

**ASSESSING PRESCRIBING AND MEDICATION ADMINISTRATION
ERRORS IN THE MANAGEMENT OF ACUTE DIARRHEA AMONGST
PEDIATRIC INPATIENT AT REGIONAL REFERRAL HOSPITALS
IN DAR ES SALAAM, TANZANIA**

Anunsiatha Peter Mrema, BSW, RN

**Masters of Public Health Dissertation
Muhimbili University of Health and Allied Sciences
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**Muhimbili University of Health and Allied Sciences
School of Public Health and Social Sciences**



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By

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**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the
Degree Masters of Public Health**

**Muhimbili University of Health and Allied Sciences
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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: “**Assessing prescribing and medication administration error in the management of acute diarrhea amongst pediatric inpatient at regional referral hospitals in Dar es Salaam, Tanzania**” in (partial) fulfillment of the requirements for the degree of Masters of Public Health of Muhimbili University of Health and Allied Sciences.

Dr. Innocent A Semali

(Supervisor)

Date

DECLARATION AND COPYRIGHT

I, **Anunsiatha Peter Mrema**, I declare that this **dissertation** is my own original work and that it has not been presented and it will not be presented to any other University for the similar or any other degree award.

Signature.....

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DEDICATION

I dedicate this dissertation to my beloved brother Aristides Peter Mrema, My sister Stella Mrema, my parents Mr. and Mrs. Peter Lyacturu Mrema and my entire family for their love, patience, encouragement, Prayers and unwavering support during my studies. I also dedicate this dissertation to Pharm Access International staff for extra time and support they had given me during my study

ABSTRACT

Background

Acute diarrhea is a major public health problem especially in developing countries. It accounts for 700,000 death in children under five years of age worldwide making it the second leading cause of child mortality. Standard treatment guideline for diarrhea management is zinc supplement and ORS (Oral Rehydration Salt) which are regarded as universal treatment of acute watery diarrhea. There is dearth of information on the magnitude and type of medical error occurring in the course of implementing the standard management of diarrhea among children. Objectives to determine prescribing and medication administration errors in management of acute diarrhea among pediatric in patients in Regional Referral Hospitals Dar es Salaam, Tanzania.

Methods Facility-based cross-sectional study was conducted. Retrospective data from July 2017-July 2018 of 1200 prescribing and medication administration errors to pediatric inpatients was done. After approval of the institutional ethics committee, data was collected to get the following details of demographic characteristics: age, gender, weight, diagnosis, medication details that checked for medication errors in acute watery diarrhea such as wrong drugs, wrong frequency, wrong dose, duration not written, route of administration not written, no prescribers signature, omitted dose by comparing with National essential drug list, Standard treatment guideline and WHO pocket book for treatment of acute diarrhea. In the management of diarrhea, all these three guidelines recommend use of Oral Rehydration Solution (ORS) and zinc supplements for acute watery diarrhea (AWD).

Raw data was cleaned and coded then entered into EPIDATA software and analyzed using SPSS Version 22. Proportions were used to describe the basic characteristics of the study participants such as age and sex as well as the types and pattern of prescribing and medication errors. Bivariate analysis was conducted were Chi-test was used to test association between categorical variables. A p value of <0.05 was used to show statistical significance. Variables were included in the multivariate models if they were significantly associated with the outcomes in bivariate analyses ($P < 0.05$) or if they were believed to be mechanistically relevant (age and sex for prescription errors). Consequently, all variables were then used in

multivariate logistic regression analysis and adjusted odds ratios with 95% CI were used to assess the significance and strength of associations.

Results

Out of 1200 prescriptions reviewed during the study, the highest prescribing errors were wrong timing 53.92%, wrong dose 19.72%, and wrong drug 12.25%, and the most medication administration errors observed were omitted drugs, 62.25%, documentation errors 62.17%, and unauthorized drugs 5.42%.

Prescription error was 40% more likely among prescriptions of those one year and older compared to those younger than one year (AOR=1.41, 95% CI 1.08-1.83; p-value 0.01). Also prescription by medical officers and interns were significantly less likely to contain a prescription error (p-value <0.001). AWD with comorbidity 37% less likely to have prescription errors compared to AWD without comorbidity.

Compared to registered nurse administered prescriptions, an enrolled nurse administered prescription had about 40% was less likelihood to be found with an error (p-value<0.001). Also, administration for condition without comorbidity compared to comorbidity was less likely to be found with an administration error (p-value 0.01).

Conclusion

Prescribing and medication administration errors were a significant problem in pediatric inpatient setting in the selected hospitals. Of these errors; wrong timing, wrong dose, wrong frequency, omission, documentation errors and timing were the most common types of errors observed with high proportion. Zinc supplements and ORS prescription pattern in this study was lower than what is recommended by WHO diarrhea treatment guideline. There is a need to ensure that mechanisms are in place like those of continuous prescription and drug administration audits to monitor, improve the prescription habits of doctors, and administration habit to ensure doctors and nurses adhere to National and international standards in management of acute watery diarrhea.

Recommendation

Continuous medical education in relation to medication errors should be organized by the hospitals and other stakeholders.

Refresher training and mentorship to medical doctors on the importance of adhering to standard treatment guideline; it has been effective in reducing use of drugs for diarrhea diseases worldwide.

The government and hospital managers should ensure National guideline for the treatment of acute watery diarrhea is in place.

The magnitude of medication administration errors could significantly be reduced by giving in-service training to the nurses on the Safe administration of medications, sensitizing the nurses to adhere to the six rights of medication administration and fostering a culture of triple checking of medication before administration.

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ABBREVIATIONS/ACRONYMS

EDL	Essential Drug List
WHO	World Health Organization
SPSS	Statistical Package for Social Science
NCCMERP	National Coordinating Council of Medication Error Reporting and Prevention
MEs	Medication errors
MoHCDGEC	Ministry of health Community Development Gender Elderly and Children
UK	United Kingdom
USA	United State of America
INRUD	International Network for Rational Use of Drugs
ORS	Oral Rehydration Salt
IMCI	Integrated Management of child Illnesses.
CI	Confidence Interval
ADE	Adverse Drug Event.
HIV	Human Immune Deficiency Virus
AWD	Acute watery diarrhea.
TFDA	Tanzania food and drug authority
GI	Gastrointestinal

DEFINITION OF TERMS

Pediatric Age less than 15 years old.

Medication administration error (MAE) A medication error that occurs while administering a medicine to a patient.

Wrong dose Administration Medication dose administered different from standards.

Acute Watery Diarrhea Passage of three or more loose stool within 24 hours and can last several hours to seven days.

Medication errors Medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) as 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 professionals, patients or consumer.

Microbiota the complex community of microorganisms inhabiting the human gastrointestinal tract.

Prescribing errors prescribing errors may be defined as the incorrect selection of drug regimen for a patients. Such errors may include dose, indication, or prescribing of a contraindicated drug, or an incorrect with inappropriate drug selection (based on indications, contraindications and other factors), dose, route, rate of administration frequency. A prescription error includes illegible hand writing, an incomplete order (missing the dose, route, or frequency) incompatibility, incorrect instructions for using the drug product and the use of non-standard nomenclature of abbreviations that requires further interpretation.

