CONTRIBUTING FACTORS TO MEDICATION ADMINISTRATION ERRORS AND BARRIERS TO SELF-REPORTING AMONG NURSES WORKING IN PEDIATRIC UNITS OF SELECTED REFERRAL HOSPITALS IN RWANDA

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Master of Sciences in Nursing (Pediatric track)

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A dissertation submitted in partial fulfillment of the requirements for the degree of
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DECLARATION

I do hereby declare that this ***dissertation*** submitted in partial fulfillment of the requirements for the degree of **MASTERS OF SCIENCE** in **NURSING**, at the University of Rwanda/College of Medicine and Health Sciences, is my original work and has not previously been submitted elsewhere. Also, I do declare that a complete list of references is provided indicating all the sources of information quoted or cited.

Date and Signature of the Student
11/06/2017

a. *Authority to Submit the dissertation*

Surname and First Name of the Supervisor: CHIRONDA Geldine, PhD

In my capacity as a Supervisor, I do hereby authorize the student to submit his/her **dissertation**.

Date and Signature of the Supervisor
11/06/2017

DEDICATION

This work is dedicated to my beloved parents late KARANGWA Fred and late NKURIKIYIMANA Mediatrice; my adoptive family Munyaburanga Laurent and his late wife UMUTESI Francoise, my brothers and sisters.

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ABSTRACT

Introduction: Medication errors continue to be the major problem that causes morbidity and mortality and increases costs for healthcare systems. Medication errors are the leading cause of incidents in the patient safety worldwide.

The aim of the study: This study aimed at assessing the contributing factors to medication administration errors and barriers to reporting among nurses who work in pediatric units of selected referral hospitals.

Methods: This study used a quantitative descriptive cross sectional design. A convenience sampling was used to get a total sample of 151 participants. The data were collected using a questionnaire. The reliability of the tool was measured by Cronbach's alpha and it had 0.86. Data were analyzed by SPSS version 21. Descriptive statistics and Chi-square test were used.

Results: The completed questionnaires were 149 which translated to the response rate of 98.6%.This study revealed that the majority of the participants were females 113 (75.84%). Twenty 20 (20.1%) of participants have identified wrong time error. Identified factors to MAEs were workload or few nurses compared to the number of patients eighty two (55.0%) and fifty (33.6%) responded that unit staff do not receive in service trainings about new medication. Whereas barriers to self-reporting were fear to be blamed if something happens to the patient as a result of the medication administration error eighty eight (59.1%). A strong association was found between socio demographic data except gender with (p= 0.039). Experience and marital status revealed as strong association to factors contributing to MAEs (p=0.001; p=0.000) respectively.

Conclusion: MAEs are committed frequently among the participants. Factors contributing to MAEs were found in both parties and barriers to self reporting were identified to be the fear reasons and administrative reasons. Therefore, a non-punitive environment is imperative in encouraging self-reporting of medication errors and it takes everyone efforts to improve patient safety by preventing medication administration errors.

Keywords: Medication, medication administration, Medication error, self-reporting, pediatric nurse.

ACCRONYMS AND ABREVIATIONS

%: Percent

$: Dollar

ADRs: Adverse Drug Reactions

CINAHL: Cumulative Index to Nursing and Allied Health Literature

Cont.: Continue

FDA: Food and Drug Administration

IOM: Institute of Medicine

IRB: Institutional Review Board

IV: Intravenous Injection

MAEs: Medication Administration Errors

MEs: Medication Errors

MSN: Masters of Sciences in Nursing

NIC: Nursing Interventions Classification

P: Probability value

p.: Page

RNs: Registered Nurses

SPSS: Statistical Package for the Social Sciences

TPB: Theory of Planned Behavior

U.S: United States

UTHB: University Teaching Hospital of Butare

UTHK: University Teaching Hospital of Kigali

WHO: World Health Organization

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CHAPTER ONE: INTRODUCTION

Medication errors continue to be the major problem that causes morbidity and mortality (Ojerinde & Adejumo, 2014 p.23) and increases costs for clinicians and healthcare systems (Feleke, Mulatu, & Yesmaw, 2015 p.1). Drugs administration is one important task of nurses (Lapkin, Levett-Jones, Chenoweth., 2016 p.2) and there is little evidence that explores contributing factors around their decision making, reasoning and questioning (Aydon, Hauck, Zimmer, & Murdoch, 2016 p.3). Thus, identification of those factors is very crucial in the prevention of medication associated errors (Lapkin, Levett-Jones, Chenoweth., 2016 p.12)

1.1 BACKGROUND

Medication error is "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer (U.S. Food and Drug Administration, 2016b). Such events may be related to professional practice, healthcare products, procedures, and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use"(U.S. Food and Drug Administration, 2016)

Medication errors are the most important cause of the incidents in the patient safety worldwide (WHO, 2016b). In the United States, medication errors kill one patient a day and harms about 1.3millions each year(U.S. Food and Drug Administration, 2016a) and it comes on the third place among the causes of death (Makary & Daniel, 2016 p.2). Globally, the total budget spent on medication errors equals to 42 billion US$ or 1% of the total global health expenditure (WHO, 2017). According to the literature review in Australia, errors excluding wrong time account 9% of drugs administrations or 1 error per 10 administrations and among 80% of discharges had at least two errors for each patient (Roughead, Semple & Rosenfeld, 2016 p.7). In Europe around 4,372 cases were reported due to medication errors and accidental overdose ranked the top among others (Goedecke *et al.*, 2016 p.5).

Nurses are reported to commit many medication errors among other health care professionals like medicine and anesthesia (Zakharov, Tomas, & Pelclova, 2012 p.311).The FDA analyzed the reports of medication errors and the most common errors were wrong dose 41%, wrong drug 16%, and wrong route 16% and the most common factors were low level of knowledge 44%, and poor communication 16% (U.S. Food and Drug Administration, 2015).

According to the human error theory by James, (2000) p.393, the types of medication administration errors are grouped into two categories like individual factors (malpractice that is related to psychological problems such as forgetfulness, lack of concentration, lack of motivation, carelessness, negligence, and irresponsibility) and the conditions under which people work. 93.3% of nurses reported that the main cause is inattention (Vilela & Jerico, 2015 p.124) whereas, Miladinia, Zarea, Baraz, & Nouri, (2016)p.1439 found that the main causes reported are poor medication knowledge and poor calculation skills which rated on 96.2% and 73.5% respectively. Therefore, the alternative approaches are needed to set the prevention measures of errors attributed to the administration of wrong drug, route, dosage and client, and failure to administer or poor documentation of drugs prescribed (Lapkin, Levett-Jones &Chenoweth., 2016 p.2).

The findings from the systematic review in Australia showed that between 60% to 80% of patients met with MAEs and omission error accounts between 40% to 60% (Australian Commission on Safety and Quality in Health Care, 2013). In Nigeria, the prevalence of MAEs among nurses was 64%, then 44% don't know the existence of reporting system and the minority of 30% reported the MAEs among pediatric nurses(Oshikoya, Oreagba, Ogunleye, Senbanjo, & Macebong, 2013 p.75)

In a study conducted by Agu et al., (2014), in Nigeria, the findings reported MAEs where by wrong drug came on the top 26.4%, 19.8% drug interaction or contraindication present and 16.6% was regarding duration and frequency. Furthermore, to strengthen patient safety there should be a reporting system that is facilitated by a punishment free environment and nurse managers should not punish nurses who reported errors only but also reward the ones with an initiative to do so. So far, nurses were reported that they fear negative consequences that may

follow the reporting after medication errors but nurse managers should enhance the reporting system and initiate support services to decrease fear and shame of nurses and provide incentives to strengthen reporting (Yung *et al.*, 2016 p.1)

Medication errors are among nursing care part that can threaten patient outcomes and pediatric population is vulnerable than others (WHO, 2014 p.2; Lapkin, Levett-Jones, & Chenoweth ., 2016 p.12) because of their physiology and developmental needs (Stratton, Blegen, & Vaughn, 2004 p.385) and also because of dosing based on weight, children are at high risk of facing MAEs (U.S. Food and Drug Administration, 2015). Moreover, pediatric population is highly exposed to Adverse Drug Reactions (ADRs) because drugs have not been studied deeply in the pediatric population, and there is a low absorption and metabolism because of different factors like immature organs (Alomar, 2014 p.85). Consequently, medication errors are among the causes of a large number of ADRs for these clients(Alomar, 2014 p.85) and they are more prone to medication errors as also reported in Czech Republic (Zakharov, Tomas, & Pelclova, 2012 p.311).

In a prospective study that has been conducted in Ethiopia, found that 7.3 % of pediatric clients who were hospitalized in pediatrics unit have been exposed to ADRs among them 47 % were avoidable, while 53 % were not(Dedefo, Mitike, & Angamo, 2016 p.8).Similarly, according to their study Haghbin, Shahsavari, &Vazin, (2016) p.109, conducted in Iran, they found that medication errors were 48.8% that are common in pediatric population compared to adults.

In Uganda, 18% of health care professionals reported that they have committed Medication Errors while 41% revealed that they have identified the medication errors committed with other health care professional and all those medication errors were potentially harmful. They also suggested that the country should establish the Medication Errors reporting system(Kiguba *et al.*, 2015). Thus, to prevent medication administration errors there should be a way for reporting them within the hospital(Bifftu, Dachew, Tiruneh, & Beshah, 2016 p.6) but still there are some barriers that hinder this activity like lack of precise definition, no

effort in reporting, fear, and administrative responses (Mohammad, Aljasser, & Sasidhar, 2016 p.6;Bifftu et al., 2016).

Rwanda was among 16 countries where they found that it does not have clear reporting system of medication errors (Holmström *et al.*, 2012). In contrast to this article, the Ministry of Health has tasked the concerned people regarding drugs selection, storage, prescribing, dispensing, administration, and patient monitoring to be sure that they are implemented to minimize the risks as well monitoring of medication errors(Ministry of Health, 2014 p.42). Still MAEs occur in Rwandan healthcare systems (Turikumana *et al.*, 2015 p.109; Mugabo *et al.*, 2015 p.111; Amendezo *et al.*, 2015 p.111). Although the Rwanda Ministry of Health has put in place different strategies to strengthen patient safety and guidelines for pharmacovigilance and Medicine Information some clients still experience adverse drugs reactions and medication errors are the leading cause(Rwanda Ministry of Health, 2010). This also was supported by the claim of Institute of Medicine, (2006) which says that medication errors are common in hospitals. Therefore, MAEs are not well studied in Rwanda. This study explored the contributing factors related to medication errors and barriers to reporting among nurses working in pediatric units of selected referral hospitals in Rwanda.

1.2 PROBLEM STATEMENT

Medication administration errors are preventable but continue to harm the patients in healthcare systems (Ferner, 2012 p.912). Medication safety is a global challenge and 18.7%-56% of hospitalized patients face medication errors that are preventable (Europian Medicines Agency, 2015 p.5). Institute of Medicine, (1999), located in the United States of America published the report, *To Err is Human: Building a Safer Health System*. This report supported that each year medication errors cause more than 7,000 deaths. According to IOM in the USA, medication errors cause injury for at least 1.5 million people and to treat those injuries also cost just about 3.5 billion dollars per year(Institute of Medicine, 2006).

In Rwandan referral hospitals audits, MAEs were identified. In University Teaching Hospital of Kigali (UTHK) there was a poor recording of drugs(Turikumana *et al.*, 2015 p.109), at

University Teaching Hospital of Butare, medication errors were reported including prescription and dosing errors which caused serious effects to the patients(Mugabo *et al.*, 2015 p.111) and at King Faisal Hospital also a dosing error postoperatively affected one patient (Amendezo *et al.*, 2015 p.111). Again, refusal of doctors to collaborate with nurses about patient care led to increased MAEs (Mukeshimana & Asingizwe, 2016, p.71). Additionally, from informal observations and clinical experiences, pediatric patients are faced with MAEs and some of them are not reported. Consequently, MAEs impact patients negatively in terms of morbidity, mortality, ADRs, and increased the length of hospitalization. Identifying and reporting those errors will help to prevent and learn from them(Rwanda Ministry of Health, 2010 p.29;Sears, 2012 p.120).

The Rwanda Ministry of Health has put in place the patient safety measures and established the reporting system, however, types of MAEs, contributing factors to MAEs are not well explored and barriers to reporting are not well studied in Rwandan context. Therefore this study aims at assessing the contributing factors to MAEs and barriers to self-reporting among reporting among nurses working in pediatric units of selected referral hospitals in Rwanda.

1.3 THE AIM OF THE STUDY

The purpose of the study is to assess the contributing factors to medication administration errors and barriers to self-reporting among nurses working in pediatric units of selected referral hospitals in Rwanda

1.4 RESEARCH OBJECTIVES

1.4.1 Main objective

To assess the contributing factors to medication administration errors and barriers to self-reporting among nurses working in pediatric units of selected referral hospitals in Rwanda

1.4.2 Specific objectives

- ✓ To identify the types of medication administration errors committed among nurses working in pediatric units of selected referral hospitals in Rwanda.
- ✓ To determine the factors that contribute to medication administration errors among nurses working in pediatric units of selected referral hospitals in Rwanda.
- ✓ To identify the barriers to self-reporting after committing medication error among nurses working in pediatric units of selected referral hospitals in Rwanda.

1.5 RESEARCH QUESTIONS

1.5.2 Main research question

What are the contributing factors to medication administration errors and barriers to self-reporting among nurses working in pediatric units of selected referral hospitals in Rwanda?

1.5.3 Specific research questions

- ✓ What are the types of medication administration errors committed among nurses who work in pediatric units of selected referral hospitals in Rwanda?
- ✓ What are the factors that contribute to medication administration errors among nurses working in pediatric units of selected referral hospitals in Rwanda?
- ✓ What are the barriers to self-reporting after committing medication errors among nurses working in pediatric units of selected referral hospitals in Rwanda?

1.6 SIGNIFICANCE OF THE STUDY

Conducting many studies about medication errors may help nurses to improve the quality of care to their patients and it has been urged that when an error is discovered, it should be reported and disclosed to prevent the future errors (Wittich, Burkle, & Lanier, 2014 p.1124). So far, nurses report that some barriers like the administration which focuses on the system and fear of reprimand are among the barriers to reporting(Mohammad et al., 2016p.8).

In nursing practice, the findings from this study will assist to reduce or eliminate barriers to reporting MEs eventually by ensuring uppermost quality and safety to the pediatric clients.
In nursing education, they will also help the nurse educators to improve and strengthening nursing curriculum by emphasizing on the prevention of medication administration errors and patient safety and also setting continuous professional development on medication errors.

In nursing research, the results will help future researchers to work on medication administration errors in other units other than pediatric.

In nursing leadership and management, they will serve the nurse managers to know how they can set free punishment ways after reporting medication errors hence it will enhance the reporting rate.
Finally, the feedback will be given to the Ministry of Health to assess how it can strengthen the reporting system as well as developing the policies and strategies to prevent medication errors.

1.7 OPERATIONAL DEFINITIONS

Medication:"A drug or other substance used to treat disease or injury; a medicine"(The free dictionary, 2016). For this study, medication is any substance like a drug, IV fluid, therapeutic milk given to a pediatric client by a nurse to cure, treat, alleviate signs and symptoms, and prevent the diseases.

Medication administration:"a nursing intervention from the Nursing Interventions Classification (NIC) defined as preparing, giving, and evaluating the effectiveness of prescription and nonprescription drugs"(The free dictionary, 2016). For this study, medication administration is the giving of a therapeutic agent to the pediatric client either in all routes.

Medication error: "A medication error is an unintended failure in the drug treatment process that leads to, or has the potential to lead to, harm to the patient**"**(Europian Medicines Agency,

2015)**.** In this study, medication error relates to any failure to obey the six rights of patient drugs administration.

Self- reporting:"Provide details about (one's circumstances, typically one's medical or psychological condition)(Oxford Dictionary, 2016)". In this study, self-reporting refers to disclosing what the nurse did to the concerned people voluntarily.

Pediatric nurse: "are Registered Nurses (RNs) who care for children of all ages in a variety of healthcare settings" (Society of Pediatric Nurses, 2006). For this study, it means any nurse who works with pediatric clients in Rwanda.

1.8 STRUCTURE/ORGANIZATION OF THE STUDY

This dissertation will be subdivided into the following main categories:

- Chapter 1: Introduction
- Chapter 2: Literature review
- Chapter 3: Methodology
- Chapter 4: Results
- Chapter 5: Discussion
- Chapter 6: Conclusions and Recommendations
- References
- Appendix

Conclusion of chapter one

Medication administration errors affect patients' outcomes and institutions. Pediatric population is vulnerable due to their physiology and developmental needs. Medication administration is one of the main tasks of nurses and they are the ones to report any error that arises when performing this task. The contributing factors are related to many reasons such as individual, medication packages, pharmacy… The error reporting is affected by so many factors including the individual and the system. Therefore, the detection of these factors and barriers to self-report may help in the prevention and improve the institution's services and patients outcomes. The purpose of this thesis is the identification of contributing factors to

medication administration errors and barriers to self-reporting among nurses working in pediatric units of selected referral hospitals in Rwanda.

CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

Medication errors happen at different stages of the medication use process which are prescribing, provision and administration (Berdot, Sabatier, Gillaizeau, Caruba, & Prognon, 2012 p.1; Institute of Medicine, 2006 p.1). In its report, Institute of Medicine, 1999, called *To Err is Human: Building a Safer Health System* revealed that each year medication errors cause more than 7,000 deaths. Therefore, the recommendations of the years followed that report suggested that there should be periodic surveys and more academic researchers to prove the rate of medication errors(Institute of Medicine, 2009).

2.1. Theoretical literature

2.1.1. Definition

According to the National Coordinating Council for Medication Error Reporting and Prevention, (2016 p.1), medication error is any preventable act that contributes to the failure of proper medication use or causes problems to the patient while it is being handled by the healthcare professional, clients, or consumer. Such acts may be associated with practice, products, techniques, and systems, including prescription, miscommunication, labeling, packing, and nomenclature, assembling, distributing, administration,…

2.1.2. Types of medication administration errors

The medication errors can be categorized as prescription errors and preparation errors whereby drugs administration are classified with other associated types of errors (Rejane, Rotta, & Goldim, 2013 p.800). MAEs also may occur when seven rights during administration are violated. Those rights are correct drug and patient, correct storage of drug, correct and most effective route, correct dose, correct preparation, correct timing, and correct recording of administration (Karch, 2013 p.49). Hardmeier *et al.*, (2014) p.55 also had illustrated some outcome measures during drug administration which are: the right drug (identity of the drug), right dose, right route, right formulation (including right technique), right date and time of administration, extra dose, omission and unauthorized/unavailable dose.

2.1.3. Management of medication errors

Medication errors may be managed by setting good standards, simplification of procedures and others (Athanasakis, 2012 p.775). However, the administration and quality improvement team are accountable for the medication errors because they should propose the solutions to medication error reported as well as following up of the effectiveness of solutions made (Su, 2013 p.18). Total elimination of medication errors is impossible but some efforts may be made to reduce them in clinical settings (Athanasakis, 2012 p.779). Moreover, double checking, updates on drugs and continuous training are the most common interventions that may be used to reduce medication administration errors among nurses (Ojerinde & Adejumo, 2014 p.27). Additionally the use of DRAINS acronym (D=Drug and Dose for legibility, Route for multiple routes which should be avoided, Allergies section to be well completed, Identification of the patient to be well defined on the charts and the whole documents, Nursing and Midwifery Council standards of medicines administration adhered and Signature from the prescriber) seems to be helpful in the management of MAEs (Nute, 2015 p.49).

2.2. Empirical literature

2.2.1. Prevalence, types and severity of medication errors

Psychologists differentiate two categories of errors: mistakes, which are errors of knowledge and planning; and slips or lapses that may occur during the implementation of care(Reason, 2000). Drugs prescription and administration are the most common medication errors (Keers, Williams, Cooke, & Ashcroft, 2013 p.1046). The first step to reducing medication errors is to identify the types and set the preventive measures according to those types(Ferner, 2012 p.912;Wright, 2016 p.37).

The study conducted by (Aboshaiqah, 2014 p.66) in Kingdom of Saudi Arabia with the aim of investigating factors associated with nurses' medication administration errors by reviewing the 288 medical records and 309 nurses filled the questionnaire. He firstly analyzed the types of medication errors through the analysis of the medical records, the analysis found that wrong timing of medication administration was very common at a level of 30.9%, followed by lack of allergy verification 25.0%, whereby the wrong route preceded as the lowest 7.3%. Concerning the seriousness of medication error, the analysis found that 13% of the medication

error reported had no risk, 41%, 27%, 27% and 2% with minimal risk, mild, moderate and severe adverse effects respectively. Data was not enough to explore individual characteristics of a full description of adverse effects caused by the medication errors (Aboshaiqah, 2014 p.66).

Another observational study which was conducted in pediatric and neonatal units at University of California San Francisco Benioff Children's Hospital by Hardmeier, Tsourounis, Moore, Abbott, & Guglielmo,(2014) with a purpose of detecting medication errors and Bar Code Medication Administration. Among 300 observed doses during the time of administration, (95%, n=285) doses were administered correctly. They identified 15 MAEs, among them the wrong route accounted 10, 2 wrong technique, 2 wrong times and 1 as omitted.

A study done to rule out the different medication errors in tertiary care hospitals has found that omission error is most prevalent 77.5% among others (Mateti, Sheikh and Kabekkodu, 2017 p.1). A different study done in hospitals affiliated with Mashhad University of Medical Sciences in, Mashhad, Iran with the purpose of evaluating the medication errors among 530 nurses. Nurses were recruited using simple and stratified random sampling strategy and survey questionnaire was also used with Likert scale format. The results showed that the most prevalent medication errors by nurses was early or late administration of medication (43.7%)(Ebrahimipour, Hosseini, Haghighi, & Tabatabaee, 2016 p. 402). Another study with comparable findings was conducted in Saudi Arabia and showed that 30.9% responded that the most common medication administration error is the wrong timing of medication administration (Aboshaiqah, 2014 p.66). Moreover, using the documentation of Pediatric mediation administration errors in Canadian pediatric center wrong time error accounted 168 cases (45.2%) among 272 cases (Sears & Goodman, 2012 p.114).

Although these studies have identified wrong time error as the most common error in clinical settings, in contrast the retrospective study of 2,380 physician orders in King Abdul-Laziz Medical city, Saudi Arabia has identified 1,333 medication errors and the dosing error as the

highest cause of medication error at the degree of 22.1% among others (Al-jeraisy, Alanazi and Abolfotouh, 2011).

This in contrast with the results from the study done in Gondar/Ethiopia which revealed that administration of a drug which is not prescribed was at the rate of 20.1% for Intravenous and 24.8% for non Intravenous drugs (Bifftu, Dachew, Tiruneh, & Beshah, 2016 p.4).

The other more than a few studies have found wrong dose at the highest percentage compared the present study findings wrong dose (Miladinia et al., 2016 p.1441;Oshikoya, Oreagba, Ogunleye, Senbanjo, & Macebong, 2013 p.71)

2.2.2. Factors contributing to medication errors

Drugs administration is one of the main steps of medication management(Wright, 2016; Jain & Guglani, 2016 p.17) and is affected by so many factors including personal, environment, systems and culture because it is not performed in isolation (Wright, 2016 p.37;Parry, Barriball, & While, 2015 p.419;Mirsadeghi & Pazokian, 2015 p.321). Furthermore, the systematic review which was conducted by Alomari, Wilson, Davidson, &Lewis,(2015) had and aim of finding out the contributing factors involving nurses, families and healthcare systems that impact on medication administration errors in pediatric patients. Medline, Embase, CINAHL and the Cochrane library databases were used to evaluate 15 medication administration errors articles. The findings found that the most common contributing factors to medication administration errors were poor communication between the caretaker and staff, nurse workload, not to abide by policies and procedures, distractions, lack of experience and shortage of staff (Alomari *et al.*, 2015).

2.2.2.1. Medication packaging reasons

Similar appearance of medication or labeling causes confusions during drugs administration (Schnoor *et al.*, 2015 p.1) . At the University of California San Diego Medical Center they were errors that affected four out of five cases resulted from confusion between neonatal and pediatric products. Three among those errors were resulted from near misses with the potential to cause harm. The remaining two errors affected the patients even they did not cause harm to them (Sauberan *et al.*, 2010 p.49). Drugs naming, labeling and packaging are associated to the patients' injuries and even deaths (Ismail and Taqi, 2013 p.121).

2.2.2.2. Physicians reasons

Use of abbreviations by the physicians during medical order or any other form of communication increases the chances of medication errors (Wittich, Burkle and Lanier, 2014 p.1117). In a study conducted in a regional health authority with the aim of evaluating medication order writing standards policy has proven that there are errors related to orders with disqualified abbreviations, acronyms or symbols to the level of 2261/8565 (26.4%) (Raymond *et al.*, 2013 p.277). Similarly 47 (31.5%) reported in the United States of America the use of abbreviations instead of writing completely as the other factor (Wittich, Burkle, & Lanier, 2014 p.4). Thus, some abbreviations should not be used for preventing the medication errors (The Joint Commission, 2016). Not only the abbreviations but also the visibility of the orders or handwriting illegibility (Abdar *et al.*, 2014 p.20).The poor communication between healthcare professionals especially the physicians and nurses has a great impact to be the factor for medication administration errors (Alomari *et al.*, 2015; Mukeshimana and Asingizwe, 2016 p.71).

2.2.2.3. Nurses reasons

Several studies have been conducted and found the most common MAEs factors from nurses' perspective that were reported: poor medication knowledge (Miladinia et al., 2016 p.1442; Abdar, Tajaddini, Bazrafshan, Khoshab, & Tavan, 2014 p.21;Aboshaiqah, 2014 p.65), poor calculation skills (Miladinia et al., 2016; Tshiamo, Kgositau, Ntsayagae, & Sabone, 2015 Pg. 21), work experience (Bifftu et al., 2016 Pg. 4; Feleke et al., 2015 p.4)nurses' fatigue (Miladinia et al., 2016 p.1442; Tshiamo et al., 2015 p.21; Abdar, Tajaddini, Bazrafshan, Khoshab, & Tavan, 2014 p.20; Oshikoya et al., 2013 p.72; Feleke et al., 2015p.4), no double checking (Oshikoya et al., 2013 p.72)and many medications on multiple patients(Miladinia et al., 2016 p.1442).

In study entitled effectiveness of a 'Do not interrupt' bundled intervention to reduce interruptions during medication administration: a cluster randomized controlled feasibility has identified how the interruptions also are the contributing factors for MAEs whereby 57 interruptions per 100 administrations were identified and 87.9% were unrelated to medication administration (Westbrook *et al.*, 2017). Those errors made the nurses to stop for handling

those issues and after an intervention those errors were reduced to 34 interruptions per 100 administrations, thus the nurses wished that this intervention should be part of the hospital policy (Westbrook *et al.*, 2017).

2.2.3.4. Systems reasons

The study that has been conducted in Malaysia with the aim of identifying the level of knowledge and factors among nurses which contribute to medication errors revealed that most of the participants 95.8% agreed that heavy workload and complicated orders take the first place to contribute to MAEs (Johari, Shamsuddin, Idris, & Hussin, 2013 p.21) supported by the several studies that have identified also workload as the main factor (Miladinia et al., 2016 p.1442; Tshiamo et al., 2015 p.21; Abdar, Tajaddini, Bazrafshan, Khoshab, & Tavan, 2014 p.20; Oshikoya et al., 2013 p.72; Feleke et al., 2015p.4).

Another factor with a great impact on medication administration was highlighted in the study that has been conducted in Saudi Arabia which revealed that nurses in the two regional hospitals 215(69.6%) agreed that they do not receive in service training regarding the new medication as the common medication administration error (Aboshaiqah, 2014 p.65). However, the results from the study that was conducted in three Canadian pediatric centers with the aim of assessing the risks factors associated to the increased severity of MAEs have found that the working shift is the most common factor whereby 64.5% of errors occur on the day shift followed by 22% that occur on the night shift(Sears & Goodman, 2012 p.114) the same as the other studies that emphasized on the working shift as the contributing factor (Abdar et al., 2014 p.21;Feleke et al., 2015 p.4). Another factor was found in the study done with the aim of evaluating the effectiveness of a "do not interrupt" bundled interruption to reduce non medication related interruptions to nurses during medication administration whereby in the observational study the interruptions accounted 57 per 100 administrations (Westbrook et al., 2017 p.1). The interruptions during medication administration impact the nurses' work because they could stop the work and handle the interruptions for at least 2.5 min, procedural failures, clinical errors and compromised patient safety(Johnson et al., 2017 p.1)

2.2.3.5. Pharmacy reasons

Pharmacists play an important role in the drugs dispensing (Rehan and Bhargava, 2015 p.2). In a study prescription and transcription errors in multidose dispensed medications on discharge from hospital: an observational and interventional study done in Sweden has evidenced that pharmacist may help in the identification of medication errors and also help the physician to correct the errors as 58% of the discharge errors were corrected by the physician after being discovered by the pharmacist (Alassaad *et al.*, 2011 p.5). In one study it has been found that some errors like omission of drug by a nurse was related to the absence of a drug secondary to the pharmacy reasons (Gaunt, 2012 p.11).

2.2.3.6. Documentation-Transcription reasons

In Swiss University Hospital the medication error was the leading cause of death in hospitalized patients, therefore the study has revealed documentation errors has been including prescribing errors 37%, transcription errors 53% and administration documentation errors 10%(Hartel *et al.*, 2011). In the other study that has been conducted in Saudi Arabia has identified prescribing error 46.5% as the top cause of MAEs (Abdel‐Latif, 2016 p.90).

2.2.3. Barriers to self-reporting

The systematic review of 10 studies in Iran regarding barriers to reporting MAEs found that those barriers may be classified into three categories including reporting factors, management factors and fear of negative consequences after reporting (Mirsadeghi & Pazokian, 2015 p.318).

2.2.3.1 Disagreement over time and error definition reason

Disagreement over time and error definition which is related to the lack of knowledge of somewhere to report may be the barrier to self reporting as it was evidenced by the study done in Egypt which concluded that this is the third leading cause of MAEs with the percentage of 36.6% from the participants (Al-Youssif et al., 2013 p.62). The similar findings were found in the other study that has been conducted in Ethiopia where among 282 participants 33.1% agreed the disagreement over time and error definition to be also the associated factor to MAEs. Furthermore, other several studies have identified also

disagreement overtime and error definition and negligence as the barriers (Mohammed et al., 2014 p.79;Aboshaiqah, 2013 p.132;Bifftu et al., 2016;Hashish & El-Bialy, 2013 p.2163).

2.2.3.2 Fear reasons

Fear reasons are related to the fear of negative consequences that may follow the reporting. The results from the studies that aimed at assessing the medication error reporting rate and its barriers and facilitators among nurses in Iran and perceptions regarding medication administration errors among hospital staff nurses of south Korea revealed that most often the nurses fear the blames (Bayazidi, Zarezadeh, Zamanzadeh, & Parvan, 2012 p.234; You, Choe, Park, Kim, & Son, 2015 p.1, Mohammed, Alduais, Mogali, Shabrain, & Enazi, 2014 p.79; Kiguba et al., 2015 p.9; Bifftu et al., 2016 p.3;Aboshaiqah, 2013 p.132;Stratton et al., 2004 p.388;Mohammad et al., 2016 p.7)). Nevertheless, from the other study the participants fear that the patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported 79 (53.0%) identical to the qualitative study regarding the perceptions and attitudes towards medication error reporting in primary care clinics in Malaysia (Samsiah, Othman, Jamshed, & Hassali, 2016 p.10). Aditionally, other barriers were aidentified in several studies like fear of being punished (Mohammed et al., 2014 p.79;Bahadori et al., 2013 p.3), lack of knowledge of reporting and procedures(Mohammed et al., 2014 p.79), complexity of work(Mohammed et al., 2014 p.79; Aboshaiqah, 2013 p.132), shortage of time (Mohammed et al., 2014 p.79), irresponsibility(Mohammed et al., 2014 p.79;Aboshaiqah, 2013 p.132)

2.2.3.3. Administrative reasons

The systematic review of different studies in Iran has argued that the most common barrier is all that when medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error (Mansouri *et al.*, 2014). Another descriptive cross sectional survey in Egypt that has argued the fear reasons on the level of 63.8% regarding that the response by nursing administration does not match the severity of the error (Al-Youssif, Mohamed, & Nabila, 2013 p.62). The recent findings from a study with aim of identifying the barriers that preventing the nursing staff from reporting medication errors in Kirkuk city hospitals has identified that a significant number of nurses 57.3% fear the administration reasons (Abdullah & Sameen, 2017 p.153) similarly to the other study from

Egypt to the extent of 63.8% (Al-Youssif, Mohamed, & Nabila, 2013 p.62) . Supplemental studies have also found the same results as the previous mentioned studies (Mohammad et al., 2016; Bifftu et al., 2016 p.3;Aboshaiqah, 2013 p.132; Hashish & El-Bialy, 2013 p.2163;Bahadori et al., 2013 p.3). Additionally the National Coordinating Council for Medication Error Reporting and Prevention places of interest on providing the positive feedback and rewards to reduce MAEs(National Coordinating Council for Medication Error Reporting and Prevention, 2014). Once more, the results showed that nurses fear the negative feedbacks, legal issues, and financial issues hence there should be the good feedbacks to self-reporting and sort of incentives (Mirsadeghi& Pazokian, 2015 p.317). Similarly, the other study from the same country in Iran found the same barriers to reporting including legal issues, losing a job and other negative consequences (Tabatabaee, Kalhor, Nejatzadegan, Jahromi, & Sharifi, 2014 p.101).

