24(21)
xi.	Hospital departments work well together to provide the best care for patients.	100(87)	15(13)

On reactions to reported errors, majority 69(60%) felt that mistakes were not held against them, and that staff were not punished whenever they made medical errors 86(75%). The respondent agreed that there is a learning culture on medical error reporting. Majority said that there are actions actively being implemented in these hospitals for purposes of ensuring improved patient safety 113(98%), that reported medical errors have led to modifications which were good and positive in the hospital processes 108(94%) and majority 107(93%) said discussions are held to develop measures to prevent medical errors recurrence. On team work level, majority 106(92%) said that team work was good with staff supporting one another whenever

needed. Also, that respective was key that people were respectiful to each other 106(92%). Majority 100(87%) also agreed that the hospital departments collaborated in their work to ensure provision of excellent care to patients.

These results are in agreement with the open ended responses. From the open ended questions, when respondents were asked how else their organizations reacted to reported medical errors, out of the 115 respondents, 50 responded to this question. 31(62%) said root-cause analysis is done to address contributing factors, 16(32%) mentioned refresher training and staff education as well as patient education and reassurance, while 3(6%) said policies and new measures are formulated and put in place to prevent recurrence of the medical errors.

When respondents were asked about the positive changes that had been implemented as a result of a reported medical error in their organizations, 68 out of the 115 responded to the question with 26(38%) mentioning that there had been improved processes which led to improved performance,19(28%) said that new policies and guidelines had been made following reported medical errors, another 19(28%) said there were quarterly audits introduced as well as increased staff education and awareness while 4(6%) mentioned increased cooperation among the staff and also reduction in medical errors incidences.

Further the respondents were asked on the negative actions that had happened as a result of reporting a medical error in their organizations and out of 115, 53 responded to the question. 31(58%) said disciplinary actions such as dismissals, warning letters, statement writing and even being sued, 10(19%) responded that victimization and working with fear of being victimized, 7(13%) felt no negative action had been taken while 4(8%) mentioned show cause letters. When respondents were asked to describe

the level of teamwork in their organization, out of the 115, 55 responded to this question. 25(45%) said their level was excellent, best and impressive, 20(36%) felt the level was good, fair and moderate, 8(15%) mentioned the level of team work in their organization was below expectation, not very good and 2(4%) of the respondents said that the level of teamwork varies from department to department.

This study established that mistakes were not held against medical error reporters, and that staff were not punished whenever they made medical errors. The respondents agreed that there is a learning culture on medical error reporting and there is continuous improvement to enhance patient safety. It is clear that reported medical errors have led to great improvements in the hospital processes and discussions are held on ways to prevent medical errors from happening again. On team work the study established that support among team mebers was good and respect was upheld among team members.

A culture which fosters blame and punishment whenever a medical error occurs discourages reporting of medical errors and poses a threat to patient safety. The finding of this study are aligned and agreeing with Banakhar et al. (2017) and Sorra et al. (2016) who mentioned that culture of safety requires organizational leaders to be committed in patient safety and in putting processes in place which make it easy for the organization to pick up errors and learn from them. It is important that organizations develop and have a process of ensuring that there is learning and continuous improvement from each and every medical error. An environment which supports a culture of safety is one which is perceived to be just. A culture which supports blame and punishment of staff whenever there is an error hinders reporting of incidents as staff fear for the consequences which will befall them if they report

(Rodziewicz et al., 2021).Where there is no just culture, then blame dominates and this impairs patient safety initiatives.

Blame culture remains a key hindrance in medical error reporting in Africa. In a study done in Nigeria, 75% of participants believed that in Africa healthcare practitioners think adverse events are mistakes made by healthcare practitioners. This made them feel guilt, caused depression and made them remorseful (Christopher et al., 2010). In Uganda, a study done showed that 62% of respondents believed that there is a blame culture in healthcare facilities and systems. This becomes a big barrier to reporting of medical errors (Kiguba et al., 2015). Prosecution and blaming of staff who make medical errors interferes with the reporting, and the affected prefer to hide rather than report such errors (Kiguba et al., 2015). Leaders and managers of healthcare facilities need to ensure blame free reporting process is put in place, and that teamwork is enhanced as this supports reporting of incidents and medical errors.

4.7 Medical Error Reporting Systems

Medical error reporting system was the fourth study objective and the fourth independent variable (Xiv). Medical error reporting systems was measured using three indicators that is Availability of a reporting system, Acceptance of the reporting system and Anonymity of the reporting system. See Table 4.6.

Table 4.6:

Descriptive Statistics on Medical Error Reporting Systems (n=115)

Statement		Yes n(%)	No n(%)
i.	We have a system for reporting medical errors in this hospital. (forms or software)	107(93)	8 (7)
ii.	The medical error reporting system; (hard copy forms or software) is readily accessible to nurses in my department to report medical errors.	97(84)	18(16)
iii.	Time taken to report a medical error in the reporting system (form or software) is good enough.	83(72)	32(28)
iv.	The medical error reporting system in my hospital; (hard copy forms or software) is easy to use	94(82)	21(18)
v.	The medical error reporting system in my hospital; (hard copy forms or software) is very useful in the medical error reporting process.	98(85)	17(15)
vi.	When reporting a medical error, the reporting system ensures that the identity of the person involved in the error is kept anonymous.	43(38)	72(63)
vii.	Medical errors reported in my organization are kept and handled in a confidential manner.	49(43)	66(57)

On availability of a reporting system, majority 107(93%) agreed that there exists a medical error reporting system either in soft or hardcopy. And that this system is readily accessible to nurses in their departments 97(84%). Majority 83(72%) also said that the time taken to report a medical error is good enough. Majority 94(82%) accepted that medical error reporting system in their hospital useful to them and was easy to maneuver during the medical error reporting process 98(85%). It is clear that the reporting system was not anonymous 72(63%) neither was it confidential 66(57%).

Results from the KIIs indicate that reporting systems have been put in place to improve medical errors reporting by nurses. For example, training nurses on how to

report and undertake root cause analysis. In addition, there is online reporting software, online documentation and incidence reporting forms. These reporting systems are accessible to all nurses.

One KII respondent had the following to say:

> "…medical errors register is available, which acts as part of the performance contract targets..."
>
> (KII, 003, Male)
>
> "…when errors are reported root cause analysis is usually done, and actions to prevent recurrence are implemented. Continuous Medical Education and staff sensitizations are also undertaken..."
>
> (KII, 003, Male)

Another KII respondent said as follows:

> "… when errors are reported, root cause analysis is done and a feedback is given on actions taken…."
>
> (KII, 001, Female)

From the open ended questions, respondents were asked on the barriers that exist in their medical errors reporting system which hindered them from reporting medical errors and out of the 115 respondents, 58 responded to this question. 23(40%) mentioned fear of victimization and fear of the disciplinary action,10(17%) sighted slow electronic reporting system, system failure and lack of follow up on the reports, another 10(17%) sighted lack of reporting tools and lack of access to reporting files, 5(9%) said time constraint and a lot of workload, 4(7%) mentioned that the software is not user friendly, another 4(7%) said failure to understand whether errors are

medical errors or not, and 2(3%) sighted forgetting log in passwords and passwords problems.

Further, the respondents were asked what they would wish improved in their organization's medical error reporting system which would enhance their reporting, 53 out of the 115 respondents replied to this question, with 37(70%) saying they would want the reporting system simplified, improved, automated and more accessible to nurses, 7(13%) wanted training undertaken to sensitize the nurses on the importance of the reporting systems and how to report, 6 (11%) said the reporting system should be made anonymous to prevent victimization, 2(4%) emphasized on need for feedback on reported errors and 1(2%) on need for reward for those who report.