Polypharmacy Is a concurrent use of multiple medications by patients.

Rational use of drugs Require that patients receive medicines appropriate to their clinical needs, a dose that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.

Wrong frequency Implies drugs prescribed with a frequency greater or less than what is recommended.

Wrong dose Implies the dose ordered by physician was higher or lower than what is recommended to provide therapeutic effect.

Wrong route Implies that the medication was prescribed to be given in a route other than the one recommended.

Wrong indication Implies the presence of incorrect indication and contraindications which were not noted by the prescribing physician.

Timing error Administration of medication 1 hour earlier or later than what was prescribed.

Omitted drug error Failure to administer the prescribed medication to patient.

Prescription Is an instruction written by a medical practitioner that authorizes a patient to be issued with medicine or treatment. Each medicine needs its own prescriptions, for example if a patient with respiratory tract infection is prescribed with paracetamol or amoxicillin this counts for two prescriptions.

Types of medication errors

There is no universal classification for different types of medication errors. However, it is common to classify based on psychological approach, the stage at which error occur during medication use. Numerous types of medication errors occur. For research purposes, the errors are subdivided and classified in different ways however the classification is not universal.

Prescribing pattern

Is the way medicines are ordered by doctors when treating or managing children with acute watery diarrhea.

Medication administration pattern

Is the way the prescribed medicine are given to children with acute watery diarrhea.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Acute diarrhea is a major public health problem especially in developing countries. It accounts for 700,000 death in children under five years of age worldwide making it the second leading cause of child mortality (1). The highest rates of child mortality due to diarrhea are in Sub-Saharan Africa and Southeast Asia. An estimated 1.7 billion episodes of diarrhea, of which is equal to 2.9 episodes per child per year, thus, creating health system costs of about 7 billion US dollars (2). It has been reported that approximately nine percent of death in children under five years of age in Tanzania are caused by diarrhea (1).

Diarrhea is associated with unhygienic environment, lack of safe drinking water and poverty. The most dangerous complication of diarrhea is dehydration that occurs when there is excessive loss of fluid and minerals (electrolytes from the body). Nonetheless, when diarrhea is accompanied with vomiting the dehydration becomes more severe and it is most dangerous in infants and under five aged children (3).

Medication errors is an incidence which can exacerbate the impact of diarrhea especially when using antibiotics for the management of acute diarrhea. Inappropriate use of antibiotic may disrupt the gastrointestinal microbiota by causing a sharp reduction in the abundance and diversity of organisms. The normal pathogens (microbiota) in the gastro intestinal (GI) are responsible for the development of immune system and may protect against diarrhea by occupying intestinal mucosal sites and inhibiting the attachment and growth of pathogens (4).

The most important cause of diarrhea in developing countries is rotavirus, *E. coli*, *S. Shigella*, *Campylobacter*, *Yersinia*, *Vibrio* and *C146lostridium difficile* (5). However, rotavirus is reported to be the commonest cause of severe and fatal diarrhea in young children worldwide (1).

In the management of acute watery diarrhea (AWD), international organization including world health organization (WHO) recommends the use of zinc and oral rehydration salt (ORS) in the management of diarrheas caused by rotavirus as this has been proven to decrease diarrhea deaths (6). Tanzania adopted the same guideline and recommend the use of zinc supplement and Oral Rehydration Salt (ORS) in treatment of acute diarrhea which are regarded as universal treatment (7). Therefore the study aims to determine the proportion of medication prescribing and administration errors in the treatment of acute watery diarrhea amongst pediatric in patients.

Types of medication errors

Medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) as 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 professionals, patients or consumer (8).

Medication errors are a significant global concern and can cause serious medical consequences for patients. Medicine can cure diseases but also can cause harmful adverse events if not properly used or wrongly prescribed (9). Errors of medication use are among the most common types of medication errors and include mistakes of prescribing, dispensing, administering or monitoring medication. Medication errors produce a variety of problems for patients ranging from minor discomfort to substantial morbidity that may prolong hospitalization or lead to death (10). Drug errors associated with morbidity and mortality increases inpatients health care cost by an estimate of \$4700 per hospital admission. In addition, time spent by the health care team tracking errors such as missed doses can have an effect on time available for direct patient care (10).

Prescribing errors

Prescribing errors may be defined as the incorrect drug selection for a patient. Such errors can include the dose, quantity, indication, or prescribing of the contraindicated drug. Lack of knowledge of the prescribed drug, its recommended dose, and of the patient details contribute to prescribing errors. Other contributing factors include, illegible handwriting, inaccurate

medication history taking, confusion with the drug name, inappropriate use of decimal points (11).

Dispensing errors

Dispensing errors occur at any stage of the dispensing process, from the receipt of the prescription in the pharmacy to the supply of a dispensed medicine to the patient. Potential dispensing errors includes wrong dose, wrong drug, or wrong patient and the use of computerized labelling has led to transportation and typing errors which are among the most common causes of dispensing error (11).

Administration errors

Administration errors occur when a discrepancy occurs between the drug received by the patient and the drug therapy intended by the prescriber. Drug administration has long been associated with one of the highest risk areas in nursing practice, with the five rights (giving the right dose of the right drug to the right patient at the right time by the right route) being the cornerstone of nursing education. Drug administration errors largely involve errors of omission where the drug is not administered for a variety of reasons. Other types of drug administration technique and the administration of incorrect or expired preparations (11).

Medication errors are significant global concern and associated with serious medical consequences for patients. Medicine can cure diseases but also can cause harmful adverse events if not properly used or wrongly prescribed (9). Errors of medication use are among the most common types of medication errors and include mistakes of prescribing, dispensing, administering or monitoring medication. Preventing the occurrence of ME may be critical in optimizing therapy for children with acute diarrhea. There is dearth of information on the magnitude and type of medical error occurring in the course of implementing the standard management of diarrhea among children.

Therefore this study aims to find out the extent of medication errors that occur in the treatment of acute diarrhea despite of availability of guidelines.

1.2 Problem statement

Burden of disease due to diarrhea among children less than five is high accounting for more than 700,000 deaths annually which is about 5.5% deaths in that age group. In Tanzania, diarrhea ranks number three to overall causes of child mortality and responsible of 30% - 50% of all hospitalized children (12). Response to the high burden due to diarrhea include development and adaption of both preventive and curative strategies. Global curative strategies to minimize morbidity and mortality includes management using acute diarrhea Zinc, ORS and other medication (WHO). Locally it is guided by the Tanzania National Standard treatment guideline, National Essential Medicine List, WHO pocket book of hospital care and Integrated Management of Children Illness (IMCI). Whereas success of curative strategies relies on compliance and professional diligence, minimizing possible medication errors is of paramount importance.

That notwithstanding there is dearth of information on the magnitude and type of medical error occurring in the course of implementing the standard management of diarrhea among children. Thus there is a need of answering the question what is the magnitude and type of medical error in the management of acute diarrhea among children. Medication errors would vary a lot depending on the practice, the impact of medication errors including but not limited to adverse drug reaction, increased morbidity, mortality, increased length of hospital stays and high medical expenses thus escalating the burden of diarrhea and consequently a need of appropriate response. Medication errors could be contributed by many factors such as patient's type of illness, health care provider, guardian, number of health workers, and number of patients and timing of the day. Therefore this study aimed to determine prescribing and medication administration errors in treatment of inpatients children with acute diarrhea.