2.3. Conceptual framework

This study was guided by the human error theory(James, 2000 p. 393) which has two approaches namely personal and system. The human error theory guided in the assessment of factors associated with medication administration errors. The Theory of Planned Behavior (TPB)(Ajzen, 1991) was also be used as a conceptual framework to guide the studying assessing barriers to self-reporting.

2.3.1 Human error theory

Regarding personal approach, it consists of individual errors like absent-mindedness, carelessness, or moral fault whereas system approach consists of conditions that people work under purposely to eliminate errors or reduce their effects (Reason, 2000). Therefore, errors and mistakes are all more frequent when situational factors sidetrack concentration. Those situational factors are for example physiological factors for example tiredness, exhaustion due to much work pressure, overwork and lack of enough sleep (Ojerinde & Adejumo, 2014 p.23).In summary, this theory normally explores the way errors have been produced rather than the individual who did them.

It also explains that there three categories of errors: slips and lapses, mistakes and violations. Slips and lapses are when the action planned failed to be achieved as it was planned before

(e.g: poor knowledge regarding medication indication, side effects or allergy, contraindication, etc). Slips occur when you plan to do something but again you do another one whereas lapses are due to the memory failure to do so. Mistakes are when the planned behavior couldn't achieve the expected outcome. Violations are when the individuals fail to follow guidelines for effective achievement of the goals while they are aware of them. So far, these errors may be grouped into two categories: unintentional errors (mistakes, slips and lapses) and intentional (violations). Therefore their causes and solutions are different. In this study, the researcher highlights that some factors that contribute to the medication administration errors are related to medication packaging, physician, nurses, system, pharmacy, documentation- transcription reasons. These factors finally may cause different medication administration errors like wrong medicine, wrong time, wrong patient, wrong dose, wrong drug, omitting drug and administration of a drug that is not ordered.

In a quantitative, descriptive, and exploratory study conducted by (Machado *et al.*, 2015) in Brazillian Sentinel Hospital network had the aim of identifying and analyzing the errors in daily intensive nursing care using human error. A sample of 36 nurses participated in a study. They said that human error in nursing practice may be interconnected to the system approach, trough active faults and different working conditions(Machado *et al.*, 2015). The active faults can be related to medication administration. The working conditions may be poor communication in a team, absence of guidelines and material resources (Machado *et al.*, 2015). Another study in Egypt with the purpose of exploring medication errors, causes and reporting behaviors used this theory of human error to rule out the causes of medication errors (Bakr & Atalla, 2012).

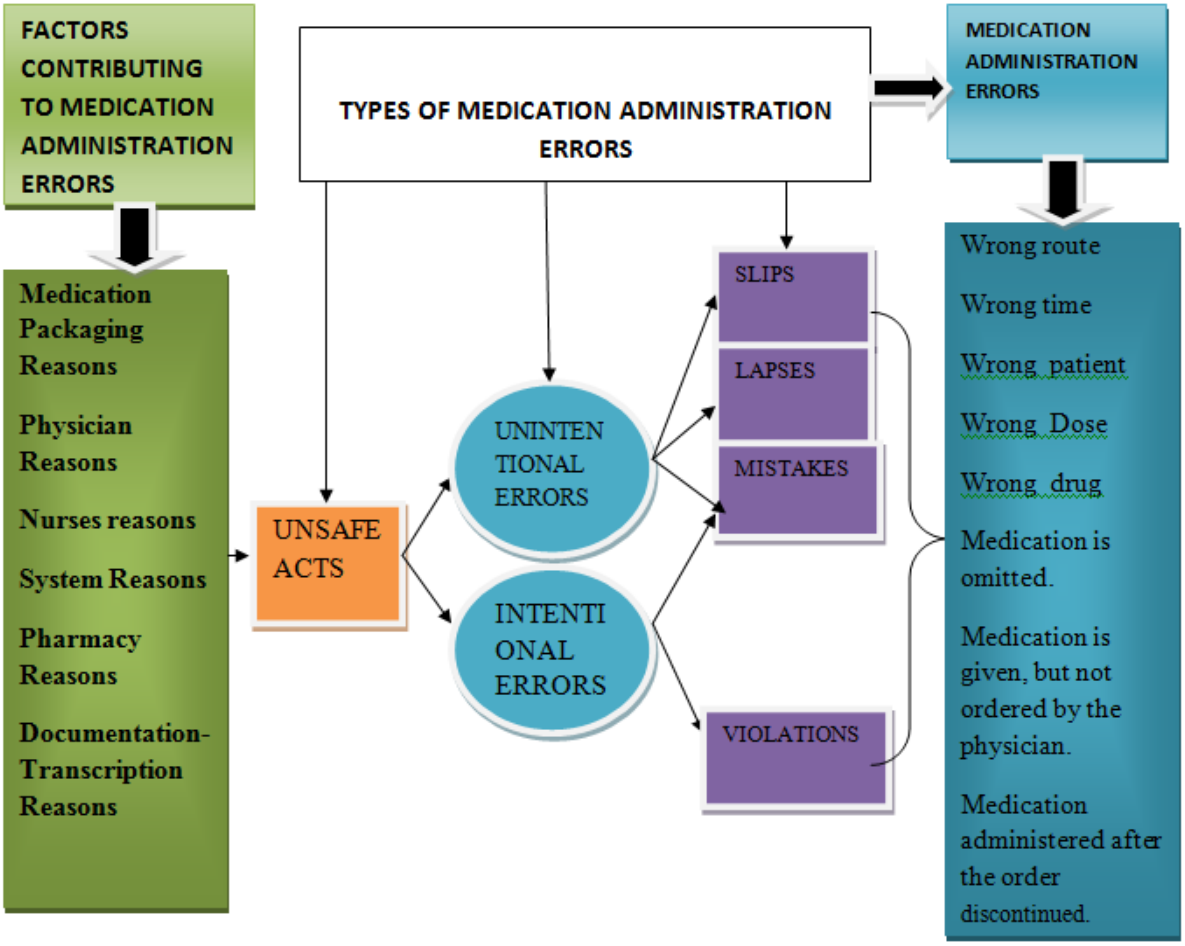

Figure 1: Adapted Human error theory (Reason, 1992).

2.3.2 Theory of Planned Behavior (TPB)

The TPB is among the reasonable theories that are very important to assess human behaviors and has been used to predict client wellbeing behaviors of nurses (Javadi, Kadkhodaee, Yaghoubi, Maroufi, & Shams, 2013 p.52). It has been used in several studies of behavioral domains(Ajzen, 2005 p.119). The theory explains that human behavior is governed by three kinds of considerations: attitudes toward the behavior, subjective norms to the behavior and perceived behavioral control to the behavior (control beliefs) (Ajzen, 1991). In this study motivation, consequences, benefits to the patients, rules and regulations may contribute to the intention or directly to reporting of medication administration errors.

TPB has also been used to evaluate if it is very important to predict nurses and physicians reporting of suspected child abuse. Therefore, it has been proven to be important to assess the intention to report negative behavior (Natan *et al.*, 2012).

Kim (2013), conducted a study using TPB. It was aimed at examining the factors associated with reporting intention and behavior in relation to child abuse among elementary school teachers in Korea. A total number of 292 teachers participated in a study. The results showed that the minority 16.3% reported the child abuse while the majority 83.7% did not. It also showed that teachers' reporting intention was affected by knowledge, attitudes, subjective norms, and self-efficacy(Kim, 2013).

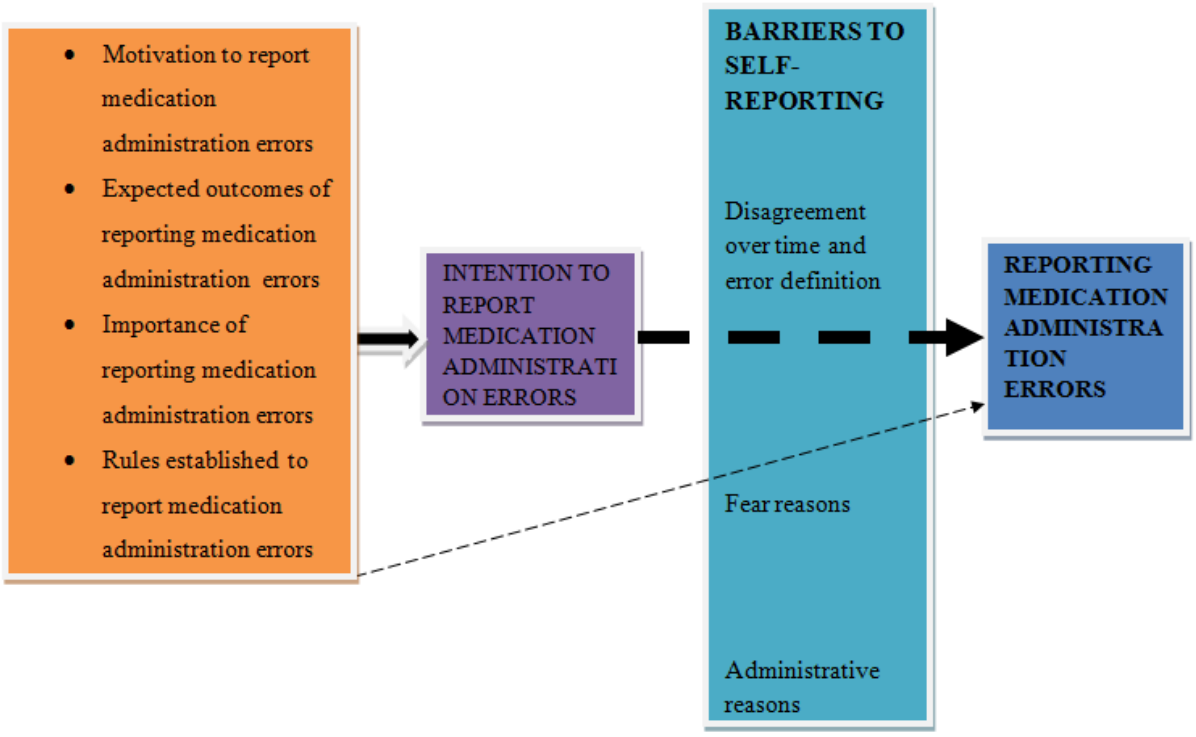

Figure 2: Adapted Theory of Planed Behavior (TPB)(Ajzen, 1991)

By the conclusion, most of the researches that have been conducted to rule out the factors contributing to MAEs and barriers to self-reporting have urged that the prevention is based first on the identification of those factors and find the way forward by also setting some

strategies that are not negative but encouraging nurses to self-report. These measures also prevent the future occurrence of MAEs and increase the level of reporting. Contributing factors to medication administration errors were analyzed through the Human error theory and the barriers to reporting were analyzed through the Theory of Planned Behavior (TPB).

Conclusion of chapter two

This chapter has gone through different literatures to find out the types of MAEs, factors contributing to MAEs and barriers to self reporting. Several articles have identified that MAEs are wrong time, wrong frequency, wrong dose, wrong route, wrong medicine, administration of a drug which is no prescribed and omitting a drug. The factors contributing to MAEs were classified under packaging reasons, nurses' reasons, physician reasons, pharmacy reasons, documentation reasons and systems reasons. Then, the barriers to self reporting were disagreement over time or error definition, administrative reasons and fear reasons. This chapter also has taken into consideration the conceptual frameworks (human error theory and Theory of planed behavior) that are used to assess the MAEs, contributing factors to MAEs and barriers to self-reporting

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This is the plan that aims at conducting research using specific steps to draw a conclusion (Grove, Burns and Jennifer, 2013). This chapter looked at the main points study design, study setting, study population, sampling criteria, sampling method, sample size, data collection instruments, reliability and validity of data collection instruments, data analysis, and ethical considerations.

3.2. Research design

This study was the descriptive cross-sectional. Cross-sectional is the type of non-experimental research design that collects data at once which mean at the present time (LoBiondo-Wood and Haber, 2014).The study described the types of medication administration errors, factors contributing to medication administration errors and barriers to reporting medication administration errors among nurses working in pediatric units of selected referral hospitals in Rwanda. In addition associations were inferred between study concepts.

3.3. Research approach

This is the plan of a researcher that helps to acquire knowledge or confirm the existing one to get accurate and meaningful data (Rebar *et al.*, 2011). The study used quantitative design which " encompasses the study of research questions that describe phenomena, test relationships, assess differences, seek to explain cause and effect relationships between variables, and test for intervention effectiveness" (LoBiondo-Wood and Haber, 2014). This study described the phenomena the types of medication administration errors, contributing factors to medication administration errors and barriers contributing to medication administration errors.

3.4. Research setting

This research was conducted in Rwandan Referral Hospitals which are two hospitals from October 2016 up to April 2017. Those hospitals are University Teaching Hospital of Kigali (UTHK) and University Teaching Hospital of Butare (UTHB). These are the hospitals with

more nurses in pediatric and surgery departments and receive complex cases from district hospitals for high specialized care.

3.5. Population

The study population is the set of individuals with the same characteristics that interest the researcher for his study (Polit and Cheryl, 2012). This study utilized nurses who work in pediatric and surgical departments of Rwandan referral Hospitals because they are the only departments. Target population is the group of people that have common characteristics that the researcher can identify and make a study on(Creswell, 2012). Thus, the target population was the nurses who work in the pediatric and surgery departments in the study site which are UTHK, UTHB, and RMH. The accessible population was the pediatric and surgery departments' nurses who were available at the time of the study and with a will to participate.

3.6. Sampling Criteria

Inclusion criteria: This study recruited all registered nurses with at least 3 months working experience in pediatric and surgical units, who had the will to participate in the study.
Exclusion criteria: The ones who were in leaves for the time of the study and those who refused to participate in a study. Even those who have not worked in pediatric units for at least 3 months are excluded from the study.

3.6.1. Sampling strategy

This study used convenience sampling strategy. This is a non-probability sampling strategy that uses the most readily or accessible participants(LoBiondo-Wood & Haber, 2014 p.576). It has been chosen because of a small population, nurses were running the duties, cost effectiveness and very fast.

3.6.2. Sample size

Sample is a subset of the total population that the researcher wants to study purposely to generalize data to the whole population(Rebar *et al.*, 2011). This study used the following formula found in the book written by(Israel, 1992 p.4)

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

Whereby,

n: Sample size

N: Population size

e: Level of precise

Therefore,

$$n = \frac{216}{1 + 216(0.05 * 0.05)} = \mathbf{140.2 \cong 141\ nurses}\ (\text{round up})$$

Therefore, among 216 (148 registered nurses from UTHK and 68 from UTHB) of total population the sample size was148 nurses which were large enough compared to the study of (Oshikoya *et al.*, 2013) that has been conducted in public hospitals in Lagos among pediatric nurses . The researcher increased to 151nurses to minimize biases and generalize data.

3.7. Data Collection

3.7.1. Data Collection instruments

This study was quantitative and used the self administered questionnaire adapted from the one used to evaluate medication administration errors in Ethiopia (Bifftu *et al.*, 2016)**.**The first section assessed the demographic information of the respondents like age, gender, qualification, professional rank, work experience as a nurse and marital status. The second part looked the information on the MAEs experienced by the nurses in pediatric units. The third section assessed the barriers to medication administration error reporting. Permission to use the instrument was granted to the researcher by the author of the survey instrument**.** The researcher used the research assistants during data collection. The nurses were asked to rank the types of MAEs, contributing factors to MAEs and barriers to self reporting using the Likert scale with six perceptions as follow: "Strongly disagree=1, moderately disagree=2, slightly disagree=3, slightly agree=4, moderately agree=5 and strongly agree"

3.7.2. Data collection procedure

Research assistants were recruited and trained before data collection. They were trained on the study area, questionnaire, challenges, confidentiality, informed consent and returning all

the given questionnaires. The researchers screened and counted the questionnaires as well as discard the incomplete ones.