This study established that medical error reporting systems were available in soft or hard copy and the systems were accessible to nurses in their facilities. The time taken to report was relatively short and the reporting system was very important and easy to use. However, it lacked confidentiality and anonymity. Any reporting system used should be perceived as useful and easy to use by the users. It should also not be time consuming to report a medical error. Similar findings on electronic or soft copy system and easy to use reporting systems were reported by Lederman et al. (2013). Poorolajal et al. (2015) mentioned that lack of effective medical error reporting systems was reported as the leading cause of underreporting of medical errors in a study done in Iran. These authors further stated that availability of a system, either be in form of a software or hard copy format determines how well healthcare workers report medical errors. Availability of a system, either be in form of a software or hard copy format determines how well healthcare workers will report medical errors

(Mauti & Githae, 2019). Similar results were found in a study done in Saudi Arabia amongst nurses, the study found that not having enough time was a leading barrier in medical errors reporting (Banakhar et al., 2017). In another study done in the USA in one of the emergency departments, there was improved medical error reporting when a medical error reporting system was put in the website for the team to easily access it and use. Key features of this process which were attributed to its high acceptance and improved use were user friendliness, the fact that it was voluntary and also non punitive.

These study results show that the reporting systems lacks anonymity hence lacks confidentiality. This is not in agreement with Afaya. et al. (2021) who recommends that reporting systems should be devoid of implicating the reporter and of blame, and that the reporting systems should be accessible to the nurses, who are at the frontline when it comes to patient care (Afaya et al., 2021)

Similar to this study finding is the fact that most felt that reporting would lead to punitive measures such as prosecution (Mauti & Githae, 2019). Nurses prefer a reporting system which is well designed and where they can report without being known. I a study by Banakhar, 48.8 % of the study participants strongly agreed that computerized systems should be utilized for medical error reporting. They also reported that the most frequent barrier to reporting errors by nurses was that the design of the reporting system was poor, and it lacked anonymity (Banakhar et al., 2017).

4.8 Reporting of Medical Errors

Reporting of medical errors was the dependent variable(Y) of the study. Reporting of medical errors was measured using two indicators that is frequency of reporting

medical errors and type of medical errors reported. The results are as shown in Table 4.7.

Table 4.7:

Descriptive Statistics on Reporting of Medical Errors (n=115)

Statement		Always n(%)	Never n(%)
i.	Whenever you commit a medical error in your course of work, how often do you report it?	74 (64)	41(36)
ii.	When you witness a medical error that has been committed by someone else, how often do you report it?	62(54)	53(46)
iii.	How often would you report a medical error which led to patient death or serious harm including disability?	71(62)	44(38)
iv.	How often would you report a medical error which led to some form of patient harm, though mild to moderate harm?	69(60)	46(40)
v.	How often would you report a medical error which was corrected before even reaching the patient?	71(62)	44(38)
vi.	How often would you report a medical error which reached the patient but did not cause any harm?	67(58)	48(42)

On frequency of reporting medical error, majority 74 (64%) said that they always report whenever they commit a medical error in their course of work. Slightly more than half 62(54%) said that they would always report errors committed by someone else. Majority 71(62%) reported that they would report a medical error which led to patient death or serious harm including disability, and that they would report a medical error which was corrected before even reaching the patient 71(62%). Slightly more than half 67(58%) would report a medical error which even though they reached the patient, no harm was caused.

Results from KIIs showed that the leading barriers to medical errors reporting by nurses are fear of victimization, fear of litigation by the client, fear of the outcome, and failure to adequately empower staff on reporting medical errors. This may be overcome by assuring staff of none punitive measures.

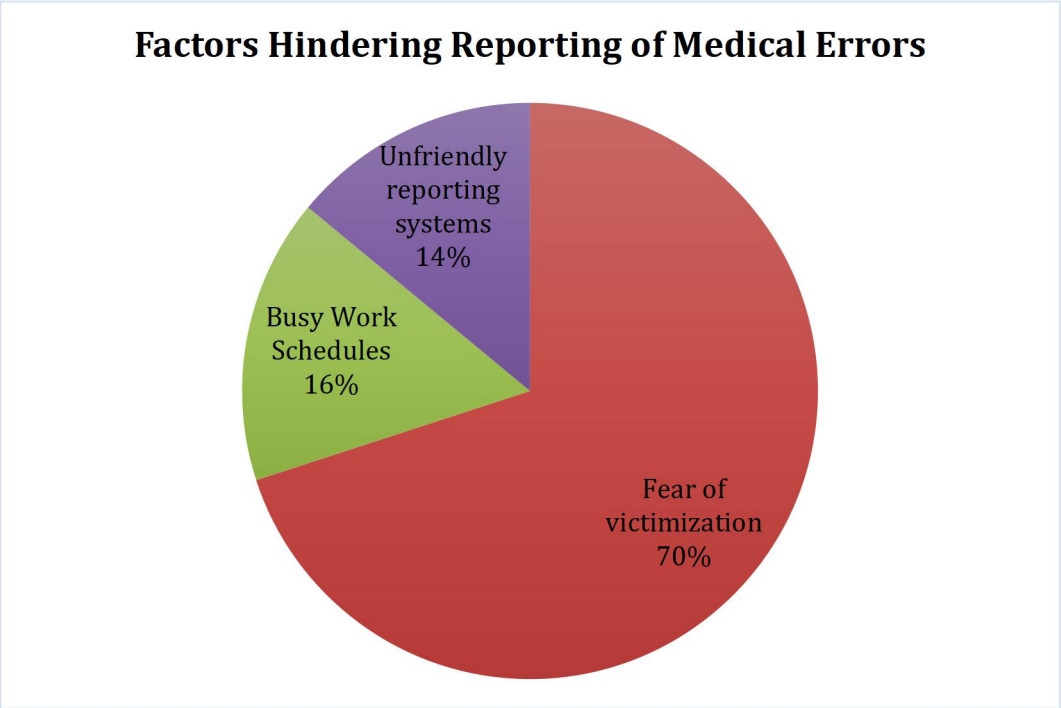
A KII respondent had the following to say:

> "…there is still fear that it may reflect like their departments are not doing well if they report. Training should be done to let them know that reporting is a positive, rather than negative reflection of their departments..."
>
> (KII, 001, Female)

Results from open ended questions showed that when respondent were asked on what hinders them from reporting medical errors. Out of 115 respondents 70 responded to this question. Out of the 70, 49(70%) mentioned fear of victimization and job loss as the main barrier to reporting medical errors, 11(16%) mentioned having a busy work schedule hinders them from reporting and10(14%) said the reporting system is not user friendly, they have not been trained on how to use it and it lacks confidentiality.