1.3 The rationale of this study

The ratio between healthcare providers and patients in a developing country like Tanzania is very high. Clinicians are usually overwhelmed by patients, therefore quality of services provided tends to decrease with minimum doctor patients time, lack of equipment and low salary further diminishes work moral hence all the mentioned factors may lead to development of medication error in our clinical setting. Therefore, the findings from this study will establish medication errors among pediatric patients with acute diarrhea. Equally information from this study will add new knowledge to the medical practitioner on the importance of adhering to the treatment guidelines. Likewise, information can be used by Ministry of Health, program managers, stakeholders and policy makers in planning of corrective measurements for improving medication safety and quality, patient's outcome, adverse drug events and quality of hospital services.

1.4 Research questions

1. What is the proportion of medication prescribing and administration errors in the management of acute diarrhea amongst pediatric inpatients in the Public regional referral Hospitals in Dar es Salaam?
2. What is the prescribing and administration pattern of medication errors in management of acute diarrhea in pediatric inpatients in Public regional referral Hospitals in Dar es Salaam?
3. What are the types of prescribing and medication administration errors in the management of acute diarrhea among pediatric inpatients in Public regional referral Hospitals in Dar es Salaam?

1.5 Objectives

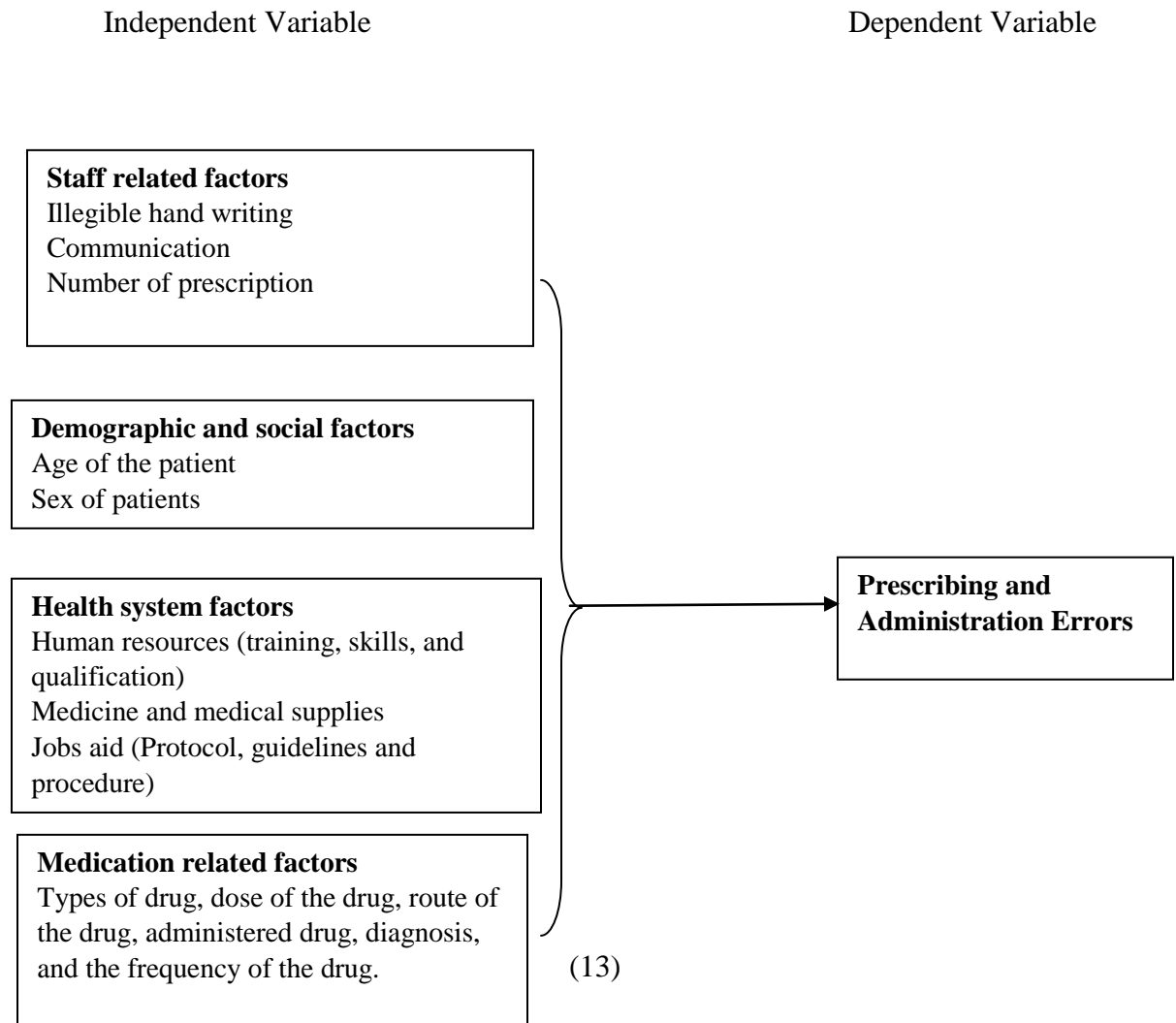
1.5.1 Broad Objective

Assessing prescribing and medication administration errors in the management of acute diarrhea amongst pediatric inpatients in public regional referral hospitals in Dar es Salaam region.

1.5.2 Specific objectives

1. To determine the proportion of prescribing and medication administration errors among practitioners in the management of acute diarrhea in pediatric inpatients in the Public regional referral Hospitals in Dar es salaam.
2. To determine the prescribing pattern of prescribing and medication administration errors in management of acute diarrhea in pediatric inpatients in Public regional referral Hospitals in Dar es Salaam.
3. To identify the types of prescribing and medication administration errors in the management of acute diarrhea among pediatric inpatients in Public regional referral Hospitals in Dar es Salaam.

1.6 Conceptual Framework



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of medication errors

Medication error is defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) as 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 professionals, patients or consumer (8). Such events may be related to professional practice, healthcare product, procedures and systems including prescribing, order communication, product labelling, packaging and nomenclature, compounding, dispensing, distribution, administration, education and monitoring use (14). Medication errors should be given priority as an urgent, critical and significant public health problem. Because many people die from medical errors than motor vehicle accidents, breast cancer, or HIV but unfortunately these statistics never become an appropriate figure in public media or deliberations (15).

Institute of Medicine report estimated that 44,000 to 98,000 people die each year in the United State as a result of medication error (16). In a one week study it was also observed that the number of pharmacist interventions (most of which related to prescribing errors) was higher in pediatric ward than in geriatric medical or surgical ward (17). A study conducted in Gauteng, South Africa , on identifying medication errors in the neonatal intensive care unit and pediatric ward reported that, a total of 663 medication errors were detected among 227 patients over a period of 16 weeks of which 177 (78%) patients had one or more errors, 338 (51%) were administration errors and 309 (47%) prescribing errors, incorrect dosing were the most frequent type of error (34%), followed by omission of medication (18.5%) and medication given at the incorrect time (12%) and (67%) of this errors resulted in no harm to the patients while (33%) resulted in some level of harm (18).