Validity and reliability of the instrument

Validity is the way the instrument measures the concept that is invented to appraise (Polit and Beck, 2010). Face validity refers to the extent to which the questionnaire appears in measuring the concept (LoBiondo-Wood & Haber, 2014 p.293). Therefore, the researcher used peer review to examine if the questions look very well if they are not boring or invisible. Content validity "concerns the degree to which an instrument has an appropriate sample of items for the construct being measured and adequately covers the construct domain"(Polit and Beck, 2010). Thus, the questionnaire was compared to other studies that have been conducted previously. Construct validity "involves inferences from the particulars of the study to the higher-order constructs they are intended to represent"(Polit and Beck, 2010). This means that the concepts in my title are the same as in research questions, objectives, conceptual framework and tool for data collection.

Table 3.1:Construct validity measure for the study

Objectives of the study	Components of the conceptual framework	Questionnaire	Items in the questionnaire
To identify the types of medication administration errors committed among nurses working in pediatric units of selected referral hospitals in Rwanda.	Unsafe acts categorized into intentional errors (slips, lapses and mistakes) and intentional errors (violations)	Appendices p.XII	Part II (Item 1-7)
To determine the factors that contribute to medication administration errors among nurses working in pediatric units of selected referral hospitals in Rwanda.	Unsafe acts categorized into intentional errors (slips, lapses and mistakes).	Appendices p.XII-VIII-XIV	Part III (Item 1-30)
To identify the barriers to self-reporting after committing medication error among nurses working in pediatric units of selected referral hospitals in Rwanda.	Attitude towards the behaviour, social influence, perceived behavioural control and intention	Appendices p.XIV-XV	Part IV (Item 1-16)

Reliability means the degree to which the tool is consistent (Allen, 2012). The pre test of the instrument was done and the reliability of the tool was calculated and Cronbach's alpha is 0.86. This reliability means that it is satisfactory to scores (Creswell, 2012 p.606).

3.8. Data analysis

The study used tables. Data entry and analysis were done by Statistical Package for the Social Sciences (SPSS) version 21, 2015. Both descriptive and inferential statistics were used. Frequencies and percentages were used to analyze the medication errors, and barriers to self-

reporting whereby chi-square with 95 % confidence interval was used to identify the associations between the variables under the study. Participants were asked to answer questions on a five point Likert-type scale that had got different values ranged from 5 = strongly agree to 1 = strongly disagree on factors contributing to medication administration errors and barriers to self-reporting.

3.9. Ethical considerations

In this study, Institutional Review Board (IRB) from University of Rwanda approved the proposal and allowed me to go for data collection and clinical settings guaranteed the permission to start the data collection. Before data collection and proposal presentation, the researcher got the certificate of ethics. Participants' rights in the study include

Right to self-determination: Participants were explained the importance to participate in the study and no influence was put on them to participate in the study; it was their choice.

Right to privacy: Access to participants' data was only to the researcher and trained research assistants.

Right to confidentiality and anonymity: The participants were given a self-administered questionnaire to be completed lonely without any influence which means that participants were requested to complete the questionnaire independently and return on the spot. The returned questionnaires were coded with numbers depending on the way the researcher were receiving them whereas the UTHK was coded as A and UTHB as B.

Right to fair management and the right to protection from embarrassment and hurt: No negative consequences followed after completing the questionnaire. Therefore, the participants were explained concerning the informed consent and signed it to authorize the researcher to go ahead for the data collection.

3.10. Data management

After data collection, data were recorded into the software and kept by the researcher in a secured way. The research assistants handled all given tools to the researcher. Then, the researcher kept the questionnaires in the locked container. Data that were recorded electronically and were kept in a password protected folder to prevent further access.

3.11. Data Dissemination

Data were presented to the University of Rwanda, Clinical settings and the Ministry of Health. They will be served in conferences, seminars, workshops and also as part of the publication of the study in the recognized journal.

Conclusion of the chapter three

By the conclusion, the purpose of this MSN thesis was the identification of factors contributing to MAEs and barriers to self-reporting. The study had cross-sectional and descriptive quantitative design with self-administered questionnaires in which the factors contributing to medication administration errors and barriers to self-reporting were explored. The study took place during the period of October 2016 to January 2017, in 2 referral hospitals in Rwanda.

CHAPTER FOUR: RESEARCH FINDINGS

4.1. Presentation of results

The research design for this study was descriptive cross sectional design. The purpose of the study was to assess the contributing factors to medication administration errors and barriers to self-reporting among nurses working in pediatric units of selected referral hospitals in Rwanda . The first objective was to identify the types of medication administration errors committed among nurses working in pediatric units of selected referral hospitals in Rwanda. The second and third objectives of the study were to determine the factors that contribute to medication administration errors and to identify the barriers to self-reporting after committing medication error among nurses working in pediatric units of selected referral hospitals in Rwanda.

A self administered questionnaire was used to collection data. The data collection period ran from 13/02 up to 12/04/2017. The calculated sample size was 151nurses. However, the completed questionnaires were 149 which translated to the response rate of 98.6%. The presentation of findings is structured according to the four sections namely, socio-demographic data, types of MAES, factors associated to MAEs and barriers to self=reporting. The study of which results are presented here was conducted pediatric units in 2 referral hospitals in Rwanda as follows:

4.2 Demographic characteristics

Information regarding the socio-demographic characteristics of the participants is presented in **Table 4.1**. The findings revealed that the majority of the participants were females 113 (75.84%), while 36 (24.16%) were males. The age ranged from 21 years to above 45 years. With regard to the level of education in the field of Nursing, the majority Advanced diploma trained nurses 122 (81.9%) and 27(18.1%) had bachelors degree. The majority of the participants experience was above 5 years [98 (65.8%)] followed by the participants with above 1 year to three years 26(17.4%), above three years up to five years 29(12.8%) and less than one year 6(4.0%). With regard to their religion a half of the participants were catholic 75 (50.34%) followed by Adventist 39(26.2%), protestant 26(17.4%), pentecotist 4(2.7%),

Muslim 2(1.3%), Jehovah's witness 2(1.3%) and restoration church 1(0.7%) . Regarding the marital status the majority of the participants were married [104 (69.8%)],
followed by unmarried 35(23.5%), widows 8(5.4%) and separated/divorced 2(1.3%). The majority of participants in this study were bedside nurses [133(89.3%)] while bedside nurses were 16(10.7%). The majority of nurses [109 (73.1%)] were from UTHK whereas 40(26.9%) were from UTHB.

Table 4.1: Participants' socio-demographic data (N=149)			
Dimension items	**Category**	**Frequency**	**%**
Gender	Males	36	24.16
	Females	113	75.84
Age (in years)	21-25	12	8.1
	>25-30	33	22.1
	>30-35	44	29.5
	>35-40	30	20.1
	>40-45	19	12.8
	>45	11	7.4
Level of education	Diploma (A1)	122	81.9
	BScN (A0)	27	18.1
Years of experience	less than 1 year	6	4.0
	>1year-3years	26	17.4
	>3years-5years	19	12.8
	>5years	98	65.8
Religion	Adventist	39	26.2
	Muslim	2	1.3
	Protestant	26	17.4
	Catholic	75	50.3
	Pentecotist	4	2.7
	Jehovah's Witness	2	1.3
	Restoration church	1	0.7
Marital status	Single	35	23.5
	Married	104	69.8
	Separated/Divorced	2	1.3
	Widowed	8	5.4
Job position	Staff nurse	133	89.3
	Head nurse	16	10.7
Healthcare settings	UTHK	109	73.1
	UTHB	40	26.9

4.1.2. Types of MAEs

Participants were presented the question with different types of MAEs and requested to tick on the box in front of each statement according to the errors they have committed. The participants were also had a chance to select all that apply. The corresponding results are illustrated in the **Table 4.2 to 4.3.** The medication errors were administration of wrong medicine, wrong timing of medicine administration, wrong route of medicine administration, wrong frequency of medicine administration, omitting a drug, wrong dose error administration of a drug which is not prescribed. The findings indicate the percentage of MAEs according to the numbers of errors made from one to seven.

Table 4.2 revealed the number of nurses who were able to identify one, two and three types of medication errors. With regards to the participants who identified only one medication error, wrong timing 20 (20.1%) was the most identified medication error, followed by omitting a drug 11 (7.4%), then both wrong route and wrong medication (2.7%) and the least identified was administering a drug not prescribed as highlighted by only 1 (0.7%). The participants who identified two MAEs Wrong dose and omitting a drug took the highest percentage 6(4.0%), followed by wrong frequency and omitting a drug 5(3.4%), wrong route and administration of a drug which is not prescribed 4(2.7), omitting a drug and administration of a drug which is not prescribed 4(2.7%), wrong time and administration of a drug which is not prescribed 3(2.0%), and the least identified was wrong time and frequency 2(1.3%) and wrong drug and administration of a drug which is not prescribed 2(1.3%). Concerning the participants who identified at least three MAEs the wrong time, omitting a drug and administration of a drug which is not prescribed 10(6.7%) followed by wrong dose, time and administration of a drug which is not prescribed 8(5.4%), wrong time, frequency and omitting a drug 6(4.0%) and wrong time, frequency and omitting a drug 3(2.0).

Table 4.2:Number of participants who have ticked on one or more types of MAEs (n=149)

VARIABLES		Frequency	%
1. Nurses who identified one MAE	Wrong time	20	20.1
	Wrong medicine	4	2.7
	Wrong route	4	2.7
	Omitting a drug	11	7.4
	Administration of a drug which is not prescribed	1	0.7
2. Nurses who identified two MAEs	Wrong dose and omitting a drug	6	4.0
	Wrong frequency and omitting a drug	5	3.4
	Wrong time and administration of a drug which is not prescribed	3	2.0
	Omitting a drug and administration of a drug which is not prescribed	4	2.7
	Wrong time and frequency	2	1.3
	Wrong route and administration of a drug which is not prescribed	4	2.7
	Wrong drug and administration of a drug which is not prescribed	2	1.3
3. Nurses who identified three MAEs	Wrong time, frequency and omitting a drug	6	4
	Wrong time, Omitting a drug, and administration of a drug which is not prescribed	10	6.7
	Wrong dose, time and administration of a drug which is not prescribed	8	5.4
	Wrong time, frequency and omitting a drug	3	2.0

Table 4.3 Continues to describe the types of MAEs according to the category. The participants who identified four MAEs the highest scored to the wrong dose, time, omitting a drug and administration of a drug which is not prescribed 9(6.0%), wrong dose, time, frequency and omitting a drug 7(4.7%), wrong time, frequency, omitting a drug and administration of a drug which is not prescribed 6(4.0%) and wrong time, route, frequency and omitting a drug (4(2.7%). The participants who identified at least six MAEs including wrong dose, time, drug, frequency, omitting a drug and administration of a drug which is not prescribed were 16(10.7%) and those who identified at least seven MAEs wrong dose, time, drug, route, frequency, omitting a drug and administration of a drug which is not prescribed were 4(2.7%).

Table 4.3: Continues to reveal the number of participants who have ticked on one or more types of MAEs (n=149)

VARIABLES		Frequency	%
4. Nurses who identified four MAEs	Wrong time, frequency, omitting a drug and administration of a drug which is not prescribed	6	4.0
	Wrong dose, time, omitting a drug and administration of a drug which is not prescribed	9	6.0
	Wrong time, route, frequency and omitting a drug	4	2.7
	Wrong dose, time, frequency and omitting a drug	7	4.7
5. Nurses who identified six MAEs	Wrong dose, time, drug, frequency, omitting a drug and administration of a drug which is not prescribed	16	10.7
6. Nurses who identified seven MAEs	Wrong dose, time, drug, route, frequency, omitting a drug and administration of a drug which is not prescribed	4	2.7

4.1.3. Factors associated to MAEs

Tables 4.4 to 4.10 illustrate the different factors associated to medication administration errors committed by the participants who work in pediatric units.

Table 4.4: Regarding the factor of similar names of medication, 83(55.7%) strongly disagree, 22 (14.8%) moderately disagree, 9 (6%) slightly disagree, 23 (15.4%) slightly agree, 3(2%) moderately agree and 9(6%) strongly agree that similar names of medication is associated with MAEs. When asked that different medications look alike is the factor for MAEs 72(48.3%) strongly disagree, 21 (14.1%) moderately disagree, 16 (10.7%) slightly disagree, 17 (11.4%) slightly agree, 7(4.7%) moderately agree and 16(10.7%) strongly agree.

Regarding the similarity of many medications 91(61.1%) strongly disagree, 17 (11.4%) moderately disagree, 10 (6.7%) slightly disagree, 16 (10.7%) slightly agree, 11(7.4%) moderately agree and 4(2.7%) strongly agree that it contributes to MAEs. With regard to the legibility of physicians' medication orders 80(53.7%) strongly disagree, 27 (18.1%) moderately disagree, 13 (8.7%) slightly disagree, 20(13.4%) slightly agree, 5(3.4%) moderately agree and 4(2.7%) strongly agree that it is a contributing factor. Concerning the clarity of physicians' medication orders 59(39.6%) strongly disagree, 16(10.7%) moderately disagree, 19(12.8%) slightly disagree, 24(16.1%) slightly agree, 13(8.7%) moderately agree and 18(12.1%) strongly agree to be a contributing factor.

Table 2.4: Factors associated to medication administration errors (n=149)

Factor	Response	Frequency	%
The names of many medications are similar	Strongly disagree	83	55.7
	Moderately disagree	22	14.8
	Slightly disagree	9	6.0
	Slightly agree	23	15.4
	Moderately agree	3	2.0
	Strongly agree	9	6.0
Different medications look alike	Strongly disagree	72	48.3
	Moderately disagree	21	14.1
	Slightly disagree	16	10.7
	Slightly agree	17	11.4
	Moderately agree	7	4.7
	Strongly agree	16	10.7
The packaging of many medications is similar	Strongly disagree	91	61.1
	Moderately disagree	17	11.4
	Slightly disagree	10	6.7
	Slightly agree	16	10.7
	Moderately agree	11	7.4
	Strongly agree	4	2.7
Physicians' medication orders are not legible	Strongly disagree	80	53.7
	Moderately disagree	27	18.1
	Slightly disagree	13	8.7
	Slightly agree	20	13.4
	Moderately agree	5	3.4
	Strongly agree	4	2.7
Physicians' medication orders are not clear	Strongly disagree	59	39.6
	Moderately disagree	16	10.7
	Slightly disagree	19	12.8
	Slightly agree	24	16.1
	Moderately agree	13	8.7
	Strongly agree	18	12.1

Table 4.5 Continues to identify the factors associated to MAEs; when asked about the frequent changes of orders by the physicians 65(43.6%) strongly disagree, 24(16.1%) moderately disagree, 23(15.4%) slightly disagree, 10(6.7%) slightly agree, 18(12.1%) moderately agree and 9(6.0%) strongly agree to be a contributing factor. About the orders that are used instead of written orders 43(28.2%) strongly disagree, 21(14.1%) moderately disagree, 8(5.4%) slightly disagree, 26(17.4%) slightly agree, 27(18.1%) moderately agree and 25(16.8%) strongly agree to be a contributing factor. Pertaining to the poor communication between nurses and physicians 91(61.1%) strongly disagree, 32(21.5%) moderately disagree, 11(7.4%) slightly disagree, 11(7.4%) slightly agree, 2(1.3%) moderately agree and 2(1.3%) strongly agree. Nurses on this unit have limited knowledge about medications 101(67.8%) strongly disagree, 9(6.0%) moderately disagree, 14(9.4%) slightly disagree, 19(12.8%) slightly agree, 2(1.3%) moderately agree and 4(2.7%) strongly agree. With regard to the interruptions during drugs administration 17(11.4%) strongly disagree, 26(17.4%) moderately disagree, 8(5.4%) slightly disagree, 40(26.8%) slightly agree, 29(19.5%) moderately agree and 29(19.5%) strongly agree to be a contributing factor.

Table 4.3: Factors associated to MAEs (n=149) cont.