Figure 4. 1

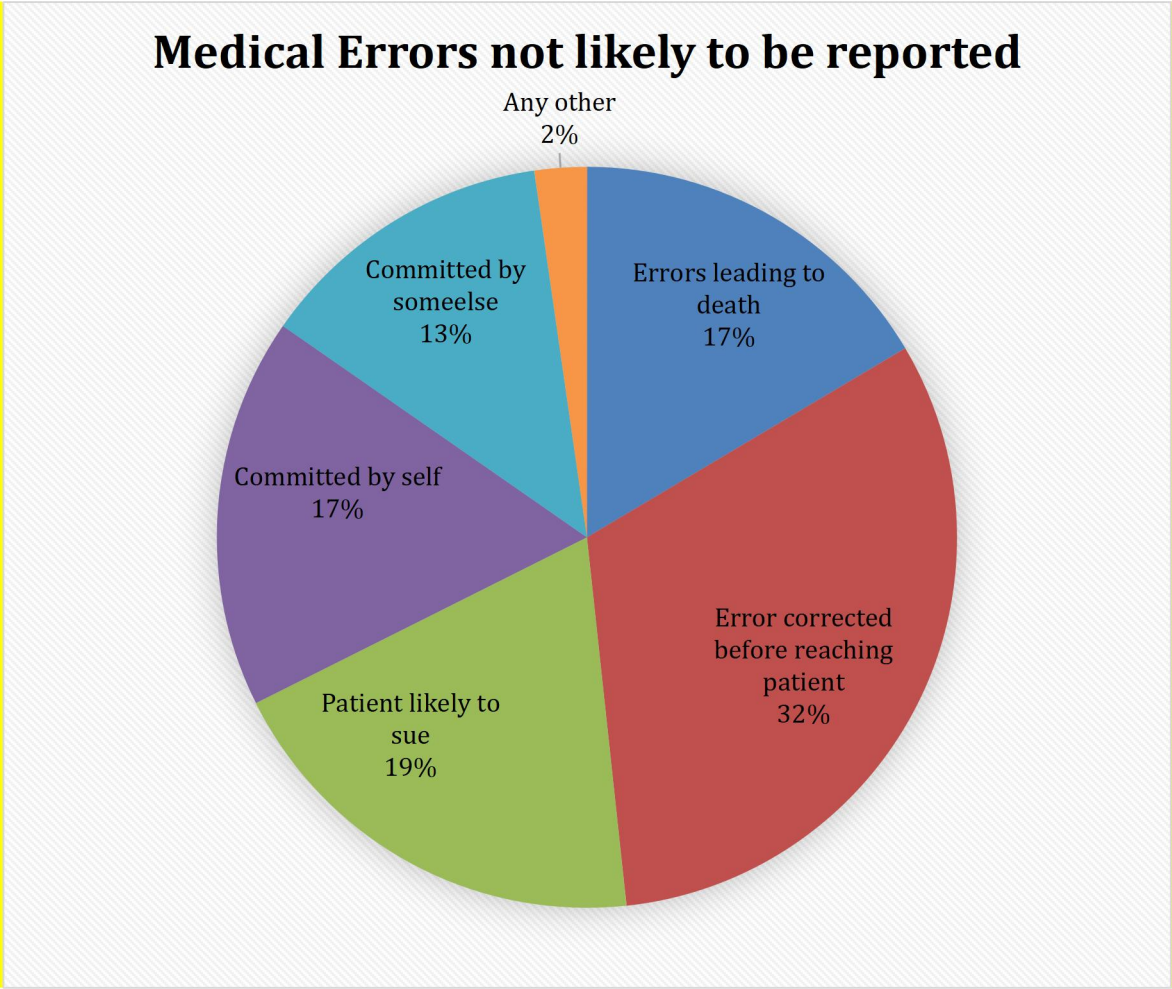
Factors hindering Nurses from Reporting Medical Errors.



Further respondents were asked to choose some of the errors that they are likely not to report, details are as shown in Figure 4.2. Out of 176 responses majority 32% would not report errors that have been corrected before reaching a patient.

Figure 4.2

Medical errors not likely to be reported

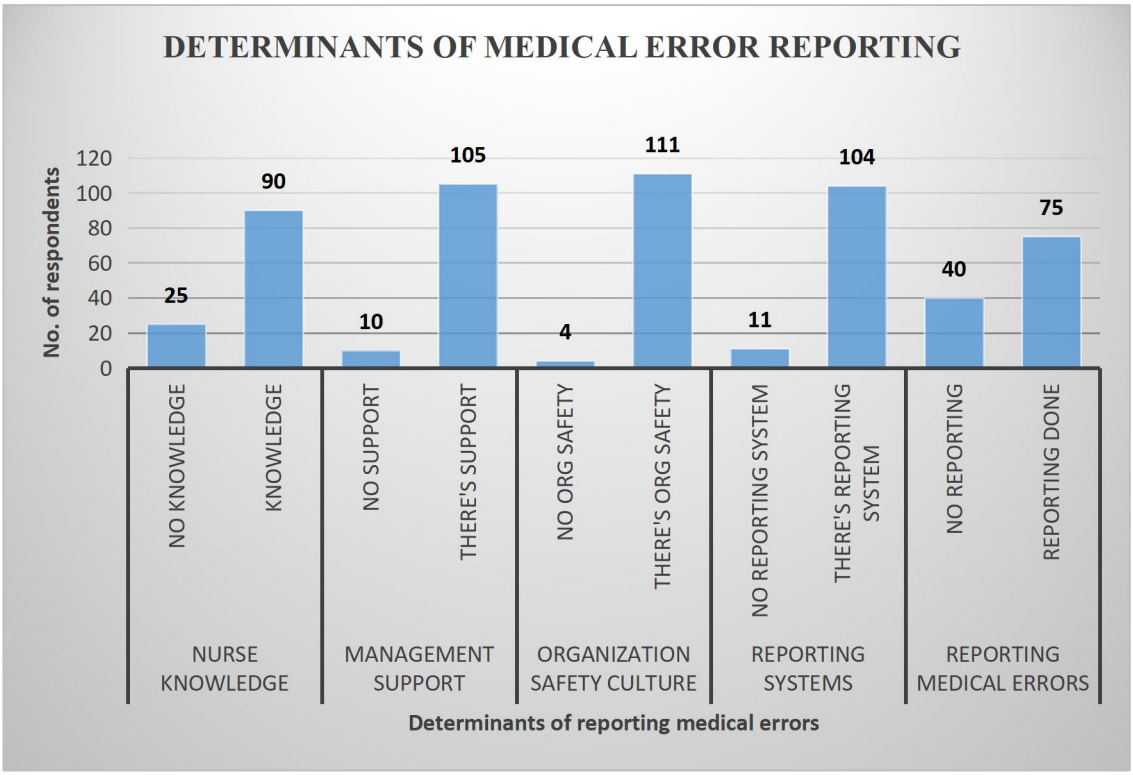


Summary statistics show that majority agreed that there was an organizational safety culture in their facilities, followed by a management support, followed by existence of reporting systems and finally that nurses have the requisite knowledge on reporting

medical errors. It was clear that reporting of medical errors was not being done by all staff in the facilities. See Figure 4.3.

Figure 4. 3

Determinants of Medical Error Reporting



This study established that most nurses always report medical errors whenever they commit the error in their course of work, with slightly more than half saying that they would always report errors committed by someone else. It is evident that medical error reporting is taken seriously with most respondents saying that they would report a medical error which led to patient death or serious harm including disability, and that they would report a medical error which was corrected before even reaching the patient and would also report a medical error which got to the patient however didn't result to any form of harm to the patient. Reporting medical errors is a key component

in ensuring better quality of care and safety of patients. The willingness of front-line staff to report medical errors is a key determinant of the overall safety of that organization.

Similar to these study findings where 41(36%) of respondents said they would not report medical errors especially those that were corrected before reaching the patient, in a study done in Iran, 50.26% of the participants reported to having committed medical errors and not reporting them (Poorolajal et al., 2015). Similarly, In Uganda, 47% of participants in a medication error study acknowledged that they had reported medical errors, either committed by them or witnessed being committed by others (Kiguba et al., 2015). In a study in England, only 22% to 39% of the errors which were perceived or termed to be simple were reported. The setious errors usually went unreported (AAnal & Seren, 2016). This is similar to the findings of this study where 41(36%) said they would not report medical errors.