Abebe Zeleke et, al (2014). conducted a study on medication prescribing errors and associated factors at the pediatric ward in Northeast Ethiopia and the study reported that, among the 384 medication orders a total of 223 prescribing errors were identified. Incomplete prescriptions and dosing errors were the most prevalent error types which accounted for 54.26% and 31.39% respectively (19). In Tanzania for pediatric inpatients very little information is known on the extent of medication errors among pediatric inpatient with acute diarrhea.

Among the reasons include poor communication which can have devastating consequences in the health care environments. It has been estimated that 75% of transcription errors are a result of distractions. Communication was a leading cause of sentinel events in 2010 and among the top 3 causes over the past several years according to the Joint Commission. Approximately 60% of sentinel events list communication as a root cause. In terms of medication errors communication was listed one of the root causes approximately 70% of sentinel events reported between 2004 through third quarter 2010 (20). There is little research that has been conducted on addressing the problem of medication errors in pediatric in patient settings especially in Tanzania. Reliable detection of medication errors requires cooperation and engagement of the staff, which depends in large measure on reducing suspicious and fear of reporting, Likewise it requires intensive, comprehensive, and active ward-based data collection (21).

A study conducted at Botswana (2015) on the role of nursing education in preventing medication errors reported that well -coordinated communication across disciplines at each step is critical for safe medication management, any communication gap in the chain of medication decision or handling will therefore increase the risk of medication error. Similarly, failure of communication between any two people who are responsible for prescribing, dispensing, or administering medication will increase the risk of error. For instance, if a nurse who hands over to another at the end of a shift gives medication and fails to document, the incoming nurse may repeat the medication and overdose the patient. The risk of medication errors has been associated with failure to provide all necessary information when transferring patients across units as well as failure to share information about changes in the medication

charts (22). Clear communication should be provided to patients as they need appropriate information about their medications.

Medication administration error (MAE) is defined as any differences between what patient received or was supposed to receive and what the prescriber intended in the original order.

A recent study revealed that MAEs is common and this occurs in 50% of all medication administration in hospital (23). In another study to determine the incidence and nature of prescribing and medication administration errors in pediatric inpatients by prospective review of drug charts to identify prescribing errors and prospective observation of nurses preparing and administering drug to identify medication administration errors has found that 391 prescribing errors were revealed, giving an overall prescribing error rate of 13.2% of medication orders. Incomplete prescriptions were the most common type of prescribing error, and dosing errors the third most common 429 medication administration errors were identified, giving an overall incidence of 19.1% erroneous administrations. Errors in drug preparation were the most common, followed by incorrect rates of intravenous administration (24).

Another study done by Prot et al, 2005 on drug administration errors and their determinants in pediatric inpatients using prospective direct observation study, has found that 538 administration errors involving timing (36%), route (19%), dosage (15%), unordered drug form (10%), errors from 1719 observed administrations to 336 patients by 485 nurses. A study conducted in Ethiopia on the magnitude of medication administration error and associated factors among nurses reported that the incidence of MAE was 199 (56.4%), the majority (87.5%) of the medications have documentation error, followed by technique errors, 363 (73.1%) and time error 193 (53.6%) (25).

2.2 Patterns of Medication Errors

A number of studies on medication prescribing pattern in various acute and chronic illness including pediatric diarrhea are commonly reported. The studies conducted in many countries on medication prescribing patterns reported that the highest type of medication errors occurred when the medication is delivered to the wrong patients, wrong dosage, wrong frequency, and drug omission and changing of the drugs. This observation is supported by the study done in Jordan about 26.2% of the total medication errors were due to medication delivered to the wrong patients, 22.2% were due to wrong dosage (26). Another study conducted in Ethiopia reported that incomplete prescriptions, wrong dose, wrong dosage form and wrong frequency were the commonest types of medication prescribing errors (19).

A study conducted by S.Sontakke, et al (2016), on medication prescribing pattern in pediatric diarrhea unit focusing on zinc supplements found that zinc supplements were prescribed in only 27 patients (13.5) out of 200 (27). Another study conducted by members of the International Network for Rational Use of Drugs (INRUD) document health workers practice of polypharmacy and peoples use of drugs inappropriately. A study conducted in Indonesia found that an average number of drugs used to treat illnesses presented to the health workers was both for children under 5 years and for the 5 years and above age group. Patients seemed to receive a similar mix of vitamins, analgesics and antibiotics irrespective of their disorders (28).

It is also observed in Southern Ethiopia in four hospitals on evaluation of trends of drug prescribing patterns based on WHO prescribing indicators reported that the percentage of use of antibiotics and injections ranges from 46.7 to 85 and 15 to 61.7, respectively. In terms of polypharmacy, there was a slight deviation in prescribing patterns from what is acceptable according to the WHO criteria. Prescribing by generic name and from essential drug list was almost optimal. There was a significant deviation in the use of injectable in two of the hospitals, (50%), where as their use in the other two hospitals was within the acceptable range (29).

Polypharmacy and other forms of inappropriate forms of prescribing could be extremely harmful in children because of their physiological peculiarities.

2.3 Prescribing errors

Prescribing errors may be defined as the incorrect selection of drug regimen for a patient. Such errors may include dose, indication, or prescribing of a contraindicated drug. Lack of knowledge of the prescribed drug, in terms of its recommended dose, clinical use, and of the details of the patients clinical condition commonly contribute to prescription errors (29). Inappropriate use of drugs can lead to reduction in the quality of drug therapy leading to increased morbidity and mortality, waste of resources leading to reduced availability of other vital drugs and increase cost, increased risk of unwanted effects such as adverse drug reactions and emergency drug resistance. Polypharmacy is one of the example of the irrational use of drugs (12).

A study conducted in India on medication prescribing pattern in pediatric diarrhea with focus on zinc supplements reported that, 184 (92%) out of 200 patients were prescribed ORS. Sixty-four percent of the prescriptions contain antimicrobials. Cotrimoxazole was the most frequently prescribed antimicrobial (57.81%) no fixed dose combination of antimicrobials was prescribed (27).

A cross sectional study conducted in Moshi Municipal, Northern Tanzania on antibiotics prescription practice in management of diarrhea reported that antibiotics were prescribed to 326 (84.9%) of all children who attended the hospital inappropriate prescription based on symptoms, antibiotics prescription was significantly more likely inappropriate for nausea/vomiting and watery diarrhea (30).

A study conducted by Judith et al (2012) on antibiotics prescribing practices in management of diarrhea reported that inappropriate antibiotic prescription was significantly associated with prescriber being a clinical officer and assistant medical officers (30). An observational study conducted in Karachi by Nizami et al (2017) reported that the proportion of antibacterial

prescribed for childhood diarrhea by pediatricians was lesser compared to the prescription of similar agents done by the general practitioners (31).

Factors affecting medication incidents includes day of the weekend, nighttime and length of stay. Duration of stay, days of the week and nighttime are the contributing factors for medication errors among inpatient, it is possible that this is due to fewer and less experienced clinicians during this period. Therefore increasing problem to occur, incidence rates have been shown to increase during weekend shifts compared with week day shift (33). This is supported by the study done by Millen (2010), on association between Nighttime and weekend medication errors rates among inpatient pediatric population and they found that during daytime nursing shifts was 1.17 errors per 1000 doses dispensed versus 2.12 errors per 1000 doses dispensed for nighttime nursing shifts and during weekday versus weekend were 1.9 errors per 1000 weekdays doses versus 2.55 errors per 1000 doses respectively (33).