Factor	Response	Frequency	%
Physicians change orders frequently	Strongly disagree	65	43.6
	Moderately disagree	24	16.1
	Slightly disagree	23	15.4
	Slightly agree	10	6.7
	Moderately agree	18	12.1
	Strongly agree	9	6.0
Verbal orders are used instead of written orders	Strongly disagree	42	28.2
	Moderately disagree	21	14.1
	Slightly disagree	8	5.4
	Slightly agree	26	17.4
	Moderately agree	27	18.1
	Strongly agree	25	16.8
Poor communication between nurses and physicians	Strongly disagree	91	61.1
	Moderately disagree	32	21.5
	Slightly disagree	11	7.4
	Slightly agree	11	7.4
	Moderately agree	2	1.3
	Strongly agree	2	1.3
Nurses on this unit have limited knowledge about medications	Strongly disagree	101	67.8
	Moderately disagree	9	6.0
	Slightly disagree	14	9.4
	Slightly agree	19	12.8
	Moderately agree	2	1.3
	Strongly agree	4	2.7
Nurses are interrupted while administering medications to perform other duties	Strongly disagree	17	11.4
	Moderately disagree	26	17.4
	Slightly disagree	8	5.4
	Slightly agree	40	26.8
	Moderately agree	29	19.5
	Strongly agree	29	19.5

Table 4.6 Continues to describe the factors associated to MAEs. Unit staff levels are inadequate 110(73.8%) strongly disagree, 12(8.1%) moderately disagree, 8(5.4%) slightly disagree, 11(7.4%) slightly agree, 2(1.3%) moderately agree and 6(4.0%). When asked if all medications for one team of patients cannot be passed within an accepted time frame 46(30.9%) strongly disagree, 11(7.4%) moderately disagree, 11(7.4%) slightly disagree, 24(16.1%) slightly agree, 19(12.8%) moderately agree and 38(25.5%). About equipment malfunctions or incorrect setting 55(36.9%) strongly disagree, 29(19.5%) moderately disagree, 12(8.1%) slightly disagree, 27(18.1%) slightly agree, 20(13.4%) moderately agree and 6(4.0%). The item that unit staffs do not receive enough in services on new medications 30(20.1%) strongly disagree, 21(14.1%) moderately disagree, 13(8.7%) slightly disagree, 21(14.1%) slightly agree, 14(9.4%) moderately agree and 50(33.6%). Nurse is unaware of a known allergy 72(48.3%) strongly disagree, 19(12.8%) moderately disagree, 11(7.4%) slightly disagree, 25(16.8%) slightly agree, 10(6.7%) moderately agree and 12(8.1%).

Table 4.4: Factors associated to MAEs(n=149) cont.

Factor	Response	Frequency	%
Unit staffing levels are inadequate	Strongly disagree	110	73.8
	Moderately disagree	12	8.1
	Slightly disagree	8	5.4
	Slightly agree	11	7.4
	Moderately agree	2	1.3
	Strongly agree	6	4.0
All medications for one team of patients cannot be passed within an accepted time frame	Strongly disagree	46	30.9
	Moderately disagree	11	7.4
	Slightly disagree	11	7.4
	Slightly agree	24	16.1
	Moderately agree	19	12.8
	Strongly agree	38	25.5
Equipment malfunctions or is not set correctly	Strongly disagree	55	36.9
	Moderately disagree	29	19.5
	Slightly disagree	12	8.1
	Slightly agree	27	18.1
	Moderately agree	20	13.4
	Strongly agree	6	4.0
Unit staffs do not receive enough in services on new medications	Strongly disagree	30	20.1
	Moderately disagree	21	14.1
	Slightly disagree	13	8.7
	Slightly agree	21	14.1
	Moderately agree	14	9.4
	Strongly agree	50	33.6
Nurse is unaware of a known allergy	Strongly disagree	72	48.3
	Moderately disagree	19	12.8
	Slightly disagree	11	7.4
	Slightly agree	25	16.8
	Moderately agree	10	6.7
	Strongly agree	12	8.1

Table 4.7 Reveals the participants answers regarding the following factors that contribute to MAEs: Patients are off the ward for other care 54(36.2%) strongly disagree, 24(16.1%) moderately disagree, 10(6.7%) slightly disagree, 32(21.5%) slightly agree, 13(8.7%) moderately agree and 16(10.7%). Regarding the fact that many patients are on the same or similar medications 69(46.3%) strongly disagree, 21(14.1%) moderately disagree, 7(4.7%) slightly disagree, 18(12.1%) slightly agree, 19(12.8%) moderately agree and 15(10.1%). When asked if abbreviations are used instead of writing completely 22(14%) strongly disagree, 26(17.4%) moderately disagree, 12(8.1%) slightly disagree, 17(11.4%) slightly agree, 25(16.8%) moderately agree and 47(31.5%). Few nurses compared to the number of patients (workload) 21(14.1%) strongly disagree, 13(8.7%) moderately disagree, 10(6.7%) slightly disagree, 5(3.4%) slightly agree, 18(12.1%) moderately agree and 82(55.0%). With regard to the frequent substitution of drugs 62(41.6%) strongly disagree, 24(16.1%) moderately disagree, 15(10.1%) slightly disagree, 17(11.4%) slightly agree, 12(8.1%) moderately agree and 19(12.8%).

Table 4.5: Factors associated to MAEs (n=149) cont.

Factor	Response	Frequency	%
Patients are off the ward for other care	Strongly disagree	54	36.2
	Moderately disagree	24	16.1
	Slightly disagree	10	6.7
	Slightly agree	32	21.5
	Moderately agree	13	8.7
	Strongly agree	16	10.7
Many patients are on the same or similar medications	Strongly disagree	69	46.3
	Moderately disagree	21	14.1
	Slightly disagree	7	4.7
	Slightly agree	18	12.1
	Moderately agree	19	12.8
	Strongly agree	15	10.1
Abbreviations are used instead of writing completely	Strongly disagree	22	14.8
	Moderately disagree	26	17.4
	Slightly disagree	12	8.1
	Slightly agree	17	11.4
	Moderately agree	25	16.8
	Strongly agree	47	31.5
Few nurses compared to the number of patients (workload)	Strongly disagree	21	14.1
	Moderately disagree	13	8.7
	Slightly disagree	10	6.7
	Slightly agree	5	3.4
	Moderately agree	18	12.1
	Strongly agree	82	55.0
Frequent substitution of drugs	Strongly disagree	62	41.6
	Moderately disagree	24	16.1
	Slightly disagree	15	10.1
	Slightly agree	17	11.4
	Moderately agree	12	8.1
	Strongly agree	19	12.8

Table 4.8 Reveals the participants answers regarding the following factors that contribute to MAEs: When asked the factor that nurses get pulled between teams and from other units, strongly disagree 74(49.7%), moderately disagree 15(10.1%), slightly disagree 16(10.7%), slightly agree 11(7.4%), moderately agree 12(8.1%) and strongly agree 21(14.1%). The fact that pharmacy delivers incorrect doses to the unit, strongly disagree 56(37.6%), moderately disagree 17(11.4%), slightly disagree 13(8.7%), slightly agree 16(10.7%), moderately agree 23(15.4%) and strongly agree 24(16.1%). The fact that pharmacy does not prepare the medication correctly strongly disagree 75(50.3%), moderately disagree 33(22.1%), slightly disagree 17(11.4%), slightly agree 14(9.4%), moderately agree 6(4.0%) and strongly agree 4(2.7%). With regard to the factor pharmacy does not label the medication correctly strongly disagree 85(57.0%), moderately disagree 14(9.4%), slightly disagree 18(12.1%), slightly agree 14(9.4%), moderately agree 5(3.4%) and strongly agree 13(8.7%).

Table 4.6: Factors associated to medication administration errors (n=149) cont.

Factor	Response	Frequency	%
Nurses get pulled between teams and from other units	Strongly disagree	74	49.7
	Moderately disagree	15	10.1
	Slightly disagree	16	10.7
	Slightly agree	11	7.4
	Moderately agree	12	8.1
	Strongly agree	21	14.1
Pharmacy delivers incorrect doses to this unit	Strongly disagree	56	37.6
	Moderately disagree	17	11.4
	Slightly disagree	13	8.7
	Slightly agree	16	10.7
	Moderately agree	23	15.4
	Strongly agree	24	16.1
Pharmacy does not prepare the medication correctly	Strongly disagree	75	50.3
	Moderately disagree	33	22.1
	Slightly disagree	17	11.4
	Slightly agree	14	9.4
	Moderately agree	6	4.0
	Strongly agree	4	2.7
Pharmacy does not label the medication correctly	Strongly disagree	85	57.0
	Moderately disagree	14	9.4
	Slightly disagree	18	12.1
	Slightly agree	14	9.4
	Moderately agree	5	3.4
	Strongly agree	13	8.7

Table 4.9 Reveals the participants answers regarding the following factors that contribute to MAEs: When asked the factor pharmacists are not available 24 hours a day, strongly disagree 95(63.8%), moderately disagree 14(9.4%), slightly disagree 8(5.4%), slightly agree 13(8.7%), moderately agree 7(4.7%) and strongly agree 12(8.1%). According to the participants answers they said that when scheduled medications are delayed, nurses do not communicate the time when the next dose is due strongly disagree 60(40.3%), moderately disagree 11(7.4%), slightly disagree 21(14.1%), slightly agree 18(12.1%), moderately agree 10(6.7%) and strongly agree 29(19.5%). Nurses on the unit do not adhere to the approved medication administration procedure strongly disagree 84(56.4%), moderately disagree 21(14.1%), slightly disagree 10(6.7%), slightly agree 17(11.4%), moderately agree 6(4.0%) and strongly agree 11(7.4%). When asked if medication orders are not transcribed to the file correctly strongly disagree 40(26.8%), moderately disagree 33(22.1%), slightly disagree 17(11.4%), slightly agree 20(13.4%), moderately agree 24(16.1%) and strongly agree 15(10.1%). Regarding the factor that errors are made in the medication sheet strongly disagree 30(20.1%), moderately disagree 22(14.8%), slightly disagree 12(8.1%), slightly agree 25(16.8%), moderately agree 30(20.1%) and strongly agree 30(20.1%).

Table 4.7: Factors associated to medication administration errors (n=149) cont.

Factor	Response	Frequency	%
Pharmacists are not available 24 hours a day	Strongly disagree	95	63.8
	Moderately disagree	14	9.4
	Slightly disagree	8	5.4
	Slightly agree	13	8.7
	Moderately agree	7	4.7
	Strongly agree	12	8.1
When scheduled medications are delayed, nurses do not communicate the time when the next dose is due	Strongly disagree	60	40.3
	Moderately disagree	11	7.4
	Slightly disagree	21	14.1
	Slightly agree	18	12.1
	Moderately agree	10	6.7
	Strongly agree	29	19.5
Nurses on this unit do not adhere to the approved medication administration procedure	Strongly disagree	84	56.4
	Moderately disagree	21	14.1
	Slightly disagree	10	6.7
	Slightly agree	17	11.4
	Moderately agree	6	4.0
	Strongly agree	11	7.4
Medication orders are not transcribed to the file correctly	Strongly disagree	40	26.8
	Moderately disagree	33	22.1
	Slightly disagree	17	11.4
	Slightly agree	20	13.4
	Moderately agree	24	16.1
	Strongly agree	15	10.1
Errors are made in the Medication sheet	Strongly disagree	30	20.1
	Moderately disagree	22	14.8
	Slightly disagree	12	8.1
	Slightly agree	25	16.8
	Moderately agree	30	20.1
	Strongly agree	30	20.1

Table 4.10 Revealed the following findings regarding the factor that in the unit, there is no easy way to look up information on medications) strongly disagree 44(29.5%), moderately disagree 19(12.8%), slightly disagree 14(9.4%), slightly agree 21(14.1%), moderately agree 18(12.1%) and strongly agree 33(22.1%).

Table 4.8:Factors associated to medication administration errors (n=149) cont.

Factor	Response	Frequency	%
On this unit, there is no easy way to look up information on medications).	Strongly disagree	44	29.5
	Moderately disagree	19	12.8
	Slightly disagree	14	9.4
	Slightly agree	21	14.1
	Moderately agree	18	12.1
	Strongly agree	33	22.1

4.1.4. Barriers to self reporting

Tables 4.11 to 4.14 highlight the different barriers to self reporting after committing the medication administration errors.

Table 4.11 findings revealed the following barriers: Nurses do not agree with hospital's definition of a medication error strongly disagree 63(29.5%), moderately disagree 24(16.1%), slightly disagree 12(8.1%), slightly agree 25(16.8%), moderately agree 17(11.4%) and strongly agree 8(5.4%). Nurses do not recognize an error occurred 74(49.7%), moderately disagree 23(15.4%), slightly disagree 20(13.4%), slightly agree 24(16.1%), moderately agree 6(4.0%) and strongly agree 2(1.3%). When answering that filling out an incident report for a medication error takes too much time strongly disagree 50(33.6%), moderately disagree 23(15.4%), slightly disagree 18(12.1%), slightly agree 30(20.1%), moderately agree 16(10.7%) and strongly agree 12(8.1%). Contacting the physician about a medication error takes too much time strongly disagree 38(25.5%), moderately disagree 34(22.8%), slightly disagree 17(11.4%), slightly agree 17(11.4%), moderately agree 17(11.4%) and strongly agree 26(17.4%). When asked to respond on the item that nurses do not recognize an error occurred strongly disagree 74(49.7%), moderately disagree 23(15.4%), slightly disagree 20(13.4%), slightly agree 24(16.1%), moderately agree 6(4.0%) and strongly agree 2 (1.3%).

Table 4.9 Barriers to self reporting after committing a MAE.

Barrier	Response	Frequency	%
Nurses do not agree with hospital's definition of a medication error	Strongly disagree	63	42.3
	Moderately disagree	24	16.1
	Slightly disagree	12	8.1
	Slightly agree	25	16.8
	Moderately agree	17	11.4
	Strongly agree	8	5.4
Nurses do not recognize an error occurred	Strongly disagree	74	49.7
	Moderately disagree	23	15.4
	Slightly disagree	20	13.4
	Slightly agree	24	16.1
	Moderately agree	6	4.0
	Strongly agree	2	1.3
Filling out an incident report for a medication error takes too much time	Strongly disagree	50	33.6
	Moderately disagree	23	15.4
	Slightly disagree	18	12.1
	Slightly agree	30	20.1
	Moderately agree	16	10.7
	Strongly agree	12	8.1
Contacting the physician about a medication error takes too much time	Strongly disagree	38	25.5
	Moderately disagree	34	22.8
	Slightly disagree	17	11.4
	Slightly agree	17	11.4
	Moderately agree	17	11.4
	Strongly agree	26	17.4
Nurses do not recognize an error occurred	Strongly disagree	74	49.7
	Moderately disagree	23	15.4
	Slightly disagree	20	13.4
	Slightly agree	24	16.1
	Moderately agree	6	4.0
	Strongly agree	2	1.3

Table 4.12 findings revealed the following barriers: Medication administration error is not clearly defined strongly disagree 37(24.8%), moderately disagree 22(14.8%), slightly disagree 32(21.5%), slightly agree 24(16.1%), moderately agree 21(14.1%) and strongly agree 13(8.7%). Nurses may not think the error is important enough to be reported 45(30.2%), moderately disagree 23(15.4%), slightly disagree 9(6.0%), slightly agree 39(26.2%), moderately agree 18(12.1%) and strongly agree 15(10.1%). When answering that nurses believe that other nurses will think they are incompetent if they make medication errors strongly disagree 41(27.5%), moderately disagree 12(8.1%), slightly disagree 14(9.4%), slightly agree 21(14.1%), moderately agree 34(22.8%) and strongly agree 27(18.1%). The expectation that medications be given exactly as ordered is unrealistic strongly disagree 65(43.6%), moderately disagree 6(4.0%), slightly disagree 23(15.4%), slightly agree 16(1110.7%), moderately agree 16(10.7%) and strongly agree 23(15.4%).

Table 4.10 Barriers to self reporting after committing a MAE (n=149). cont

Barrier	Response	Frequency	%
Medication administration error is not clearly defined.	Strongly disagree	37	24.8
	Moderately disagree	22	14.8
	Slightly disagree	32	21.5
	Slightly agree	24	16.1
	Moderately agree	21	14.1
	Strongly agree	13	8.7
Nurses may not think the error is important enough to be reported	Strongly disagree	45	30.2
	Moderately disagree	23	15.4
	Slightly disagree	9	6.0
	Slightly agree	39	26.2
	Moderately agree	18	12.1
	Strongly agree	15	10.1
Nurses believe that other nurses will think they are incompetent if they make medication errors	Strongly disagree	41	27.5
	Moderately disagree	12	8.1
	Slightly disagree	14	9.4
	Slightly agree	21	14.1
	Moderately agree	34	22.8
	Strongly agree	27	18.1
The expectation that medications be given exactly as ordered is unrealistic	Strongly disagree	65	43.6
	Moderately disagree	6	4.0
	Slightly disagree	23	15.4
	Slightly agree	16	10.7
	Moderately agree	16	10.7
	Strongly agree	23	15.4

Table 4.13 findings revealed the following barriers: The patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported strongly disagree 6(4%), moderately disagree 6(4%), slightly disagree 13(8.7%), slightly agree 13(8.7%), moderately agree 32(21.5%) and strongly agree 79(53.0%). Nurses are afraid the physician will reprimand them for the medication error strongly disagree 29(19.5%), moderately disagree 10(6.7%), slightly disagree 18(12.1%), slightly agree 37(24.8%), moderately agree 26(17.4%) and strongly agree 29(19.5%). When asked if nurses fear adverse consequences from reporting medication errors 11(7.4%), moderately disagree 15(10.1%), slightly disagree 2(1.3%), slightly agree 24(16.1%), moderately agree 20(13.4%) and strongly agree 77(51.7%). Regarding the factor that too much emphasis is placed on medication administration errors as a measure of the quality of nursing care provided strongly disagree 29(19.5%), moderately disagree 17(11.4%), slightly disagree 16(10.7%), slightly agree 11(7.4%), moderately agree 21(14.1%) and strongly agree 55(36.9%).