4.9 Bivariate analysis

Bivariate analysis was conducted determine if statistical association existed between the independed variable and depended variable. This is a good analysis for comparing two variables as was the case for this study.

4.9.1 Chi Square Measure of Association

To determineh whether there was any relationship between each independent variable and the dependent variable, cross tabulations were done. To evaluate tests of independence of the categorical variables, Chi-Square statistic was used to. The data which had been recoded from a Likert scale in to binary variables was used to test the independence of the study variables. Results are in Table 4.8 below.

Table 4.8:

Chi Square Measure of Association

Variable	Sample Size (n)	χ^2	Df	*p*-value
Nurses Knowledge	115	4.255	1	0.039
Management Support	115	4.671	1	0.031
Organizational safety Culture	115	0.242	1	0.623
Reporting Systems	115	9.769	1	0.002

4.9.2 Binary Correlation of Independent Variables and Dependent Variable

To determine effect oeach independent variable has on the dependent variable, a bivariate analysis was carried out. The results are presented in Table 4.9. The results show as follows; nurse knowledge on medical errors $\chi 2$ (1, N =115) = 4.255, p =.039) , management support on reporting $\chi 2$ (1, N =115) = 4.671, p = .043) and medical errors reporting systems $\chi 2$ (1, N =115) = 9.769, p = . 002). The p-value for all these is below 0.05 level of significance. This shows that the association of each of these independent variable with reporting medical errors was significant, in the three facilities.

There was however no relationship between organization safety culture and reporting medical errors, $\chi 2$ (1, N =115) = 0.242, p = . 623) and this may be explained from the view that nurses culture of under or non-reporting is highly seen to result from fear of victimization and fear of the disciplinary action which may result after a nurse has reported.

Table 4.9:

Bivariate Analysis of independent variable and dependent variable

Variable	B	S.E	Odds Ratio	*p-value*	R^2
Nurse knowledge on Medical errors					
Nurses have no knowledge on medical error reporting (ref)			1.000		
Nurses have knowledge on medical error reporting	0.934	.461	2.545	0.043	0.048
Management support on reporting					
Management does not provide support (ref)			1.000		
Management provides support	1.456	.720	4.288	0.043	0.053
Organizational safety culture					
Organization has no safety culture (ref)			1.000		
Organization has safety culture	-0.496	1.019	0.609	0.609	0.003
Medical error reporting systems			1.000		
No medical error reporting systems (ref)					
There is medical error reporting systems	2.183	0.809	0.113	0.007	0.110

Where there was nurse knowledge, nurses were 2.545 times more likely to report medical errors than where there was no nurse knowledge. Where there was management support, nurses were 4.288 times more likely to report medical errors than where there was no management support on reporting. Also, where there were medical errors reporting systems nurses were 0.113 times more likely to report medical errors than where there were no medical errors reporting systems.

Table 4.9 also shows how each independent variable contributes towards reporting medical errors, when all other factors are held constant. Nagelkerke R Square (R^2)

was used to measure medical error reporting model summary of bivariate analysis. The results in Table 4.9, show that medical error reporting systems was the leading contributor towards reporting medical errors in the three facilities, with an R^2 of 0.110. This means that it accounts for about 11% of all the variations in reporting medical errors. This was followed by management support for reporting which had an R^2 of 0.053, nurse knowledge which had an R^2 of 0.048, and lastly organization safety culture which had an R^2 of 0.003. This implies that management support accounts for about 5.3%, nurse knowledge accounts for 4.8%, and organization safety culture accounts for about 0.3% of all the variations in reporting medical errors respectively. Organization safety culture scored the least. The results are agreeing with the chi square test results which showed that Organization safety culture did not influence reporting medical errors with a p value >0.05.

Similar to results in this study where nurses' knowledge, management support and medical error reporting system influenced reporting of medical errors, Havens and Boroughs, (2000) mentioned that medical error reporters are more likely to report errors when they know what is to be reported, when to do the reporting and how to do these reports. These authors said that reporting should be made clear to all reporters through training and guided by policy. Understanding of medical errors and how to report them is important for any successful improvement in the medical error reporting process. This study therefore shows that it is important that healthcare professionals are trained on medical errors, before graduation and also in-service training to enhance their effectiveness. The management has a key role in ensuring policies exist to guide its staff on medical errors reporting. Flexible policies are crucial in creating a safe environment where staff can freely report errors once they occur (Rodziewicz et al., 2021). The study findings are in agreeing with Kiguba et al.

(2015) who said that organizational leadership and support was critical in improving error reporting. A culture which fosters blame and punishment whenever a medical error occurs discourages reporting of medical errors and is a big threat to patient safety. Any reporting system used should be perceived as useful and easy to use by the users. It should also not be time consuming to report a medical error. Similar findings on electronic or soft copy system and easy to use reporting systems were reported by Lederman et al. (2013). Poorolajal et al. (2015) mentioned that lack of effective medical error reporting systems was reported as the leading cause of underreporting of medical errors in a study done in Iran. These authors further stated that availability of a system, either be in form of a software or hard copy format determines how well healthcare workers will report medical errors.

4.10 Multivariate Analysis

Logistic regression was carried out. This was to determine the effects nurses' knowledge, management support, organization safety culture and medical error reporting system has on the likelihood that nurses report medical errors. To test whether the study model was correctly specified, Hosmer and Lemeshow Goodness-of-fit test (GOF) was used. The study results show that the logistic regression model was statistically significant, χ^2 (3) = 1.814, *p >0.05 where* p=0.612. A Goodness-of-fit test result with a *p-value* below 0.05, you fail to accept the study model, and vice versa, if the GOF results *p-value* is higher than 0.05, the model passes the test. The model explained 16.3% (Nagelkerke R^2) of the variations of reporting medical errors. The odds ratio and the levels of significance results are found in Table 4.10.

Table 4.10

Determinants of Medical Errors Amongst Nurses in Pediatric Wards

Variable	B	S.E	Odds Ratio	*p-value*
Nurse knowledge on Medical errors				
Nurses have no knowledge on medical error reporting (ref)			1.000	
Nurses have knowledge on medical error reporting	0.765	.519	2.149	0.141
Management support on reporting				
Management does not provide support (ref)			1.000	
Management provides support	0.738	.815	2.091	0.365
Organizational safety culture				
Organization has no safety culture (ref)			1.000	
Organization has safety culture	-0.465	1.335	0.628	0.728
Medical error reporting systems			1.000	
No medical error reporting systems (ref)				
There is medical error reporting systems	2.149	0.860	8.574	0.012

Multivariate analysis results are found in Table 4.10. Results with a p-value of less than 0.05 were significant. Therefore, only one variable met this standard, i.e. medical error reporting system. From these results medical error reporting system(p=0.012), significantly contributed to the model/prediction.

This implies that having in place a medical error reporting system significantly influences reporting of the medical errors. Where there was medical error reporting system, nurses were 8.574 times more likely to report medical errors than where there was no medical error reporting system.

The significance of medical error reporting system may imply that for reporting to be done, staff must be trained on how to use the system whether soft or hard copy, and this calls for management support, therefore existence of a reporting system that is acceptable and in use, justifies that the other study variables namely nurse knowledge,

management support and organizational safety culture have been understood. Availability of a system, either be it in form of a software or hard copy format determines how well healthcare workers will report medical errors. These findings are agreeing with Poorolajal et al. (2015) who established that lack of effective medical error reporting systems was reported as the leading cause of underreporting of medical errors in a study done in Iran. Similarly, availability of clear and easy to use error reporting tool is believed to influence medical error reporting. In another study done in the USA in one of the emergency departments, there was improved medical error reporting when a system for medical error reporting was put in the website for the team to easily access it and use. Key features of this process which were attributed to its high acceptance and improved use were user friendliness, is the fact that it was voluntary and also non punitive (Okafor et al., 2015).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is a representation summary of the findings of this study as per specific objectives. Study conclusions and recommendations are also captured in this chapter, and they inform direction of research and directions in future.