As study conducted by Danielle M Olds et al (2011) on the effect of work hours and adverse events and Errors in health care University of Toronto the results suggest that nurses working more than 40 hours per week were 28% more likely to report that patients occasionally /frequently received the wrong medication or dose, likewise voluntary unpaid overtime increases the risk of both medication errors and Adverse Events (33).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

Cross sectional study was conducted to review hospital records for children admitted with acute watery diarrhea to assess the prescribing and administration error from July 2017 to July 2018. The study was done at inpatient because is where all the treatment plan according to the degree of dehydration for AWD will be found.

3.2 Study Area

The study was conducted in Dar es Salaam which is the largest city and commercial Centre in Tanzania, it covers a total area 1397 square kilometer based on 2012 National census, and the projected population of the city were 4,364,541. For 2000-2012 the regions 5.6% average annual population growth rates was the highest in the country. The region had 616 health facilities of which 2 are National Hospitals, 38 are hospitals 58 health center and 436 are dispensaries. Public or government hospitals are Muhimbili National hospital, and three are Ocean Road Cancer Institute, regional referral hospitals, namely Mwananyamala, Amana, and Temeke hospital.

The study was conducted in three Public Municipal Hospitals in Dar es Salaam because they represent the three regional referral hospitals but also they carry the biggest chunk of attendees in public facilities hence represent real life situation of health care facility in Tanzania.

3.3 Study population

The study included 1200 prescriptions and nurses drug administration forms for acute watery diarrhea among children admitted between July 2017 to July 2018 in pediatric ward at three Public Regional Referral Hospital Dar es Salaam.

3.4 Inclusion criteria

Prescriptions and nurses drug administration forms for pediatric in- patients with provisional diagnosis of AWD for the past one year was included irrespective of other comorbid conditions.

3.5 Exclusion criteria

All prescriptions of a child with chronic diarrhea, dysentery, cholera and those prescriptions with no body weight was excluded.

3.6 Sampling technique and sample size determination

Sample descriptions. To determine the number of medication records to be reviewed in assessing medication errors, single population proportion formula was used (34).

It was assumed that the proportion of medication charts with medication errors in the pediatric inpatient will be 68% taken from study by (Of et al 2016), sampling error (Marginal error) to be 5% and with 95% confidence interval.

$$N = Z^2 p (100-P)/e^2$$

Where

N=the number of medical records of pediatric inpatient to be sampled (sample size).

Z= Z score at 95% CI

P= Proportion of medication errors 68%.

E= Margin of error/sampling error.

Based on this the sample size was

$$N = Z^2 p (100-P)/e^2$$

$$N = 1.96 \times 1.96 \times 0.68 (1-0.68) / 0.05 \times 0.05$$

$$N = 334.37$$

Assuming 10% non-response, response rates (RR) is 90%

Therefore adjusted sample size was $N/RR = 334.37/0.9 = 372$

$N = 372$ round off to 400 in each facility. Since we plan to study three municipal hospitals therefore the sample size was 1200.

3.7 Sampling frame and sampling technique

Dar es Salaam region has three referral hospitals now serving as regional referral hospitals, all three were included in the study. In each hospital all admissions and diagnosis at admission for the period of one year from the month of study was listed down. All those with diarrhea was listed down and their records was retrieved arranged by month of admission and given a serial number starting with the earliest. Then using systematic random sampling the required number per health facility was picked and included in the study. Thus, all files of children admitted in the ward during data collection period who meet the inclusion criteria was enrolled in the study until the sample size reached.

3.8 Measurement of variables

3.8.1 Prescribing Error and medication administration errors.

3.8.1.1 Independent variables

Information on independent variables collected included age, sex of the patient. Others included diagnosis, type of medication ordered and administered, dosages of the medication its frequency and duration. Information was also collected on polypharmacy (Five or more concurrent regular medications per patient), legibility of handwriting, prescribers qualifications and route of administration. Others was whether administered drug was checked against prescribed drug and dose, expected administration time and also if there was administration of unauthorized drugs.

3.8.1 2 Dependent variables

Prescribing errors and medication administration errors

General process of identifying medication errors

Medication errors, is defined as errors in drug ordering, transcribing, dispensing, administration or monitoring.

Identification of prescribing and medication administration error

Trained research assistants retrieved records of all pediatric patients admitted in the past one year from the date of data collection. All records of those admitted with acute diarrhea was included in the study. The trained research assistant each independently review the patient's source records for medication error. The source records included was prescription, laboratory records, charts and administrative data to detect a medication error.

3.9.1 Data Collection Techniques and Tools

Trained research assistants retrieve records of all pediatric patients admitted in the past one year from the date of data collection. All records of those admitted with acute diarrhea was included in the study. The trained research assistant independently review the patient's source records for medication error. The source records include prescription, laboratory records, charts and administrative data to detect a medication error.

Data abstraction form was used to abstract data from source records that was used to asses prescribing error and medication administration error. All abstracted and gathered data were checked for medication errors in acute watery diarrhea. Reviewers' decision was guided by the National essential drug list, Standard treatment guideline and WHO pocket book for treatment of acute diarrhea. Responses were recorded on the form and then checked for last verification by pediatrician and principal investigator the data were coded entered and analyzed using SPSS version 22.

3.9.2 Pretest

Pre-test was done prior to the actual data collection in one of the health Centre which was not included in the study. (20 medical records review) were done, cross check of the data collection forms for completeness, data collection tool was modified based on the findings from the pre-test.

Research assistant were trained on their responsibilities for describing the purpose of the study methodology and research ethics.

3.9.3 Recruitment and training of the research assistant

Two registered nurses working at National Hospital at diarrhea and malnutrition unit were recruited because of their background and experience and they were trained for one day on how to record patients details as they appear in the prescription while in the field and the code was assigned. Data collectors were trained together to ensure consistency in results and they were allowed to work together at one or two pre-test sites. This was an important step which provide an opportunity to identify and solve unforeseen problems. Finally the pilot testing allows study planner to make realistic estimate of the time required for collecting data at each study sites.

3.9.4 Data Analysis

Raw data was cleaned and coded then entered into EPIDATA software and analyzed using SPSS Version 22. Proportions were used to describe the basic characteristics of the study participants such as age and sex as well as the types and pattern of prescribing and medication errors. Bivariate analysis was conducted were Chi-test was used to test association between categorical variables. A p value of <0.05 was used to show statistical significance. Variables were included in the multivariate models if they were significantly associated with the outcomes in bivariate analyses ($P < 0.05$) or if they were believed to be mechanistically relevant (age and sex for prescription errors). Consequently, all variables were then used in multivariate logistic regression analysis and adjusted odds ratios with 95% CI were used to assess the significance and strength of associations.

3.8.5 Validity and Reliability

The tool which was used addresses the questions in this study, hence if by any time will be used in the same scenario will bring the same results. Similarly the tool was used in another study by Hamrawit (2013) and it brings the same results.