Table 4.11 Barriers to self reporting after committing a MAE (n=149). cont

Barrier	Response	Frequency	%
The patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported	Strongly disagree	6	4.0
	Moderately disagree	6	4.0
	Slightly disagree	13	8.7
	Slightly agree	13	8.7
	Moderately agree	18	21.5
	Strongly agree	15	53.0
Nurses are afraid the physician will reprimand them for the medication error	Strongly disagree	29	19.5
	Moderately disagree	10	6.7
	Slightly disagree	18	12.1
	Slightly agree	37	24.8
	Moderately agree	26	17.4
	Strongly agree	29	19.5
Nurses fear adverse consequences from reporting medication errors	Strongly disagree	11	7.4
	Moderately disagree	15	10.1
	Slightly disagree	2	1.3
	Slightly agree	24	16.1
	Moderately agree	20	13.4
	Strongly agree	77	51.7
Too much emphasis is placed on medication administration errors as a measure of the quality of nursing care provided	Strongly disagree	29	19.5
	Moderately disagree	17	11.4
	Slightly disagree	16	10.7
	Slightly agree	11	7.4
	Moderately agree	21	14.1
	Strongly agree	55	36.9

Table 4.14 findings revealed the following barriers: The response by nursing administration does not match the severity of the error strongly disagree 24(16.1%), moderately disagree 8(5.4%), slightly disagree 20(13.4%), slightly agree 20(13.4%), moderately agree 16(10.7%) and strongly agree 61(40.9%). No positive feedback is given for passing medications correctly 44(29.5%), moderately disagree 20(13.4%), slightly disagree 11(7.4%), slightly agree 9(6.0%), moderately agree 13(8.7%) and strongly agree 52(34.9%). When asked if when medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error strongly disagree 20(13.4%), moderately disagree 13(8.7%), slightly disagree 5(3.4%), slightly agree 8(5.4%), moderately agree 26(17.4%) and strongly agree 77(51.7%).

Table 4.12 Barriers to self reporting after committing a MAE (n=149). cont

Factor	Response	Frequency	%
The response by nursing administration does not match the severity of the error	Strongly disagree	24	16.1
	Moderately disagree	8	5.4
	Slightly disagree	20	13.4
	Slightly agree	20	13.4
	Moderately agree	16	10.7
	Strongly agree	61	40.9
No positive feedback is given for passing medications correctly	Strongly disagree	44	29.5
	Moderately disagree	20	13.4
	Slightly disagree	11	7.4
	Slightly agree	9	6.0
	Moderately agree	13	8.7
	Strongly agree	52	34.9
When medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error	Strongly disagree	20	13.4
	Moderately disagree	13	8.7
	Slightly disagree	5	3.4
	Slightly agree	8	5.4
	Moderately agree	26	17.4
	Strongly agree	77	51.7

Table 4.13 Association among the variables

To identify the association between the groups (socio-demographic data, types of MAEs, factors associated to MAEs and barriers to self reporting) the researcher used the Chi-square test and the confidence interval was 0.05.

The results are summarized in the following tables

Table 4.15 Illustrates that there is a slight significance between sex of the participants and types of MAEs (p= .039) and a strong relationship between other remaining socio-demographic data. With regard to the socio-demographic data and factors contributing to MAEs there is a strong relationship of experience (p= .001) and marital status (p= .000). However the job position also showed a slight significance (p= .044). Concerning the socio-demographic data and barriers to self-reporting after committing an error, the results revealed that there is a strong relationship.

Table 4.15. Chi-square analysis between socio demographic with types of MAEs, contributing factors to MAEs and barriers to self reporting n(=149)

VARIABLES		Pearson Chi-square	P value
Socio-demographic and types of MAES	Sex of the participants	33.684[a]	.039
	Age of the participants	229.571[a]	.000
	Experience of the participants	121.611[a]	.000
	Level of education	62.133[a]	.000
	Marital status	103.320[a]	.001
	Religion	316.334[a]	.000
	Job position	70.853[a]	.000
Socio-demographic and factors contributing to MAEs	Sex of the participants	90.059[a]	.063
	Age of the participants	392.493[a]	.083
	Experience of the participants	286.713[a]	.001
	Level of education	63.853[a]	.714
	Marital status	328.660[a]	.000
	Religion	437.681[a]	.337
	Job position	92.489[a]	.044
Socio-demographic and barriers to self reporting	Sex of the participants	63.674[a]	.013
	Age of the participants	436.858[a]	.000
	Experience of the participants	281.301[a]	.000
	Level of education	98.906[a]	.000
	Marital status	217.728[a]	.000
	Religion	492.527[a]	.000
	Job position	89.141[a]	.000

4.1.6 CONCLUSION OF THE FINDINGS

Data were analyzed using Statistical Package for Social Sciences (SSPS) software version 23, 2015. Both descriptive and inferential statistics were used. Frequencies and percentages were used to assess the medication errors, contributing factors to medication errors and barriers to self-reporting of medication errors. Inferential statistics were used to test associations between variables under study. The results revealed that the common type of MAEs made by nurses is administration of a drug at wrong time 20(20.1%) which is the highest for those who identified one type of MAE whereas administration of a drug which is not prescribed was 1(0.7%), those who identified at least two wrong dose and omitting a drug 6(4.0) and the least identified was wrong route and administration of a drug which is not prescribed 2(1.3%), for the category for those who identified three drugs the highest was wrong time, omitting a drug and administration of a drug which is not prescribed 10(6.7%) and the least identified in this group was wrong time, frequency and omitting 3(2.0%), the highest in a group that was identified four MAEs was wrong dose, wrong time, omitting a drug and administration of a drug which is not prescribed 9(6.0%) and the lowest was wrong time, route, frequency and omitting a drug 4(2.7%).

The participants identified the six MAEs wrong dose, wrong time, wrong drug, wrong frequency, omitting a drug and administration of a drug which is not prescribed 16(10.7%) and those who identified seven MAEs wrong dose, wrong time, wrong drug, wrong route, wrong frequency, omitting a drug and administration of a drug which is not prescribed 4 (2.7%). The main factors to MAEs identified in the present study are workload or few nurses compared to the number of patients 82 (55.0%), unit staff do not receive in service trainings about new medication 50(33.6%), use of abbreviations instead of writing completely 47 (31.5%), interruptions during drugs administration40 (26.8%), all medications for one team of patients cannot be passed within an accepted time frame38 (25.5%) and errors are made in the medication sheet 30 (20.1%). The main barriers to self reporting in the present study were: When medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error77 (51.7%), no positive feedback is given for passing medications correctly 52 (34.9%), nurses could be blamed if something happens to the patient as a result of the medication administration error 88 (59.1%), the response by

nursing administration does not match the severity of the error 61 (40.9%), too much emphasis is placed on medication administration errors as a measure of the quality of nursing care provided 55 (36.9%), nurses fear adverse consequences from reporting medication errors 77 (51.7%), and the patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported 79 (53.0%). On the other hand, the lowest answer was disagreement of error definition with 8 (5.4%). Inferential statistics revealed that there is a significant association between socio-demographic, types of MAEs, factors contributing to MAEs and barriers to self-reporting.

CHAPTER FIVE: DISCUSSION

5.1. Introduction

This chapter compares and contrasts the different findings under the study with current studies done on MAEs. The main subtopics under this chapter are: socio-demographic data, types of MAEs, contributing factors to MAEs, barriers to self reporting and the relationship between socio-demographic data with other variables under the study.

5.2. Socio-demographic

The present study revealed that the majority of the participants were females 113 (75.84%), while 36 (24.16%) were males this is related to the culture that in Rwanda the nursing schools were designed to young girls only or nursing was a female dominated profession when it was started by the missionaries(Mukamana, Uwiyeze and Sliney, 2015). The age ranged from 21 years to the above 45years above simply because the Advanced diploma is joined after secondary school. With regard to the level of education in the field of Nursing, the majority Advanced diploma trained nurses 122 (81.9%) this is because the bachelors degree has started late in 2002 in Kigali Health Institute which was the only Higher learning Institution that was training this level at that time and also most of the nurses in Rwanda have the minimum level (Harerimana et al., 2015 p.6) . Similarly also to the special report called the human resources for health program in Rwanda — a new partnership which also showed the figures of Bachelors degree trained nurses by 2018 at 1011 compared to Advanced diploma nurses 11384(Binagwaho et al., 2013 p.2055).

The majority of the participants experience was above 5 years 98 (65.8%) and according to Benner's stages of clinical competence they are considered as expert (Benner, 1984). With regard to their religion a half of the participants were catholic 75 (50.34%) which is in relation to the religious population in Rwanda whereby the big number is from catholic church at 44% (National Institute of Statistics of Rwanda, 2014 p.17). Regarding the marital status the majority of the participants were married 104 (69.8%) similar to the marital status of Rwandan population which is on 46.1% (National Institute of Statistics of Rwanda, 2014 p.13). The majority of participants in this study were bedside nurses 133(89.3%) this is

because this study were looking at nurses and nurse managers and of course in nursing practice bedside nurses are more than the managers.

5.3. Types of MAEs

Among the participants who chose one type of MAE wrong time was the highest common MAE 20 (20.1%) this might be because of in the factors the participants mentioned on the top the heavy workload . Similar to the findings from the study done in hospitals affiliated with Mashhad University of Medical Sciences in, Mashhad, Iran with the purpose of evaluating the medication errors among 530 nurses. Nurses were recruited using simple and stratified random sampling strategy and survey questionnaire was also used with Likert scale format. The results showed that the most prevalent medication errors by nurses was early or late administration of medication (43.7%)(Ebrahimipour, Hosseini, Haghighi, & Tabatabaee, 2016 p. 402).

Another study with similar findings was conducted in Saudi Arabia and showed that 30.9% responded that the most common medication administration error is the wrong timing of medication administration (Aboshaiqah, 2014 p.66). Moreover, using the documentation of Pediatric mediation administration errors in Canadian pediatric center wrong time error accounted 168 cases (45.2%) among 272 cases (Sears & Goodman, 2012 p.114). Although these studies have identified wrong time error as the most common error in clinical settings, in contrast the retrospective study of 2,380 physician orders in King Abdul-Laziz Medical city, Saudi Arabia has identified 1,333 medication errors and the dosing error as the highest cause of medication error at the degree of 22.1% among others (Al-jeraisy, Alanazi and Abolfotouh, 2011).

The least associated factor that was mentioned by the only one participant was administration of a drug which is not prescribed 1(0.7%). This in contrast with the results from the study done in Gondar/Ethiopia which revealed that administration of a drug which is not prescribed was at the rate of 20.1% for Intravenous and 24.8% for non Intravenous drugs (Bifftu,

Dachew, Tiruneh, & Beshah, 2016 p.4). The possible reasons here may be the fear for legal issues or any other negative consequences.

The participants who identified at least the two MAEs chose wrong dose and omitting a drug 8(4%) contrary to the several studies that have found wrong dose at the highest percentage compared the present study findings wrong dose (Miladinia et al., 2016 p.1441;Oshikoya, Oreagba, Ogunleye, Senbanjo, & Macebong, 2013 p.71) however, the omission of a drug with the lowest percentage is similar to the study done at Benioff Children's Hospital by Hardmeier, Tsourounis, Moore, Abbott, & Guglielmo,(2014).

The participants who identified at least three MAEs, the highest chosen category of MAEs was wrong time, omitting a drug, and administration of a drug which is not prescribed 10(6.7%). The participants also identified the category at least four MAEs 9(6%) wrong dose, time, omitting a drug and administration of a drug which is not prescribed, those who identified at least six MAEs wrong dose, time, drug, frequency, omitting a drug and administration of a drug which is not prescribed 16(10.7%)and those who identified at least seven MAEs including wrong dose, time, drug, route, frequency, omitting a drug and administration of a drug which is not prescribed 4(2.7%). Considering the above discussions still these types of errors are cross-cutting and each ahs got a significant place to contribute to MAEs.

Even if the wrong time comes on the top for the present study may be due to nurse patient ratio but dosing error is very crucial in pediatric clients as the simple error in dosing may lead to the greater risk to their health and requires weight related calculations compared to adults prescriptions(WHO, 2016 p.12).

The present results have suggested the significant association between the types on MAEs with the socio-demographic data except the sex of the participants (p=.039). Similarly to the study done in hospitals affiliated with Mashhad University of Medical Sciences, Mashhad, Iran which found that there was no significant association for MAEs with gender but in contrast it found also that there was no significant association between MAEs and experience (Ebrahimipour *et al.*, 2016 p.1).

5.4. Factors associated to MAEs

The main factors that lead to MAEs are: workload or few nurses compared to the number of patients 82 (55.0%). Correspondingly to the study that has been conducted in Malaysia with the aim of identifying the level of knowledge and factors among nurses which contribute to medication errors whereby most of the participants 95.8% agreed that heavy workload and complicated orders take the first place to contribute to MAEs (Johari, Shamsuddin, Idris, & Hussin, 2013 p.21). Another contributing factor from the present study is that unit staff do not receive in service trainings about new medication 50(33.6%) similarly to the study that has been conducted in Saudi Arabia which revealed that nurses in the two regional hospitals 215(69.6%)agreed that they do not receive in service training regarding the new medication as the common medication administration error (Aboshaiqah, 2014 p.65).

Alongside that factor the following was the use of abbreviations instead of writing completely 47 (31.5%) which is also another factor that can lead to medication errors as also reported to the United States of America (Wittich, Burkle, & Lanier, 2014 p.4). Thus the Joint Commission has put out the precautions of using abbreviations that includes the list of abbreviations to not be used (The Joint Commission, 2016). Additionally in this study the interruptions during drugs administration play an important role in the cause of MAEs to the extent of 40 (26.8%). Likewise to the study done with the aim of evaluating the effectiveness of a “do not interrupt’ bundled interruption to reduce non medication related interruptions to nurses during medication administration errors whereby in the observational study the interruptions accounted 57 per 100 administrations (Westbrook et al., 2017 p.1).

The interruptions during medication administration impact the nurses’ work whereby they can make nurses to stop the work and handle the interruptions for at least 2.5 min, procedural failures, clinical errors and compromised patient safety(Johnson et al., 2017 p.1) . However, the results from the study that was conducted in three Canadian pediatric centers with the aim of assessing the risks factors associated to the increased severity of MAEs have found that the working shift is the most common factor whereby 64.5% of errors occur on the day shift followed by 22% that occur on the night shift(Sears & Goodman, 2012 p.114). The participants 83(55.7%) from the present study also have strongly disagreed that the similarity

of medications names is a contributing factor contrarily to the results of the retrospective study aimed at assessing the differences in recognition of similar medication names between pharmacists and nurses which revealed that drug names error is also high among others (Tsuji et al., 2015 p.3)

With regard to the socio-demographic data and factors contributing to MAEs there is a significant association of experience (p= .001) and marital status (p= .000). In contrast done in Turkey with aim of assessing the medication errors basing on perspectives of newly graduated and experienced nurses which showed that there was no statistically significant difference for both groups in terms of experience (Unver, Tastan, & Akbayrak, 2012 p.321) . The job position also showed a slight significance (p= .044). However, all these mentioned findings from the present study are dissimilar to the study which was conducted in India and found that there was statistically significance for job position, marital status and experience (Venkatesh, 2014 p.6).

5.5. Barriers to self reporting

The present study has revealed that nurses fear to be blamed if something happens to the patient as a result of the medication administration error 88 (59.1%) which is analogous to the results from a study that aimed at assessing the medication error reporting rate and its barriers and facilitators among nurses in Iran where that factor was ranked as the top barrier to self reporting and another study perceptions regarding medication administration errors among hospital staff nurses of south Korea (Bayazidi, Zarezadeh, Zamanzadeh, & Parvan, 2012 p.234; You, Choe, Park, Kim, & Son, 2015 p.1). The second barrier in this study exposed that when medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error77 (51.7%) the same as the findings from the systematic review of different studies in Iran (Mansouri *et al.*, 2014).