5.2 Summary of Findings

This study sought to determine factors influencing reporting of medical errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County. The specific objectives of the study were to determine if nurses' knowledge of medical errors reporting, management support for the reporting of medical errors, medical error reporting systems and organizational safety culture influence the reporting of these errors amongst nurses in pediatric wards in three teaching and referral hospitals in Nairobi County.

This study utilized a cross-sectional descriptive design. The study was carried out in three teaching and referral hospitals in Nairobi County. The study population comprised of nurses working in Pediatric wards; both general and critical care pediatric wards, in Gertrude's Children's Hospital (GCH), Kenyatta National Hospital (KNH) and The Aga Khan University Hospital Nairobi (AKUH-N). The total study population was 195 nurses. The study utilized multi stage sampling technique to obtain nurse participants, Key Informants were purposively selected for the study. A structured questionnaire and Key Informant Interview Guide were utilized to collect data.

This study involved nurse managers. Majority 60(52%) were from KNH, were female 88(76%), were below 35years of age 75(65%), and had worked at the facility for less than 5years 69(60%). Nurses seemed to understand medical errors well, this is because majority 102(89) and 99(86%), agreed that nurses in their department knew what medical errors are and that nurse had a clear understanding on what medical errors reporting is, respectively. Results on medical error reporting policies showed that majority 104(90%), said policies and procedures on medical error reporting exist in their hospitals, and that nurses have access to these policies 89(77%). Regarding reactions to reported errors, 69(60%) felt that mistakes were not held against them, and that staff were not punished whenever they made medical errors 86(75%). On the availability of a reporting system, majority 107(93%) agreed that a medical error reporting system exists either in soft or hardcopy. And that this system is readily accessible to nurses in their departments 97(84%). On frequency of reporting medical error, majority 74 (64%) said that they always report whenever they commit a medical error in their course of work. Slightly more than half 62(54%) said that they would always report errors committed by someone else. The majority, 71(62%), reported that they would report a medical error leading to patient death or serious harm including disability, and 71(62%) said that they would report a medical error which was corrected before even reaching the patient.

Bivariate analysis showed; nurses' knowledge on medical errors($p<0.043$), management support on reporting ($p<0.043$), and medical errors reporting systems($p<0.007$). The p-value for all these was less than 0.05 significance level. This therefore shows that there was a significant association of each of the independent variable with reporting medical errors, in the three facilities. Where there was nurse knowledge, nurses were 2.545 times more likely to report medical errors than where

there was no nurse knowledge. Where there was management support, nurses were 4.288 times more likely to report medical errors than where there was no management support on reporting. Also where there were medical errors reporting systems nurses were 0.113 times more likely to report medical errors than where there were no medical errors reporting systems.

Multivariate analysis showed that medical error reporting system(p=0.012) significantly influenced reporting medical error and where there was a medical error reporting system, nurses were 8.574 times more likely to report medical errors than where there was no medical error reporting system.

5.3 Conclusion

Based on the study objectives and the findings, this study concludes that:

Nurses' knowledge medical errors reporting influences reporting of medical errors amongst nurses in pediatric wards in the three teaching and referral hospitals in Nairobi County. For nurses to report medical errors, it is paramount they understand what they are, what errors are reportable and how to report them.

Management support for medical error reporting influences reporting of medical errors amongst nurses in pediatric wards in the three teaching and referral hospitals in Nairobi County. The management has a key role in ensuring policies exist to guide its staff on medical error reporting. Organizational leadership and support is critical in improving error reporting. The availability of clear medical error reporting standards and policies is believed to influence medical error reporting. Flexible policies are crucial in creating a safe environment where staff can freely report errors once they occur.

Medical error reporting systems influence reporting of medical errors amongst nurses in pediatric wards in the three teaching and referral hospitals in Nairobi County. The users should perceive any reporting system as useful and easy to use. It should also not be time consuming to report a medical error. Availability of a clear and easy to use system, either be in form of a softcopy or hard copy format determines how well healthcare workers will report medical errors. Availability of clear and easy to use error reporting tool is believed to influence medical error reporting. Lack of an effective medical error reporting system is likely to lead to underreporting of medical errors.

Organizational safety culture was found not to influence reporting of medical errors amongst nurses in pediatric wards in the three teaching and referral hospitals in Nairobi County. A culture of nurses' fearing what may happen after reporting a medical error may inhibit reporting. Nurses mentioned that disciplinary actions such as dismissals, warning letters, statement writing, being sued, victimization and show cause letters instilled fear and made them not to report. A culture which fosters blame and punishment whenever a medical error occurs discourages reporting of medical errors and is a big threat to patient safety.

5.3 Study Recommendations

This study recommends that universities and college administrators to ensure that nurses' knowledge and understanding of medical errors and medical error reporting be promoted from college/university level training. During inservice, hospital administration and management to endure that nurses training on medical errors reporting is done during orientation and regularely as part of in-service training.

The study also recommends that hospital leaders and managers disseminates policies and procedures to staff in their health facilities and ensure the same is well understood and implemented correctly. In addition, feedback about changes put into place based on those errors need to be communicated to staff on timely basis.

To address the aspect of fear for victimization, and hold organizations accountable for system failures, this study recommenda that hospital Chief Executives and Chief Nursing Officers embrace and cultivate a just culture in their hospitals to ensure objective approach to medical errors.

Lastly, this study recommends that health information officers and management in the various hospitals ensure that medical error reporting systems are simplified and made readily accessible to enable ease of use for timely reporting of medical errors. Also, anonymity and confidentiality to be incorporated in the reporting process.

5.5 Recommendation for Further Study

This study recommends further research on the medical error reporting system to determine why it is the only factor that influences reporting of medical errors in a combined relationship. This will likely enhance how the reporting system is designed and improve its implementation for improved patient safety in health facilities.

The study also recommends further study factors influencing medical errors reporting other departments and other healthcare facilities not classified as teaching and referral hospitals.

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APPENDICES

APPENDIX 1 : RESEARCH PARTICIPANTS CONSENT FORM

Jane N. Ngivu
PO BOX 7683 - 00300
Nairobi

Dear Sir/Madam,

RE: Research Participants Consent Form

I am a student at the Kenya Methodist University pursuing a Masters Degree in Health Systems Management. I am carrying out a study to establish factors influencing reporting of medical errors amongst nurses in pediatric wards in four teaching and referral hospitals in Nairobi County. This is in partial fulfillment of my Masters degree requirements. The study aims at determining the factors influencing reporting of medical errors amongst nurses in four teaching and referral hospitals in Nairobi County. The research questions are;

1) What is the influence of nurse's knowledge on reporting of medical errors amongst nurses in pediatric wards in four teaching and referral hospitals in Nairobi County?
2) What is the influence of management support on reporting of medical errors amongst nurses in pediatric wards in four teaching and referral hospitals in Nairobi County?
3) What is the influence of medical error reporting systems on reporting of medical errors amongst nurses in pediatric wards in four teaching and referral hospitals in Nairobi County?
4) What is the influence of organizational safety culture on reporting of medical errors amongst nurses in pediatric wards in four teaching and referral hospitals in Nairobi County?