3.9 Ethical consideration

Approval to carry out the study was sought and granted by the Muhimbili University of health and allied science Ethical Review Committee. Official letters was written to the selected hospitals and permission was obtained before conducting the data collection. . To ensure confidentiality of the participant's responses, no names was collected on the data abstraction forms.

3.10 Results Dissemination

The research finding will be disseminated to MUHAS, MoHCDGEC, RMO Kinondoni Municipality, RMO Temeke Municipal, RMO Ilala Municipal, Facility In –charge of all facilities which will be included in the study, Globally for everyone to read the information as manuscript and directorate of post graduate MUHAS.

CHAPTER FOUR

4.0 RESULTS

4.1 Sociodemographic characteristics of paediatric inpatient with acute watery diarrhea.

The study included 1200 prescriptions for acute watery diarrhea among children whom 601 (50.08%) were for children below the age of one year; 559 (49.92%) were above one year and 810 (67.5%) were males and 390 (32.5%) were female (Table 1). The number of prescriptions of a patients admitted with acute watery diarrhea with no commorbid were 214 (17.83%) and those with acute watery diarrhea with co morbid were 986 (82.16%).

Like wise the majority of prescriptions were done by interns 964 (80.30%) followed by medical officers 125 (10.42%), assistant medical officer had 37 (3.08%) and least was among specialist 36 (3.00%), Prescriptions which were not signed were 38 (3.17% Administration was done by enrolled nurses 175 (14.58) followed by medical attendants 154 (12.83) and registered nurses 99 (8.25%) (Table 1).

Table 1: Sociodemographic characteristics of inpatients admitted with acute watery diarrhea N=1200

Characteristics child	N (1200)
Sex	
Male	810 (67.5%)
Female	390 (32.5%)
Age group in years	
< 1	601 (50.08%)
1+	599 (49.92%)
Qualifications of prescribers	
Specialist	36 (3%)
Medical Officer	125 (10.42%)
Assistant medical officer	37 (3.08%)
Intern	964 (80.30%)
Qualification not documented	38 (3.17%)
Cadre of Administrator	
Registered nurse	99 (8.25%)
Enrolled nurse	175 (14.58%)
Medical attendant	154 (12.83%)
Administered not signed	772 (64.33%)
Diagnosis	
AWD with comorbid	986 (82.16%)
AWD without comorbid	214 (17.83%)

4.2 Prescribing errors in management of acute watery diarrhea

Table 2 presents the type of prescription errors encountered the highest was wrong timing accounting for 53.92%, followed by wrong dose (19.72%) and least (12.25%) was wrong drug.

Table 2: Prescribing errors in management of acute watery diarrhea among pediatric inpatients.

Prescribing errors	Frequency(N)	Percent (%)
Wrong time	647	53.92
Wrong dose	337	19.72%
Wrong route	228	19.00%
Wrong duration	170	14.17%
Wrong frequency	147	12.25%
Wrong drug	147	12.25%
*Others	53	4.41%

*Pollypharmacy and Illegible hand witting

Table 3 below shows that males were less likely to have prescription errors (71.85% compared to female (77.95%) p value 0.02). Also those who were one year of older had higher error (76.96%) compared to (70.72%) among younger one, p value 0.01. Significant difference was also observed between those with comorbidity and those (72.27% vs (81.31); p value (0.01), prescribers' qualifications associated with prescription errors, medical officers and interns less likely to have prescription errors (p value <0.001)

Table 3: Association between prescription errors and sociodemographic of participants and other characteristics (N=1200)

Characteristics	Prescription error		X ²	P value
	Yes	No		
Sex				
Male	582 (71.85)	228 (28.15)	5.07	0.02
Female	304 (77.95)	86 (22.05)		
Age group in years				
< 1	425 (70.72)	176 (29.28)	6.06	0.01
1+	461 (76.96)	138 (23.04)		
Qualifications of prescribers				
Specialist	33 (91.76)	3 (8.33)	22.11	<0.001
Medical Officer	85 (68.00)	40 (32.00)		
Assistant medical officer	33 (89.19)	4 (10.81)		
Intern	699(72.51)	265 (27.49)		
Qualification not documented	36 (94.74)	2 (5.26)		
Diagnosis				
AWD with comorbid	712 (72.27)	274 (27.79)	7.53	0.01
AWD with no comorbid	174 (81.31)	40 (18.69)		

4.3 Medication administration errors

Medication errors observed the highest was ommited drug (62.25%), followed by documentation error (62.17%) and least (5.42%) was unauthorized drugs (Table 4).

Table 4: Medication administration errors

Administration errors	Frequency(N)	Percent (%)
Ommited error	747	62.25%
Documentation error	746	62.17%
Time error	722	60.17%
Unauthorized drugs	65	5.42%
*Others	33	2.75%

*Incorrect dose and Route error

Table 5 below shows that there was no difference in administration errors between males and females, male errors were 571(70.49%) and female 266 (68.21), less likely P value 0.42. Also No difference in administration errors between age groups because < 1 it was observed that 419 (69.72) and +1 418 (69.78) P.value 0.98..

Significant difference was observed in the differecne between administers p-value < 0.001 and whether patient had comorbidity or not p-value < 0.001 .

Table 5: Association between administration errors and sociodemographic of participant and other characteristics (N=1200)

Characteristics	Administration error		X ²	P value
	Yes	No		
Sex				
Male	571 (70.49)	239 (29.51)	0.65	0.42
Female	266 (68.21)	124 (31.79)		
Age group in years				
< 1	419 (69.72)	182 (30.28)	0.001	0.98
>1+	418 (69.78)	181 (30.22)		
Qualifications of administrators				
Registered nurses	38 (38.38)	61 (61.62)		
Enrolled nurses	46 (26.29)	129 (73.71)	395.48	<0.0001
Medical attendants	65 (42.21)	89 (57.79)		
Administer not documented	688 (89.12)	84 (10.88)		
Diagnosis				
AWD with comorbid	666 (67.55)	320 (32.45)	12.73	<0.001
AWD with no comorbid	171 (79.91)	43 (20.09)		

4.4 Prescribing pattern on management of acute watery diarrhea

Most prescribed drugs were antibiotics 373 (37.09%) followed by Minerals/pedzinc 258 (21.50%), Oral rehydration solution 257 (21.42%), Fluids 112 (9.33%), Ant- hematics 100 (8.33%) Ant-pyretics 80 (6.67%), Ant – malaria 8 (0.67%), Bronchiodilator 7 (0.58%), Multivitamin 2 (0.16%) and Ant-convulsant 1 (0.08%) (Table 6)

Table 6: Prescribed medication in pediatric inpatients

Drug Category	Number of drugs	Total percent (%)
Antibiotics	373	37.09%
Minerals (Pedzinc)	258	21.50%
Oral rehydration solution (ORS)	257	21.42%
Fluids	112	9.33%
Ant- hematics	100	8.33%
Ant- pyretics	80	6.67%
Anti –malaria	8	0.67%
Brochiodilator	7	0.58%
Ant – emetics	2	0.17%
Multivitamin	2	0.16%
Ant- Convulsant	1	0.08%

Number of drugs per prescription

Table 7 presents the number of drugs per prescription, the commonest (36.30%) number of drugs per prescription was two, followed by six (31.41%) and least was (0.93%).

Table 7: Number of drugs per prescription (N=1200).