The current study agrees that the response by nursing administration does not match the severity of the error 61 (40.9%) comparable to the recent findings from a study with aim of identifying the barriers that preventing the nursing staff from reporting medication errors in Kirkuk city hospitals whereby 57.3% of nurses fear the administration reasons (Abdullah &

Sameen, 2017 p.153) again similar to the study from Egypt to the point of 63.8% (Al-Youssif, Mohamed, & Nabila, 2013 p.62) . Another barrier from the present study is that nurses fear adverse consequences from reporting medication errors 77 (51.7%) similar to the descriptive cross sectional survey in Egypt that has argued the fear reasons on the level of 63.8% (Al-Youssif, Mohamed, & Nabila, 2013 p.62).

Not only those factors discussed above but also the patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported 79 (53.0%) alike to the qualitative study regarding the perceptions and attitudes towards medication error reporting in primary care clinics in Malaysia (Samsiah, Othman, Jamshed, & Hassali, 2016 p.10). The other significant factor suggested in this study is that no positive feedback is given for passing medications correctly 52 (34.9%) which is dissimilar to the National Coordinating Council for Medication Error Reporting and Prevention that emphasizes on providing the feedback and rewards to reduce MAEs (National Coordinating Council for Medication Error Reporting and Prevention, 2014).On the other hand, the lowest answer was disagreement of error definition with 8 (5.4%) contrarily to the findings from the study that found that disagreement over time and error definition is the third leading cause of not reporting the MAEs by the echelon of 36.6% (Al-Youssif et al., 2013 p.62). Concerning the socio-demographic data and barriers to self-reporting after committing an error, the results revealed that there was statistically significance all variables in socio-demographic. In dissimilarity to the results of the study that was conducted in Turkey which revealed no statistical significance regarding experience and reporting (Unver et al., 2012 p.320).

5.6 Limitations of the study

Because this study is not funded there were problems during data collection to reach the clinical sites that the researcher used and also to get the remunerations of the research assistants. Because the data were sensitive there might be the reporting biases.

5.7 Recommendations

The recommendations for the present study are drawn based on the findings and addressed to the following areas such as practice, research, administration and leadership.

Nursing practice

From this study, it has been found that nurses' reasons such as poor calculation skills, low level of knowledge have an impact on MAEs even if it is not important they were identified by some participants. Moreover, there was a strong association between individuals' categories and types of MAEs. Therefore, the following recommendations are advised to prevent MAEs in nursing practice:

- Bedsides nurses are advised to combine multiple interventions to prevent MAEs including but not limited to double check orders and doses.
- Continuous training and updates on drugs as well as teaching the patients the proper taking of drugs to prevent also patient related errors.

Nursing research

This study has looked on the factors contributing to MAEs and barriers to self-reporting among nurses who work in pediatric units of Rwanda. Hence, future researches are advised to be done on:

- Strategies to reduce medication administration errors in various clinical settings
- To extend this research in other units as well as other healthcare professionals including physicians and pharmacists
- To assess the use of incidents reports to inform the prevention of MAEs.
- Because of the strong relationship (strength, magnitude and directions) between socio-demographic data and types of MAEs, the future research are so called to test the relationship between those two variables
- To assess the contribution of nurse managers in the reporting MAEs

Administration and leadership

- The main cause factor that is contributing to MAEs is about few nurses compared to the number of patients (heavy workload), thus it is a concern of the Ministry of Health to increase the number of nurses in the healthcare settings. This is also goes with that the most common identified type of MAEs which is wrong time due to that sometimes one nurse would take care of many patients then this might take long.

- ❖ The findings revealed that the nurses do not get information on the new drugs therefore the healthcare settings should increase the in service trainings regarding the new medication
- ❖ The healthcare settings should alert to the physicians to reduce the use of abbreviations as it was identified as one of the factors to MAEs
- ❖ The hospitals should also set standards that are designed to reduce the interruptions during MAEs.
- ❖ With regard to the barriers to self reporting, the nursing administration should establish the free punishments environment and create incentives to those who have self reported after committing an error.
- ❖ The institutions should avoid the culture of blame to increase the rate of reporting of MAEs and not focusing on individual but also look at the other factors.

Education

- ❖ The higher learning Institutions which train nurses should strengthen the curriculum paying attention to medication administration errors and bringing new innovations as well as evidence based practices from researches to the clinical settings.
- ❖ The higher learning Institutions in collaboration with other partners in health should also provide Continuous Professional Development to the healthcare professionals as well as the students regarding patient safety especially Medication Administration.

5.8 Conclusions

The main findings are based on the objectives:

The present study revealed that the majority of the participants were females 113 (75.84%) and the age ranged from 21 years to the above 45years. The majority Advanced diploma trained nurses 122 (81.9%) with experience above 5 years 98 (65.8%). The majority of participants in this study were bedside nurses 133(89.3%).

Summary of the findings in relation the objectives

Objective #1: To identify the types of medication administration errors committed among nurses working in pediatric units of selected referral hospitals in Rwanda: The majority of the participants 20 (20.1%) responded that the most common MAE is administration of a drug at wrong time and it is also cross-cutting in the other categories of errors. However, all types of MAEs were also identified in this study by the participants inclusive depending on the different categories those who identified at least two wrong dose and omitting a drug 6(4.0) and the least identified was wrong route and administration of a drug which is not prescribed 2(1.3%), for the category for those who identified three drugs the highest was wrong time, omitting a drug and administration of a drug which is not prescribed 10(6.7%) and the least identified in this group was wrong time, frequency and omitting 3(2.0%), the highest in a group that was identified four MAEs was wrong dose, wrong time, omitting a drug and administration of a drug which is not prescribed 9(6.0%) and the lowest was wrong time, route, frequency and omitting a drug 4(2.7%). The participants identified the six MAEs wrong dose, wrong time, wrong drug, wrong frequency, omitting a drug and administration of a drug which is not prescribed 16(10.7%) and those who identified seven MAEs wrong dose, wrong time, wrong drug, wrong route, wrong frequency, omitting a drug and administration of a drug which is not prescribed 4 (2.7%)..

Objective #2: To determine the factors that contribute to medication administration errors among nurses working in pediatric units of selected referral hospitals in Rwanda which were workload or few nurses compared to the number of patients 82 (55.0%), unit staff do not receive in service trainings about new medication 50(33.6%), use of abbreviations instead of writing completely 47 (31.5%) and the interruptions during drugs administration play an important role in the cause of MAEs at the extent of 40 (26.8%). Still, the respondents have also mentioned all the factors to contribute to MAEs.

Objective #3: To identify the barriers to self-reporting after committing medication error among nurses working in pediatric units of selected referral hospitals in Rwanda which were fear to be blamed if something happens to the patient as a result of the medication

administration error 88 (59.1%), when medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error77 (51.7%), nursing administration does not match the severity of the error 61 (40.9%), nurses fear adverse consequences from reporting medication errors 77 (51.7%), the patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a medication error is reported 79 (53.0%) and no positive feedback is given for passing medications correctly 52 (34.9%). Even though these are the barriers mentioned but the remaining barriers also have been answered to hinder the reporting process.

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APPENDICES

INFORMED CONSENT

Introduction

My name is NKURUNZIZA Aimable, a graduate student at the University of Rwanda/ College of Medicine and Health Sciences in Masters of Sciences in Nursing/ Pediatric Specialty. I am inviting you to participate in my research study on **contributing factors to medication administration errors and barriers to self-reporting among nurses who work with pediatric clients.**

Purpose of the study

The purpose of the study is to assess the contributing factors to medication administration errors and barriers to self-reporting among nurses working in pediatric units in Rwanda

Description of study procedures

You will be asked to tick your best answer according to the questions provided. This will take approximately 15min of your time. Please don't indicate your name on the questionnaire.

Confidentiality

Confidentiality will be assured as no names will appear on the interview scheduled guide at any stage of data collection as they will be coded. Signed consent forms will not be attached to instruments to ensure anonymity. Data will be stored in a locked cabinet and not be accessible to any other person other than the investigator. However, absolute confidentiality cannot be guaranteed and personal information may be disclosed if required by the law. The study staff will have access to all the information collected in this study. In addition, there are organizations that may inspect or copy your research records for quality assurance and data analysis and these include the institutional review board (IRB). Furthermore, all documents for the study will be destroyed after 5 years of study completion.

Right to refuse or withdraw from the study

Involvement in the study is voluntary, so you may choose to participate or not. . If you do not wish to continue, you have the right to withdraw from the study, without penalty, at any time.

Risks of the study

There will be no risks behind the participation to this research. Of course the risks will be minimized by voluntary participation, no name to indicate on the questionnaire, no one of neither your authority nor colleague will access you answers. All your rights will be protected

I am now going to explain the study to you. Please feel free to ask any questions that you may have about the research; I will be happy to explain anything in greater detail.

Benefits of the study

The benefit of this research is that you will be helping us to understand contributing factors to medication administration errors and barriers to self-reporting among nurses who work with pediatric clients. This information should help us to set measurers to prevent the errors and also to increase the rate of reporting.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this research study and to have those questions answered by me or my supervisor before, during or after the research. If you have any further questions about the study, at any time feel free to contact me, [*Aimable*] by telephone at [**+250788221439**].

Contact details of the supervisor

- DR Geldine CHIRONDA
  Human Resources for Health (HRH)
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  Rory Meyers College of Nursing
  New York, USA
  University of Rwanda
  College of medicine and Health Sciences
  School of Nursing and Midwifery
  Kigali, Rwanda
  Phone: +250 789924956, *+27 810461411*

For any concern about this project, please contact the Institutional Review Board (IRB)

- **Contact details of the ethical board**

Institutional Review Board
Research Office
University of Rwanda
Kigali, Rwanda
Chairperson788490522
Deputy Chairperson 0783340040

CONSENT TO PARTICIPATE IN THE STUDY Your signature below indicates that you have decided to volunteer as a research participant for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the researcher.

_____
Names of the participants

_____ _____
Signature of participant date

_____
Print name of investigator

_____ _____
Signature of investigator date

KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

Iriburiro

Amazina yanjye ni NKURUNZIZA Aimable, a graduate student at the University of Rwanda/ College of Medicine and Health Sciences in Masters of Sciences in Nursing/ Pediatric Specialty. Mutumiwe mukugira uruhare muri ubu bushakashatsi kugirango tumenye byimbitse **impamvu zitera amakosa mugutanga imiti ndetse nibibangamira kwivuga igihe wakoze ayo makosa mubaforomo bakorana nabarwayi babana mu bitaro mu Rwanda.** Biragutwara iminota nka 15 ngusubize ibibazo byose.

Intego y'ubushakashatsi

Intego y'ubushakashatsi ni ukureba impamvu zitera amakosa mugutanga imiti ndetse nibibangamira kwivuga igihe wakoze ayo makosa mubaforomo bakorana nabarwayi babana mu bitaro mu Rwanda

Imiterere yuko ubushakashatsi buzagenda

Urasabwa gushyira akamenyetso kugisubizo mubibazo wahawe. Ibi biragutwara iminota nka 15. Ntushyireho amazina yawe kurupapuro rw'ubushakashatsi.

Ibanga

Ubu bushakashatsi harimo ibanga kuko ntamazina azagaragara mugihe cyitangwa ry'amakuru hakazanakoreshwa imibare yibanga. Impapuro zemera kugira uruhare mubushakashatsi ntizizafatanywa ni mpapuro zibazwa. Impapuro zibazwa zizabikwa mukabati kabugenewe gafunze ntawundi wemerewe kurebaho usibye ushinzwe ubushakashatsi nushinzwe gufata amakuru. Nyuma yibyo hari ibigo byareba kumakuru murwego rwo kuvugurura ireme ry'ubuvuzi, ubusesenguzi bw'amakuru harimo Institutional Review Board (IRB). Kandi impapuro z'ubushakashatsi zizatwikwa nyuma y'imyaka itanu.

Uburenganzira bwo kwanga cyangwa kuva mu bushakashatsi

Kugira uruhare mu bushakashatsi ni ubushake, rero ushobora kwemera cyangwa ukabyanga nta ngaruka mbi.

Ingaruka kubushakashatsi

Nta ngaruka ziri nyuma y'ubushakashatsi. Birumvikana ko ingaruka zizirindwa kubera ko kwitabira ubushakashatsi ari ubushake, ntamazina azagaragara kumpapuro z'ubushakashatsi, ntanumwe wemerewe kureba kumakuru watanze haba umuyobozi cyangwa mugenzi wawe. Uburenganzira bwawe bwose buzubahirizwa.
Ubu rero nkaba ngiye kubasobanurira ubushakashatsi. Mubaze ibibazo byose mumbaza kandi ndishimira kubasubiza.

Inyungu kubushakashatsi

Inyungu nuko udufasha kugirango tumenye byimbitse impamvu zitera amakosa mugutanga imiti ndetse nibibangamira kwivuga igihe wakoze ayo makosa mubaforomo bakorana nabarwayi babana mu bitaro mu Rwanda.

Ubrenganzira bwo kubaza ibibazo
Ufite uburenganzira bwo kubaza ibibazo byerekeranye nubu bushakashatsi kandi nkabasubiza cyangwa umwunganizi wanjye mere, hagati cyangwa nyuma y'ubushakashatsi. Niba ufite ikibazo kuri ubu bushakashatsi, igihe icyo aricyo cyose rwose wampamagara, [*Aimable*] kumurongo wa telephone [**+250788221439**].

Umwirondoro w'umwunganizi

- DR Geldine CHIRONDA
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Ikindi cyifuzo cyangwa ikibazo wahamagara muri Institutional Review Board (IRB)
Institutional Review Board
Research Office
University of Rwanda
Kigali, Rwanda
Tel……..
Email…….

KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

Umukono wawe hasi uragaragaza ko wemeye kubushake kugira uruhare mu bushakashatsi, ko wanasomye ukumva neza amakuru yo haruguru. Urahabwa urupapuro ruriho umukono nitariki ubika, hamwe nizindi mpapuro zubushakashatsi umushakashatsi abono ko ari ingirakamaro.

_____

Amazina y'uwemeye gutanga amakuru

_____ _____
Umukono w'uwemeye gutanga amakuru Itariki

_____
Amazina y'uhagarariye ubushakashatsi

_____ _____
Umukono w'uhagarariye ubushakashatsi Itariki

UNIVERSITY OF RWANDA
COLLEGE OF MEDICINE AND HEALTH SCIENCES
DEPARTEMENT OF NURSING

Questionnaire: survey on contributing factors to medication administration errors and barriers to self-reporting among nurses who work with pediatric clients in Rwanda, 2017

Introduction: You are invited to take part in this study that is intended to gain a better understanding **the contributing factors to medication administration errors and barriers to self-reporting among nurses who work with pediatric clients in Rwanda**. It needs approximately 15 minutes to completely the questions.

Would you willing to participate please? Agree ☐ Disagree ☐

For any further question, contact the investigator:

Principal Investigator: NKURUNZIZA Aimable Cell phone: +250788221439

Name and signature of data facilitator _____ Date_____

Name and signature of supervisor _____ Date_____

Part I- Questions about socio-demographic characteristics

This section asks you to provide some socio demographic data. Please give an appropriate response in each question.

1. Sex 1.Male 2. Female
2. Age in year_____
3. Work experience as a nurse 1.3moths- 1year ☐ 2. >1year-3years ☐ 3.over 3years ☐
4. Educational levels 1. Diploma 2. BSc degree 3. Masters degree
5. Marital status 1. Single 2. Married 3. Separated/ Divorced 4. Widowed
6. Religion 1. Adventist 2. Muslim 3. Protestant 4. Catholic 5. other(specify)--
7. Job position 1. Staff nurse 2. Head nurse 3. Others (specify) _____

PART II: Types of medication administration errors. Please indicate the medication errors your committed during drugs administration for a pediatric client. TICK IN THE BOX

1. Wrong dose error ☐
2. Wrong timing of medicine administration ☐
3. Administration of wrong medicine ☐
4. Wrong route of medicine administration ☐
5. Wrong frequency of medicine administration ☐
6. Omitting a drug ☐
7. Administration of a drug which is not prescribed ☐

PART. III. Factors contributing to medication errors. Please indicate your level of agreement to the questions that contribute to medication administration errors.