The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask me 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 study participant, and anything else about this study that is not clear to you. When i have answered all your questions to your satisfaction, you may decide to be in the study or not.

Once you understand and agree to be in the study, I will request you to sign your name on this consent form. Your decision to participate is entirely voluntary and you may withdraw from the study at any time without necessarily giving a reason for your withdrawal. This study has approval by NACOSTI, KeMU and your hospital's ethical review board.

I will be administering questionnaire to nurses working in pediatric wards, including critical care pediatric wards, in these hospitals. I will also be contacting one key informant guide interview to the head of nursing or her appointee. I am asking for

your consent to consider participating in this study. If you agree to participate in this study, you will be issued with a questionnaire to respond to by the researcher, and you will be given time to respond to it in a private area where you feel comfortable answering questions. It will take about 20 minutes to complete the questionnaire. Medical research has the potential to introduce psychological, social, emotional and physical risks. One potential risk of being in the study is loss of confidentiality. We have however put everything in place to make sure the study is completely confidential. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you. To mitigate this, we do not require your name at all in this questionnaire. Also, answering questions may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse to respond to some of the questions. The benefits of you participating in this study are that you will be contributing to the knowledge base of medical errors reporting within Nairobi County teaching and referral hospitals.

If you have further questions or concerns about participating in this study, please call or send a text message to the researcher in the number provided. You may also contact your ethical review office in case of any queries concerning this research. The number has also been provided.

Participant's statement

I have read this consent form and I have had the chance to discuss this research study with the researcher. 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. By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

If you agree to participate in this research study kindly proceed and sign below

Participant signature _____ Date _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant and I believe that the participant has understood and has willingly and freely consented to participate in this study.

Researcher's Name: Jane Ngivu

Signature _____ Date_____

APPENDIX 2: STUDY QUESTIONNAIRE FOR NURSES

SECTION A: DEMOGRAPHIC DATA

1. Your Hospital of Work

Kenyatta National Hospital (KNH) Gertrude's Children's Hospital (GCH)
The Nairobi Hospital (TNH) Aga Khan University Hospital

2. Gender

Male Female

3 What is your current age bracket?

≤30 years 31- 35 years
36-40 years 41-45 years
46-50 years 51 years and above

4. How long have you worked in this <u>hospital</u>?

☐ Less than 1 year ☐ 11 to 15 years
☐ 1 to 5 years ☐ 16 to 20 years
☐ 6 to 10 years ☐ 21 years or more

SECTION B. NURSES KNOWLEDGE ON MEDICAL ERROR

On the statements below, select the rating which correctly reflects your agreement or disagreement on each of the statements below.

Nurses Knowledge; Understanding of medical error reporting

To what extent do you agree with the statements below;	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. Medical errors are mistakes made by healthcare practitioners due to carelessness or failure to be keen.	☐1	☐2	☐3	☐4	☐5
2. Medical errors reporting is reporting colleagues who make mistakes so that actions can be taken against them	☐1	☐2	☐3	☐4	☐5
3. In medical error reporting, one should report the serious errors which lead to serious harm or death, the mild errors which cause minor harm and even the errors which are minor and which don't lead to harm.	☐1	☐2	☐3	☐4	☐5
4. Nurses in my department know what medical errors are.	☐1	☐2	☐3	☐4	☐5
5. Nurses in my department have a clear understanding on what medical errors reporting is.	☐1	☐2	☐3	☐4	☐5
6. I personally have a clear understanding of how to report medical errors.	☐1	☐2	☐3	☐4	☐5

7. In your own words, what do you understand by the term medical errors?

_____

_____

8. In your own words, why is medical error reporting important?

_____

_____

Nurses Knowledge; Training on medical error reporting

To what extent do you agree with the statements below;	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
9. I received training on Medical errors when I was a student during my college/ university studies.	☐1	☐2	☐3	☐4	☐5
10. In my place of work, I have been taken through medical errors and how to report them.	☐1	☐2	☐3	☐4	☐5
11. Nurses are routinely trained on medical errors and error reporting as part of their induction upon hire.	☐1	☐2	☐3	☐4	☐5
12. Refresher trainings for nurses on medical errors and error reporting are routinely done in my hospital.	☐1	☐2	☐3	☐4	☐5
13. I have personally been trained on medical errors and error reporting process.	☐1	☐2	☐3	☐4	☐5

14. What is your comment on adequacy of nurses training on medical errors?

_____

_____

15. In your own view, how relevant is nurses training on medical errors?

_____

_____

SECTION B: MANAGEMENT SUPPORT FOR MEDICAL ERROR REPORTING

Management support; Clear policies on medical error reporting

To what extent do you agree with this statements below;	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
16. Policies and procedures on medical error reporting exist in this hospital.	☐1	☐2	☐3	☐4	☐5
17. I have access to the hospital's medical error reporting policy and procedure.	☐1	☐2	☐3	☐4	☐5
18. Medical error reporting policies and procedures are readily accessible to nurses in this hospital.	☐1	☐2	☐3	☐4	☐5
19. Medical error reporting policies and procedures are well understood by nurses in this hospital.	☐1	☐2	☐3	☐4	☐5

20. What is your view on the role of policies in improving medical error reporting?

_____

_____

21. How would you describe medical errors reporting policies in your organization?

_____

_____

Management Support; Feedback and acting on reported errors

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
22. When medical errors occur, we are given feedback about changes put into place based on those errors.	☐1	☐2	☐3	☐4	☐5
23. We are usually informed about medical errors that happen in my department.	☐1	☐2	☐3	☐4	☐5
24. In my department, we discuss ways to prevent medical errors from happening again.	☐1	☐2	☐3	☐4	☐5
25. When medical errors are reported, the management promptly acts on it to implement corrective measures.	☐1	☐2	☐3	☐4	☐5

26. In your organization, what action is taken when medical errors are reported?

_____

_____

Hospital management support & priority for patient safety

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
27. Hospital management provides a work climate that promotes patient safety.	☐1	☐2	☐3	☐4	☐5
28. The actions of hospital management show that patient safety is a top priority.	☐1	☐2	☐3	☐4	☐5
29. Hospital management seems interested in patient safety only after patient harm happens.	☐1	☐2	☐3	☐4	☐5

30. How are patient safety concerns handled in your organization?

_____

_____

SECTION C: ORGANIZATIONAL SAFETY CULTURE

Organizational safety Culture; Reactions to reported errors

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
31. Staff here feel like their mistakes are held against them.	☐1	☐2	☐3	☐4	☐5
32. Staff here are punished whenever they make medical errors	☐1	☐2	☐3	☐4	☐5

33. How else does your organization react to reported medical errors?

_____

_____

Organizational safety Culture; Learning Culture of the organization

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
34. In this hospital, we are actively doing things to improve patient safety.	☐1	☐2	☐3	☐4	☐5
35. Medical errors made here in the past have led to positive changes in the hospital processes.	☐1	☐2	☐3	☐4	☐5
36. In my hospital, we discuss ways to prevent medical errors from happening again.	☐1	☐2	☐3	☐4	☐5

37. In your organizations, what positive changes have been implemented as a result of a reported medical error?

_____

_____

38. In your organizations, what negative action has happened as a result of reporting a medical error?

_____

_____

Organizational safety Culture; Team Work level in the organization

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
39. People support one another in my department.	☐1	☐2	☐3	☐4	☐5
40. When a lot of work needs to be done quickly, we work together as a team to get the work done.	☐1	☐2	☐3	☐4	☐5
41. In my department, people treat each other with respect.	☐1	☐2	☐3	☐4	☐5
42. When one area in my department gets really busy, others help out.	☐1	☐2	☐3	☐4	☐5
43. There is good cooperation among hospital departments that need to work together.	☐1	☐2	☐3	☐4	☐5
44. Hospital departments work well together to provide the best care for patients.	☐1	☐2	☐3	☐4	☐5

45. In your own words, how would you describe the level of team work in your organization?

_____

_____

Medical Error Reporting Systems; Availability of a reporting system

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
46. We have a system for reporting medical errors in this hospital. (forms or software)	☐1	☐2	☐3	☐4	☐5
47. The medical error reporting system; (hard copy forms or software) is readily accessible to nurses in my department to report medical errors.	☐1	☐2	☐3	☐4	☐5
48. Time taken to report a medical error in the reporting system (form or software) is good enough.	☐1	☐2	☐3	☐4	☐5

49. In your organizations, what barriers exist in your medical errors reporting system which hinder you from reporting medical errors?