Prescription containing number of drugs	Number of drugs	Percent (%)
Two	436	36.30%
Three	14	0.93%
Four	65	5.41%
Five	163	13.58%
Six	377	31.41%
Seven	54	4.50%
Eight	42	3.50%
Nine	49	4.08%
Total	1200	100%

4.5 Multivariate analysis

Prescription error was 40% more likely among prescriptions of those one year and older compared to less (AOR=1.41, 95% CI 1.08-1.83; p-value 0.01). Also prescription by medical officers and interns were significantly less likely to contain a prescription error (p-value <0.001). AWD with comorbidity 37% less likely to have PE compared to AWD without comorbidity. Rest did not reveal a significant difference.

Table 8: Multivariate results for factors associated with prescription errors

Characteristics	Proportion with PE	AOR (95% CI)	P value
Sex			
Female	77.95	1.00	
Male	71.85	0.76 (0.56, 1.01)	0.06
Age			
<1	70.72	1.00	
1+	76.96	1.41 (1.08, 1.83)	0.01
Prescriber's qualification			
Specialist	91.67	1.00	
Medical Officer	68.00	0.22 (0.06, 0.77)	<0.001
Assistant Medical Officer	89.19	0.65 (0.13, 3.16)	0.88
Intern	72.51	0.27 (0.08, 0.89)	<0.001
Not documented	94.74	2.10 (0.33, 13.49)	0.40
Diagnosis			
AWD without comorbidity	81.31	1.00	
AWD with comorbidity	72.21	0.63 (0.43, 0.92)	0.02

Table 9 present Summary of multivariate results multivariate analysis, of administration errors. Compare to registered nurse administered prescription, an enrolled nurse administered prescription had about 40% was less likelihood to be found with an error (p-value<0.001). Also administration for condition without comorbidity compared to comorbidity was less likely to be found with an administration error (p-value 0.01).

Table 9: Multivariate results for factors associated with administration errors

Characteristics	Proportion with PE	AOR (95% CI)	P value
Sex			
Female	68.21	1.00	
Male	70.49	1.05 (0.76, 1.45)	0.78
Age			
<1	69.72	1.00	
1+	69.78	0.75 (0.55, 1.02)	0.07
Administrator's qualification			
RN	38.38	1.00	
EN	26.29	0.58 (0.34, 0.98)	<0.0001
MA	42.21	1.13 (0.67, 1.91)	0.39
Not documented	89.12	13.36 (8.37, 21.33)	<0.001
Diagnosis			
AWD without comorbidity	79.91	1.00	
AWD with comorbidity	67.55	0.56 (0.36, 0.85)	0.01

CHAPTER FIVE

5.0 DISCUSSION

The results of this study show that the highest types of prescribing errors were timing errors, wrong dose and the least was wrong drugs. The findings are similar to the study conducted in Saudi Arabia which observed that dosing errors, were the most common type of error, followed by incorrect route, and frequency (36). The same findings were reported by Fekadu and Hamrawit (2013) which showed that among the prescription writing error, the commonest was omitting the duration of treatment followed by route, dose, frequency, and not documented.

Also the study revealed that within administration errors, omission error was the highest (62.25%) followed by documentation errors was (62.17%) and the least was unauthorized (5.42%). The proportion of these errors were higher compared with those reported in a study done in Ethiopia which found that dose error were (37%), omission (29.0%), time error (30.3%) and 18.3% were drug dose (37). Another study done in Alabama at Birmingham reported dose error (37%), wrong drug (27%), route (22.7%) and 4% time error (37). However the wide difference in administration errors, it is obviously not good to the patients.

On analyzing the drug use pattern in the present study it was observed that (37.09%) of prescriptions contained antibiotic. This was lower than what was reported in another study from Dhaka in AWD in children below 5 years, which shows that outpatient prescription containing antibiotics were 52% in government and 75% in private hospitals respectively (31). This study also observed that ORS was prescribed in 21.42% of the prescription, pedzinc (21.50%), fluids (9.33%), this was far lower than WHO recommendation of 100% of these drugs to be prescribed for AWD patients and it is always recommended to use ORS and zinc in patient with diarrhea as most of the patients do respond to ORS alone (38). This finding is lower compared to findings in a study conducted in India on medication prescribing pattern in pediatric diarrhea with focus on zinc supplements which found that (92%) of patients were prescribed with ORS (27) also in the study from community pharmacy which shows that ORS were dispensed to (66%) of patient with AWD and (29.6%) of pedzinc (39).

This study also found that interns and medical officers were significantly less likely to contain prescriptions errors (P value < 0.001) Assistant medical officers did not reveal a significant differences. However this are the staff involved in the majority of prescribing in the hospitals, this findings varies from Hospital to hospital possibly due to differences in hospital settings such as differences in training level of prescribers, availability of support system especially for interns and composition of health care teams and differences in definition of prescribing errors. This findings are contrary to the study conducted on prescribing errors in hospital inpatients which found that most of the prescribing errors were made by junior medical staff (40). Also this findings are similar to some other studies which found that physicians had been committed the most medication errors followed by pharmacist and then nurses (26).

Multivariate analysis of the administration errors and social demographic shows that compare to registered nurse administered prescription, an enrolled nurse administered prescription was significantly less likely. Contrary to the study conducted by (Wudma et al, 2017), found that nurses have made MAE while administering medications and all observed errors involved some breaches in at least one of the six rights of medication administration (41). Also prescription for condition without comorbidity compared to comorbidity was less likely to be found with an administration error (p -value 0.01). In this study the age was significantly associated with MAEs, the patients age <1 were more likely to have MAEs as compared to those children greater than one year. This findings are similar to those found in other studies in Ethiopia which found the young people were 2 times more likely to face errors than the elder once (25). It is important to note that because the study was conducted in regional referral hospital, the results may be generalizable to other hospitals due to the larger sample size.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Prescribing and medication administration errors were significant problem in pediatric inpatient setting in the selected hospitals. Of these wrong timing, wrong dose, wrong frequency, omission, documentation errors and timing were the most common types of errors observed with high proportion. Zinc supplements and ORS prescription pattern in this study was lower than what is recommended by WHO diarrhea treatment guideline. There is a need to ensure that mechanisms are in place like those of continuous prescription and drug administration audits to monitor, improve the prescription habits of doctors, and administration habit to ensure doctors and nurses adhere to National and international standards in management of acute watery diarrhea.

6.2 Recommendation

Continuous medical education in relation to medication errors should be organized by the hospitals and other stakeholders.

Refresher training and mentorship to medical doctors on the important of adherence of standard treatment guideline; it has been effective in reducing use of drugs for diarrhea diseases worldwide.

The government and hospital managers should ensure National guideline for the treatment of acute watery diarrhea is in place.

The magnitude of medication administration errors could significantly be reduced by giving in-service training to the nurses on the Safe administration of medications, sensitizing the nurses to adhere to the six rights of medication administration and fostering a culture of triple checking of medication before administration.