	Items	**Strongly disagree**	**Moderately disagree**	**Slightly disagree**	**Slightly agree**	**Moderately agree**	**Strongly agree**
	Medication Packaging Reasons						
1	The names of many medications are similar.	1	2	3	4	5	6
2	Different medications look alike.	1	2	3	4	5	6
3	The packaging of many medications is similar	1	2	3	4	5	6
	Physician Reasons						
4	Physicians' medication orders are not legible.	1	2	3	4	5	6
5	Physicians' medication orders are not clear.	1	2	3	4	5	6
6	Physicians change orders frequently.	1	2	3	4	5	6
7	Verbal orders are used instead of written orders.	1	2	3	4	5	6
8	Poor communication between nurses and physicians.	1	2	3	4	5	6
	Nurses reason						
9	Nurses on this unit have limited knowledge about	1	2	3	4	5	6

	medications						
10	Nurses are interrupted while administering medications to perform other duties.	1	2	3	4	5	6
11	Unit staffing levels are inadequate.	1	2	3	4	5	6
12	All medications for one team of patients cannot be passed within an accepted time frame.	1	2	3	4	5	6
13	Equipment malfunctions or is not set correctly.	1	2	3	4	5	6
14	Unit staffs do not receive enough in services on new medications	1	2	3	4	5	6
15	Nurse is unaware of a known allergy.	1	2	3	4	5	6
16	Patients are off the ward for other care.	1	2	3	4	5	6
17	Many patients are on the same or similar medications.	1	2	3	4	5	6
	System Reasons						
18	Abbreviations are used instead of writing completely.	1	2	3	4	5	6
19	Few nurse compared to the number of patients (heavy workloads)	1	2	3	4	5	6
20	Frequent substitution of drugs.	1	2	3	4	5	6
21	Nurses get pulled between teams and from other units.	1	2	3	4	5	6
	Pharmacy Reasons						
22	Pharmacy delivers incorrect doses to this unit.	1	2	3	4	5	6
23	Pharmacy does not prepare the medication correctly.	1	2	3	4	5	6
24	Pharmacy does not label the medication correctly.	1	2	3	4	5	6
25	Pharmacists are not available 24 hours a day.	1	2	3	4	5	6
	Documentation-Transcription Reasons						
26	When scheduled medications are delayed, nurses do not communicate the time when the next dose is due	1	2	3	4	5	6
27	Nurses on this unit do not adhere to the approved medication administration procedure.	1	2	3	4	5	6
28	Medication orders are not transcribed to the file correctly.	1	2	3	4	5	6

29	Errors are made in the Medication sheet	1	2	3	4	5	6
30	On this unit, there is no easy way to look up information on medications	1	2	3	4	5	6

IV. Barriers to Self-reporting after committing a medication administration error. Please indicate your level of agreement to the items which indicate the reasons that contribute to not report medication administration errors.

	Items	**Strongly Disagree**	**Moderately Disagree**	**Slightly Disagree**	**Slightly agree**	**Moderately agree**	**Strongly agree**
	Disagreement Over Time and Error Definition Reason						
1	Nurses do not agree with hospital's definition of a medication error.	1	2	3	4	5	6
2	Nurses do not recognize an error occurred.	1	2	3	4	5	6
3	Filling out an incident report for a medication error takes too much time.	1	2	3	4	5	6
4	Contacting the physician about a medication error takes too much time	1	2	3	4	5	6
5	Medication error is not clearly defined.	1	2	3	4	5	6
6	Nurses may not think the error is important enough to be reported.	1	2	3	4	5	6
7	Nurses believe that other nurses will think they are incompetent if they make medication errors.	1	2	3	4	5	6
8	The expectation that medications be given exactly as ordered is unrealistic	1	2	3	4	5	6
	Fear Reason						
9	The patient or family might develop a negative attitude toward the nurse, or may sue the nurse if a	1	2	3	4	5	6

	medication error is reported.						
10	Nurses are afraid the physician will reprimand them for the medication error.	1	2	3	4	5	6
11	Nurses fear adverse consequences from reporting medication errors.	1	2	3	4	5	6
12	Too much emphasis is placed on medication errors as a measure of the quality of nursing care provided.	1	2	3	4	5	6
	Administrative Reason						
13	The response by nursing administration does not match the severity of the error.	1	2	3	4	5	6
14	Nurses could be blamed if something happens to the patient as a result of the medication error.	1	2	3	4	5	6
15	No positive feedback is given for passing medications correctly.	1	2	3	4	5	6
16	When medication errors occur, nursing administration focuses on the individual rather than looking at the systems as a potential cause of error	1	2	3	4	5	6

KAMINUZA Y'U RWANDA

KOLEJI Y'UBUVUZI N'UBUZIMA
ISHAMI RY'UBUFOROMO

Ibazwa ku bushakashatsi: Ubushakashatsi kumpamvu zitera amakosa mugutanga imiti ndetse nibibangamira kwivuga igihe wakoze ayo makosa mubaforomo bakorana nabarwayi babana mu bitaro bya kaminuza mu Rwanda, 2017

Iriburiro: Mutumiwe mukugira uruhare muri ubu bushakashatsi kugirango tumenye byimbitse impamvu zitera amakosa mugutanga imiti ndetse nibibangamira kwivuga igihe wakoze ayo makosa mubaforomo bakorana nabarwayi babana mu bitaro mu Rwanda. Biragutwara iminota nka 15 ngusubize ibibazo byose.

Urabyemeye? Yego ☐ Oya ☐

Ugize ikibazo iyambaze ukuriye ubushakashatsi:

Ukuriye ubushakashatsi: NKURUNZIZA Aimable Telefoni: +250788221439

Amazina numukono byutanze amakuru _____

Itariki_____

Amazina numukono byushaka amakuru _____

Itariki_____

IGIKA CYA MBERE: IBIBAZO BIJYANYE NUMWIRONDORO

Iki gika kiragusaba gutanga umwirondoro wawe. Dufashe usubize ibisubizo uko byabugenewe

8. Igitsina 1.Gabo 2. Gore
9. Imyaka_____
10. Uburambe mubuforomo _____
11. Urwego rwamashuri 1. Icyiciro cya mbere cya kaminuza 2. Icyiciro cya kabiri cya akaminuza 3. Icyiciro cya gatatu cya kaminuza
12. Irangamimerere 1. Ingaragu 2. Urubatse 3. Mwaratanye 4. Umupfakazi

13. Idini 1. Umudive 2. Umuyisiramu 3. Umuporoso 4. Umukatorika 5. ibindi(Bivuge)----------
14. Icyo ushinzwe 1. Umuforomo usanzwe 2. Uyobora abaforomo 3. Ibindi(Bivuge) _____

IGIKA CYA KABIRI: Amoko yamakosa mugutanga imiti. Vuga amakosa waba warakoze igihe watangaga umuti kumwana urwaye. Shyira akamenyetso(×) imbere yigisubizo ushaka guhitamo :

1. Gutanga ingano yumuti itariyo ☐
2. Gutanga umuti igihe kitaricyo ☐
3. Gutanga umuti utariwo ☐
4. Gutanga umuti munzira itariyo ☐
5. Gutanga umuti inshuro zitarizo ☐
6. Kudatanga umuti ☐
7. Gutanga umuti utanditswe na muganga ☐

IGIKA CYA GATATU: Imapmvu zituma habaho amakosa mugutanga imiti. Vuga ukurikije imyumvire yawe impamvu habaho amakosa mugutanga umuti kumwana urwaye. Shyira akazeru kumubare uhisemo uteganye nimpamvu ukurikije ubusobanuro hejuru :

	Impamvu	**Ndabihakanuye cyane**	**Ndabihakanye biringaniye**	**Ndabihakanye gahoro**	**Ndabyemeye gahoro**	**Ndabyemeye biringaniye**	**Ndabyemeye cyane**
	Impamvu zuko imiti ifunze						
1	Amazinayimiti myinshi ajya gusa	1	2	3	4	5	6
2	Imiti imwe ijya gusa	1	2	3	4	5	6
3	Ibyo imiti ifunitsemo birasa	1	2	3	4	5	6
	Impamvu zitewe na muganga						

4	Imiti muganga yanditse ntiyumvikana	1	2	3	4	5	6
5	Imiti yanditse ntigaragara kubera umukono	1	2	3	4	5	6
6	Muganga ahindura imiti buri kanya	1	2	3	4	5	6
7	Muganga avuga imiti ntayandike	1	2	3	4	5	6
8	Abaganga na baforomo ntibumvikana	1	2	3	4	5	6
	Impamvu zabaforomo						
9	Abaforomo bahano bafite ubumenyi buke kumiti	1	2	3	4	5	6
10	Abaforomo bahura nibindi bibabangamira mugihe batanga imiti	1	2	3	4	5	6
11	Urwego rwamashuli ruri hasi	1	2	3	4	5	6
12	Ntibishoboka ko imiti yose yatangwa kubarwayi mugihe cyabugenewe	1	2	3	4	5	6
13	Ibikoresho bidakora neza	1	2	3	4	5	6
14	Abakozi ntibahabwa amakuru kumuti mushya bawubona bagiye kuwutanga	1	2	3	4	5	6
15	Umuforomo ntazi ingaruka zumuti zizwi.	1	2	3	4	5	6
16	Hari igihe abarwayi baba badahari	1	2	3	4	5	6
17	Abarwayi benshi baba kumiti isa cyangwa ijya gusa	1	2	3	4	5	6
	Impamvu kubuyobozi						
18	Hakoreshwa impine aho kwandika umuti birambuye	1	2	3	4	5	6
19	Abaforomo bake ugereranyije na abarwayi(akazi kenshi)						
20	Basimburanya imiti buri kanya	1	2	3	4	5	6
21	Abaforomo barahinduranywa cyane babajyana ahandi	1	2	3	4	5	6
	Impamvu kuri farumasi						
22	Farumasi itanga ingano yimiti idahagije	1	2	3	4	5	6
23	Farumasi ntitegura imiti neza	1	2	3	4	5	6
24	Farumasi ntiyandika kumiti neza	1	2	3	4	5	6
25	Abakora muri farumasi ntibaboneka amasaha 24	1	2	3	4	5	6
	Impamvu y'imyandikire y'imiti mw'ifishi						
26	Iyo itangwa ry'umuti kugihe bitabaye, abaforomo	1	2	3	4	5	6

	ntibavuga igihe undi uri butangirwe.						
27	Abaforomo bahano ntibakurikiza itangwa ryimiti uko ryabugenwe	1	2	3	4	5	6
28	Imiti ntiyandikwa neza mwifishi uko byabugenewe	1	2	3	4	5	6
29	Amakosa abera mwiyandikwa ry'imiti	1	2	3	4	5	6
30	Aha ntaburyo bworoshye bwo kubona amakuru kumiti buhari	1	2	3	4	5	6

IGIKA CYA KANE: Ibibangamira kwivuga igihe umaze gukora ikosa mugutanga umuti. Garagaza uburyo ubyemeramo ukurikije impamvu umuntu ativuga amaze gukora ikosa mugutanga umuti.

	Impamvu	**Ndabihakanye cyane**	**Ndabihakanye biringaniye**	**Ndabihakanye buhoro**	**Ndabyemeye gahoro**	**Ndabyemeye biringaniye**	**Ndabyemeye cyane**
	Impamvu mukutemeranywa ndetse nubusobanuro bwikosa						
1	Abaforomo ntibemeranwa nibitaro kubusobanuro bwikosa mugutanga umuti	1	2	3	4	5	6
2	Abaforomo ntibamenya igihe ikosa riba ryabereye	1	2	3	4	5	6
3	Kuzuza raporo yikosa ryabaye bisaba igihe kirekire	1	2	3	4	5	6
4	Gushaka muganga igihe ikosa ryabaye bisaba umwanya muremure	1	2	3	4	5	6
5	Ubusobanuro bwikosa ntibusobanutse	1	2	3	4	5	6
6	Abaforomo bashobora kutamenya ko ikosa rikwiye kuba ryavugwa kunzego zibakuriye igihe ryabaye	1	2	3	4	5	6
7	Abaforomo batekereza ko bagenzi babo babona ko badashoboye igihe bakoze ikosa mugutanga umuti	1	2	3	4	5	6
8	Gutekereza ko umuti uri butangwe uko wanditswe na	1	2	3	4	5	6

	muganga si ukuri.						
	Impamvu y'ubwoba						
9	Umurwayi cyangwa abomumuryango we bashobora kumerera nabi umuforomo cyangwa bakamujyana munkiko igihe avuze ko akoze ikosa mugutanga umuti.	1	2	3	4	5	6
10	Abaforomo batinyako muganga yabafata nabi igihe bakoze ikosa mugutanga umuti.	1	2	3	4	5	6
11	Abaforomo batinya ingaruka mbi zakurikiraho nyuma yo kuvuga ko bakoze ikosa mugutanga umuti.	1	2	3	4	5	6
12	Hibandwa kumakosa mugutanga umuti nkaho aricyo gipimo kibanze mugutanga ireme ry'ubuvuzi.	1	2	3	4	5	6
	Impamvu z'abayobozi						
13	Igisubizo kiva kubuyobozi bw'abaforomo ntikingana n'uburemere bw'ikosa.	1	2	3	4	5	6
14	Igihe habayeho ikosa mugutanga umuti abaforomo bashobora kubihanirwa igihe hari ikibaye ku murwayi giturutse mu gutanga umuti	1	2	3	4	5	6
15	Niyo watanga umuti neza ntushimirwa.	1	2	3	4	5	6
16	Niyo ikosa mu gutanga umuti ryabaho ubuyobozi bw'abaforomo bwibasira umuntu kugiti cye wabikoze aho kureba ibindi (imikorere, farumasi, muganga, ubuyobozi,…) byatera impamvu kubaho kw'ikosa.	1	2	3	4	5	6

CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL

Quality Health Care
Training & Research

Ethics Committee / Comité d'éthique

February 3rd, 2017 **Ref.: EC/CHUK/247/2016**

Review Approval Notice

Dear Nkurunziza Aimable,

Your research project: ***"Contributing Factors to Medication Administration Errors and Barriers to self-Reporting among nurses working in Pediatric units of Referral Hospitals in Rwanda."***

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 3/02/2017 to evaluate your protocol of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your protocol.

You are required to present the results of your study to CHUK Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

ETHICS COMMITTEE
CHUK

John Nyirigira
The Secretary, Ethics Committee,
University Teaching Hospital of Kigali

<<University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations>>.

B.P. :655 Kigali- RWANDA www.chk.rw Tél. Fax : 00 (250) 576638 E-mail :chuk.hospital@chukigali.rw

CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL

CENTRE HOSPITALIER UNIVERSITAIRE DE BUTARE (CHUB)
OFFICE OF DIRECTOR GENERAL

Huye, 06 MAR 2017
N° Ref: CHUB/DG/SA/03/398/2017

Aimable Nkurunziza
University of Rwanda
College of Medicine and Health Sciences
School of Nursing and Midwifery
Phone: +250788221439
Email: aimable2020@yahoo.fr

Dear Nkurunziza

Re: Your request for data collection

Reference made to your letter requesting for permission to collect the data within University Teaching Hospital of Butare, for your research proposal entitled "**Contributing factors to medication administration errors and barriers to self reporting among nurses working in pediatrics units of selected referral Hospital in Rwanda**", and based on approvals **Ref: CMHS/ IRB /087/2017** from University of Rwanda and No **RC/UTH/B/008/2017** from our research committee, we are pleased to inform you that your request was accepted. Please note that your final document will be submitted in our Research department.

Sincerely,

Dr. Augustin SENDEGEYA
Director General of CHUB

Cc:

- Medical Director
- Nursing Director
- Training and Research Manager

CHUB

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

Kigali, on 30 / 01 /2017

Ref. No: 62../ UR-CMHS/SoNM/17

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Re: Request to collect data

Referring to the above subject, I am requesting for permission for **NKURUNZIZA Aimable,** a final year student in the Masters of Science in Nursing at the University of Rwanda/College of Medicine and Health Science to collect data for his research dissertation entitled **"Contributing Factors To Medication Administration Errors And Barriers To Self-Reporting Among Nurses Working In Pediatric Units Of Selected Referral Hospitals In Rwanda".**

This exercise that is going to take a period of 2 months starting from 13th February 2017 to 12th April 2017 will be done at **University Teaching Hospital of Kigali, University Teaching Hospital of Butare and Rwanda Military Hospital.**

We are looking forward for your usual cooperation.

Sincerely,

Dr. Donatilla MUKAMANA, RN, PhD

Dean, School of Nursing and Midwifery

College of Medicine and Health Sciences

Email: schoolofnursingandmidwifery@ur.ac.rw, P.O.Box: 3286 Kigali-Rwanda, Website: www.ur.ac.rw

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 16/01/2017
Ref: CMHS/IRB/087/2017

NKURUNZIZA Aimable
School of Nursing and Midwifery, CMHS, UR

Dear NKURUNZIZA Aimable

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Contributing Factors To Medication Administration Errors And Barriers To Self-Reporting Among Nurses Working In Pediatric Units Of Selected Referral Hospitals In Rwanda."***.

Having reviewed your protocol and found it satisfying the ethical requirements, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Dr. JB Gakuba
IRB Vice-Chair

Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Aimable NKURUNZIZA** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 09/22/2016.

Certification Number: 2185440.