_____

Acceptance of the Medical Error Reporting System

To what extent do you agree with the statements below?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
50. The medical error reporting system in my hospital; (hard copy forms or software) is easy to use	☐1	☐2	☐3	☐4	☐5
51. The medical error reporting system in my hospital; (hard copy forms or software) is very useful in the medical error reporting process.	☐1	☐2	☐3	☐4	☐5

52. What would you wish improved in your organization's medical error reporting system which would enhance your reporting?

_____

Anonymity of the medical error reporting system

To what extent do you agree with the statements below;	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
53. When reporting a medical error, the reporting system ensures that the identity of the person involved in the error is kept anonymous.	☐1	☐2	☐3	☐4	☐5
54. Medical errors reported in my organization are kept and handled in a confidential manner.	☐1	☐2	☐3	☐4	☐5

SECTION E: REPORTING OF MEDICAL ERRORS

Reporting Medical Errors; Frequency of reporting medical errors

Select your appropriate response to the statements below about medical errors reporting in your hospital	Never	Rarely	No comment	often	Always
55. Whenever you commit a medical error in your course of work, how often do you report it?	☐1	☐2	☐3	☐4	☐5
56. When you witness a medical error that has been committed by someone else, how often do you report it?	☐1	☐2	☐3	☐4	☐5

Reporting Medical Errors; Type of errors reported.

Select your appropriate response to the statements below about medical errors reporting in your hospital	Never	Rarely	No comment	often	Always
57. How often would you report a medical error which led to patient death or serious harm including disability?	☐1	☐2	☐3	☐4	☐5
58. How often would you report a medical error which led to some form of patient harm, though mild to moderate harm?	☐1	☐2	☐3	☐4	☐5
59. How often would you report a medical error which was corrected before even reaching the patient?	☐1	☐2	☐3	☐4	☐5
60. How often would you report a medical error which reached the patient but did not cause any harm?	☐1	☐2	☐3	☐4	☐5

61. What factors hinder you from reporting medical errors? Kindly list them below;

_____

_____

_____

_____

62. What kind of medical errors would you not report? You may select more than one.

Serious Medical errors which have led to patient death or visible patient harm.
Medical error which is corrected before reaching the patient
Medical errors on a patient who is likely to sue.
Medical errors committed by myself
Medical errors committed by someone else in my department
Other, Kindly
specify_____

63. What would you term as your leading barrier to reporting of medical errors?

_____

_____

APPENDIX 3: KEY INFORMANT INTERVIEW GUIDE

Job role:
Organization:

1. How would you rate your immediate nurse managers' knowledge on management of reported medical errors?

   _____

2. Are your nurse managers who nurses directly report to trained on medical errors and how to handle any of those reported by the nurses?

   _____

3. Does the hospital have a policy/ and procedure for reporting of medical errors?

   _____

4. Has the policy/ procedure been disseminated to nurses for use?

   _____

5. How accessible is the policy/ procedure to each nurse?

   _____

6. How does your hospital monitor compliance to the medical errors reporting policy and procedure?

   _____

7. What measures has your organization put in place to enhance medical errors reporting by your nurses?

   _____

   _____

8. What tools, if any has the hospital supplied to nurses for reporting medical errors?

_____

_____

9. How accessible are the medical errors reporting tools to the nurses?
10. What does the management do with the errors which nurses report?

_____

_____

11. In your own opinion, what do you think is the leading barrier to medical errors reporting by nurses in your organization?

_____

_____

APPENDIX 4: KEMU ETHICAL REVIEW BOARD APPROVAL LETTER

KENYA METHODIST UNIVERSITY
P. O. BOX 267 MERU - 60200, KENYA FAX: 254-64-30162
TEL: 254-064-30301/31229/30367/31171 EMAIL: serc@kemu.ac.ke

January 20, 2021 KeMU/SERC/HSM/78/2019/EXT.1

Jane Ndungulu Ngivu
Kenya Methodist University

Dear Jane,

SUBJECT: FACTORS INFLUENCING REPORTING ON MEDICAL ERRORS AMONG NURSES IN PEDIATRIC WARDS IN NAIROBI COUNTYS TEACHING HOSPITALS

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your above research proposal. Your application approval number is KeMU/SERC/HSM/1/2021. The approval period is 20th January 2021 – 20th January 2022

This approval is subject to compliance with the following requirements

I. Only approved documents including (informed consents, study instruments, MTA) will be used.

II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Scientific Ethics and Review committee.

III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU SERC within 72 hours of notification.

IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU SERC within 72 hours.

V. Clearance for export of biological specimens must be obtained from relevant institutions.

VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal

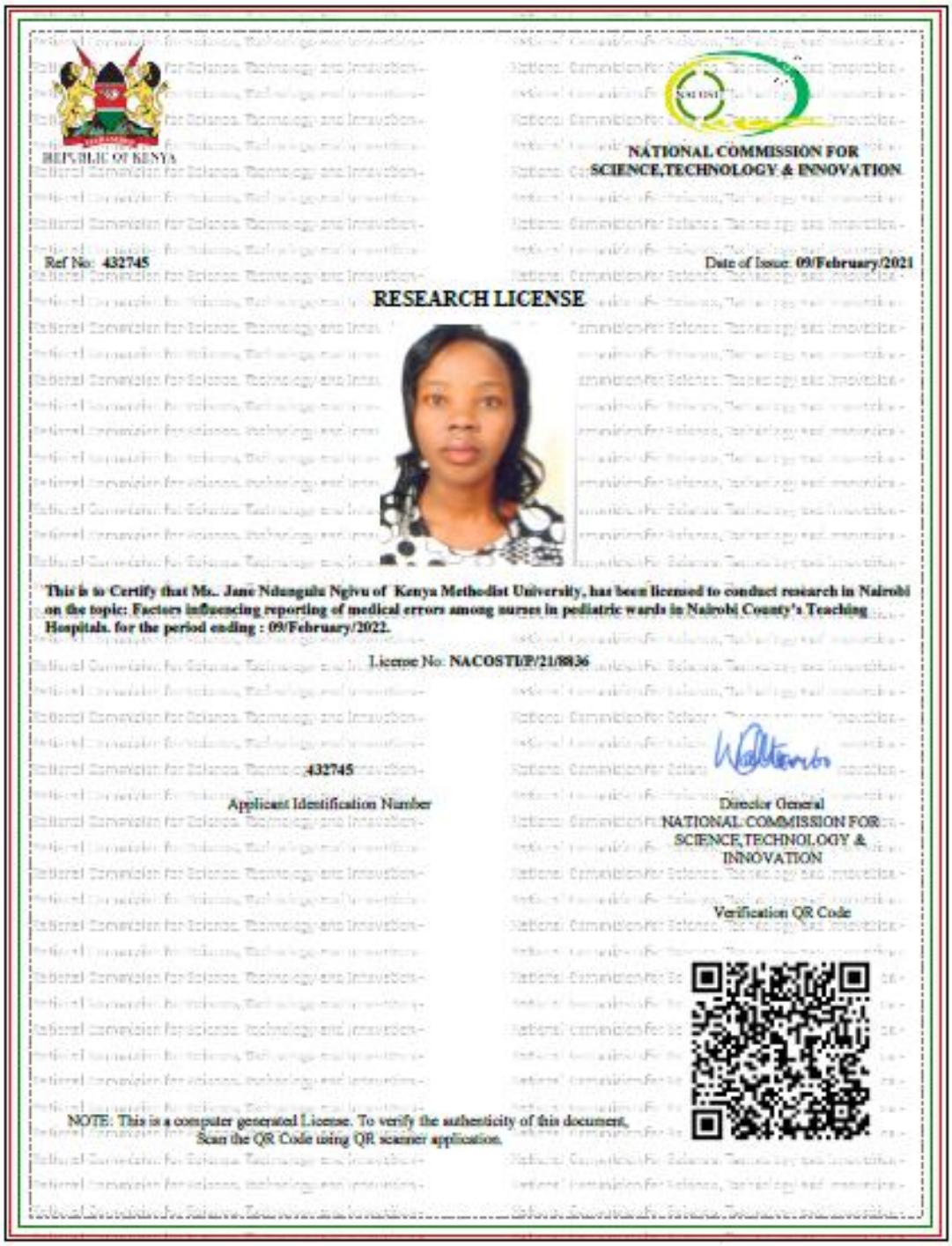
VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

Dr. A. WAMACHI
Chair, SERC

APPENDIX 5: NACOSTI ETHICAL REVIEW APPROVAL LETTER



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: 432745

Date of Issue: 09/February/2021

RESEARCH LICENSE

This is to Certify that Ms.. Jane Ndungulu Ngivu of Kenya Methodist University, has been licensed to conduct research in Nairobi on the topic: Factors influencing reporting of medical errors among nurses in pediatric wards in Nairobi County's Teaching Hospitals. for the period ending : 09/February/2022.

License No: NACOSTI/P/21/8836

432745

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX 6: GCH ETHICAL REVIEW BOARD APPROVAL LETTER

Gertrude's
CHILDREN'S HOSPITAL
Quality healthcare for children

Gertrude's Children's Hospital

Final Decision Certificate

This document certifies that the study:

"FACTORS INFLUENCING REPORTING OF MEDICAL ERRORS AMONGST NURSES IN PEDIATRIC WARDS IN NAIROBI COUNTY'S TEACHING HOSPITALS"

Principal Investigator: Ms. NGIVU, JANE NDUNGULU
Reference number: RH003/2019
Was reviewed and received the following status:
"approved"
"Additional Comments:"

Reviewer #1:
'Proceed.you are good to go'

Regards,

Dr. Thomas Ngwiri
Secretary - Ethical Review Board

Dr. Vankwa Indecha
Chair-Ethical Review Board

APPENDIX 7: AKUH-N ETHICAL REVIEW BOARD APPROVAL LETTER

THE AGA KHAN UNIVERSITY

Faculty of Health Sciences
Medical College

Ref: 2021/IERC-42 (v2)
June 07, 2021

Ms. Jane Ngivu - Principal Investigator
MP Shah Hospital- Nairobi

Dear Ms. Ngivu and team,

Re: FACTORS INFLUENCING REPORTING OF MEDICAL ERRORS AMONGST NURSES IN PEDIATRIC WARDS IN NAIROBI COUNTY'S TEACHING HOSPITALS.

The Aga Khan University, Nairobi Institutional Ethics Review Committee (IERC), is in receipt of your protocol resubmitted to the Research Office (RO) on April 28, 2021. With reference to the IERC letter Ref: 2021/IERC-42 (v1) dated April 15, 2021, the IERC reviewed and approved this project *(as per attached official stamped protocol and attachments - version Ref: 2021/IERC-42 (v2))*. You are authorized to conduct this study from **June 07, 2021**. This approval is valid until **June 06, 2022** and is subject to compliance with the following requirements;

1. The conduct of the study shall be governed at all times by all applicable national and international laws, rules and regulations. IERC guidelines and Aga Khan University Hospital policies shall also apply, and you should notify the committee of any changes that may affect your research project (amendments, deviations and violations)
2. Researchers desiring to initiate research activities during COVID-19 pandemic must comply with the COVID-19 SOPs for Research as well as submit to the Research Office a Request Form to Initiate, Reinstate or Continue Research During COVID-19 Pandemic.
3. **Prior** to human subjects enrolment you must obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI); site approvals from the targeted external site(s) and file the copies with the RO.
4. As applicable, **prior** to export of biological specimens/data, ensure a Material Transfer Agreement (MTA)/Data Transfer Agreement (DTA), is in place as well as seek shipment authority/permit from the relevant government ministry. Copies of these approvals, should be submitted to the RO for records purpose.
5. All Serious Adverse Events and the interventions undertaken must be reported to the IERC as soon as they occur but not later than 48 hours. The SAE shall also be reported through the AKUHN quality monitoring mechanism(s) at Client Relations Department of the Chief of Staff's Office.
6. All consent forms must be filed in the study binder and where applicable, patient hospital record.
7. Further, you must provide an interim Progress Report Form **60 days before expiration** of the validity of this approval and request extension if additional time is required for study completion.
8. You must advise the IERC when this study is complete or discontinued and a final report submitted to the Research Office for record purposes. The hospital management should be notified of manuscripts emanating from this work.

If you have any questions, please contact Research Office at AKUKenya.ResearchOffice@aku.edu or 020-366 2148/1136.

With best wishes,

Professor Stanley Luchters
Interim Chair - Institutional Ethics Review Committee (IERC)
Aga Khan University, (Kenya)

cc: Co- Investigators

3rd Parklands Avenue, off Limuru Road, P. O. Box 30270, GPO 00100, Nairobi, Kenya
Telephone: +254 20 366 2107/2109; Fax: +254 20 374 4035

APPENDIX 8: KNH-UON ETHICAL REVIEW BOARD APPROVAL LETTER

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/knhuonerc
Twitter: @UONKNH_ERC http://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

APPROVED
19 JUL 2021
KNH/UoN-ERC

Ref: KNH-ERC/A/261

19th July, 2021

Jane Ndungulu Ngivu
Reg. No. HSM-3-1984-3/ 2017
Department of Health System Management
Kenya Methodist University

Dear Jane

RESEARCH PROPOSAL: FACTORS INFLUENCING REPORTING OF MEDICAL ERRORS AMONGST NURSES IN PAEDIATRIC WARDS IN FOUR TEACHING AND REFERRAL HOSPITALS IN NAIROBI COUNTY (P207 /03/2021)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and approved your above research proposal. The approval period is 19th July, 2021 – 18th July, 2022.

This approval is subject to compliance with the following requirements:

i. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
ii. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
iii. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal).
vii. Submission of an executive summary report within 90 days upon completion of the study.

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

For more details consult the KNH- UoN ERC website http://www.erc.uonbi.ac.ke

Yours sincerely,

PROF. M.L CHINDIA
SECRETARY, KNH- UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chair, KNH- UoN ERC
The Assistant Director, Health Information Department, KNH
Supervisors: Dr. Caroline Kawila, Kenya Methodist University
Ms. Lilian Muiruri, Kenya Methodist University