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APPENDICES

Appendix I: Data Collection Tools

Data abstraction form for prescribing error

Name of the Hospital _____ Card no _____. Age _____ Weight _____ Sex M ___ F ___
 Height _____ MUAC _____

NO		
1	Patient Information	<p>Sign and symptoms (Mention them)</p> <hr/> <p>Major diagnosis:</p> <hr/> <p>Co morbid conditions:</p> <hr/> <p>Lab results. Eg, CRP,FBP,Stool analysis, Rectal swab, Urinalysis.</p>
2	Prescribed Medication	<p>Date _____ Time _____ Drug _____ Dose _____ Duration _____</p> <hr/> <p>Dosage form _____ Route _____ Frequency _____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p>

		<p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p> <p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p> <p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p> <p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p>
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		<p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p> <p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p> <p>Date____Time____Drug_____Dose_____Duration _____</p> <p>Dosage form__Route__Frequency_____ Prescribers qualifications eg Specialist, MD, AMO,CO, INT</p>
--	--	---

Name of data collector

signature

Appendix III: Prescribing error check format

Name of the Hospital _____ Card no _____ Age _____ weight _____ Sex M ___ F ___

Height _____ Ward _____

No	Types of Medication Prescribing errors.										
	Diagnosis	Name of the drug	Drug	Dose	Duration	Frequency	Route	Time	Polypharmacy	Illegible handwriting	Prescribers qualifications
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											

Appendix III: Medication administration data collection format

Name of the Hospital _____ Ward _____ Sex _____ Age _____

Height _____ weight _____ Initial of the patient _____

			Administered						
Date	Diagnosi s	Prescribe d drugs	Dose	Route	Missed drug/dose	Missing documentation	Time	Given not prescri bed.	Administe red by (RN, EN, MA)

Code of administrator _____

sex _____

Name of data collectors _____

Signature _____

Appendix IV: Drug administration error check format

Name of the Hospital _____ Ward _____ Sex _____ Age _____

Height _____ weight _____ Initial of the patient _____

Date of administration.	Name of drug Administered	Wrong dose		Route		Documentation error		Omitted/missed drug error		Wrong time error		Given not prescribed/authorized		Administered by (RN, EN, MA)
		Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	

Key

Y=Yes, N= No, RN= Registered nurse, EN=Enrolled nurse, MA=Medical attendant

NT: Note Documented

Appendix V: Research Permit

**THE UNITED REPUBLIC OF TANZANIA
President's Office
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**

DAR ES SALAAM REGION
Phone Number: 2203158
Fax number: 2205158
email: ras@dsm.go.tz
website: www.dsm.go.tz



REGIONAL COMMISSIONER'S OFFICE,
3 RASHID KAWAWA ROAD,
P.O. BOX 5429,
12880 DAR ES SALAAM

In reply please quote:
Ref. No.

..... 5/7 2018

District Administrative Secretary,
..... LUALA
P. O. Box
DAR ES SALAAM.

RE: RESEARCH PERMIT

Prof/Dr/Mrs./Ms/Miss ANUNSIATHA PETER MREMA is
student/Research from MUHAS has been
permitted to undertake research on Assessing prescribing and
..... Medication administration errors in the management
..... of acute diarrhea amongst paediatric inpatients
..... in Regional Referral Hospitals in Dar-es-Salaam
From July 2018 to August 2018.

I kindly request your good assistance to enable her/his research.

.....
For; **REGIONAL ADMINISTRATION SECRETARY**
DAR ES SALAAM

Copy: Municipal Director,
..... LUALA
DAR ES SALAAM.

Principal/Vice-Chancellor
..... Muhimbili University of Health and Allied
..... Sciences (MUHAS)

Appendix VI: Ethical Clearance

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES**

P.O. Box 65001
DAR ES SALAAM
TANZANIA
Web: www.muhas.ac.tz



Tel G/Line: +255-22-2150302/6 Ext. 1015
Direct Line: +255-22-2151378
Telefax: +255-22-2150465
E-mail: dpgs@muhas.ac.tz

Ref. No. DA.287/298/01A/

2nd July, 2018


Ms. Anunsiatha Peter Mrema
MPH-Executive Track
MUHAS

**RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED:
"ASSESSING PRESCRIBING AND MEDICATION ADMINISTRATION
ERRORS IN THE MANAGEMENT OF ACUTE DIARRHEA AMONGST
PAEDIATRIC IN PATIENTS IN REGIONAL REFERRAL HOSPITALS IN DAR
ES SALAAM"**

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 28th June, 2018 to 27th June, 2019. In case you do not complete data analysis and dissertation report writing by 27th June, 2019, you will have to apply for renewal of ethical clearance prior to the expiry date.


Prof. P. Muganyizi
ACTING: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
cc: Dean, School of Public Health and Social Sciences

TEMEKE MUNICIPAL COUNCIL

ALL COMMUNICATIONS TO BE ADDRESSED TO MUNICIPAL DIRECTOR

P.O.Box. 45232
Tel: 2850142



TEMEKE MUNICIPAL MEDICAL
OFFICE OF HEALTH
DAR ES SALAAM
TANZANIA.

MDC TEMEKE HOSP.

Date: 13/07/018

Approved
By
[Signature]

Area: HOD, Paediatric
Kindly grant

KWISI NGANGA MKUU
HOSPITAL YA HANISBA, YA TEMEKE

REF: PERMISSION TO CONDUCT HEALTH RESEARCH ACTIVITIES IN TEMEKE MUNICIPALITY.

Please refer to the above heading.

Extension of Permission has been granted to
Mr./Mrs./Ms./Prof./Dr. MREMA ANUNJIATHA PETER
from (Institution) MUHAS Address DSM to
Tel. No to collect data for research work in your area.

The research title is
Assessing prescribing and medication administration errors in the management of acute diarrhoea among Paediatric inpatients in Regional Hospitals
She/he has submitted the proposal for the mentioned study to the MMOH Office as a pre-condition prior to authorisation.

The researchers have been instructed and agreed to submit the research progress reports and final results to the MMOH prior to any publications.

Data collection will restart on 16/07/018 to 16/08/018
Sample size 400

This research work is part of Academic fulfilment for Diploma/Advanced Diploma/Degree/master/PhD it is part of ongoing research in your institution

I am kindly requesting you to give him/her the necessary assistance so as to accomplish this task timely.

Yours Sincerely

[Signature]

AGNES KYAMBA
For; Temeke Municipal Medical Officer of Health

KINONDONI MUNICIPAL COUNCIL
ALL CORRESPONDENCE TO BE ADDRESSED TO THE MUNICIPAL DIRECTOR

Tel: 2171022
Fax: 2172951



MUNICIPAL MEDICAL OFFICER OF HEALTH,
KINONDONI MUNICIPAL COUNCIL
P. O. BOX. 61665,
DAR ES SALAAM.

Unapojibu tafadhali taja:
Kumb. No. PT/K/14.Vol.VI/

Date: 17/07/2018

Health Facility I/C.

MWANANYAMALE HOSPITAL
Kinondoni Municipal.


REF: RESEARCH WORK PERMIT.

Refer to the above heading.

DMO office is pleased to inform you health facility that MUNSIATHA P. NYEM which is/from MUMBAI UNIVERSITY OF HEALTH AND ALLIED SCIENCE has been given a permit to perform the research work in your facility stating from 17/07/2018 to 18/08/2018 the research is titled PRESCRIBING AND MEDICATION ADMINISTRATION ERRORS IN THE MANAGEMENT OF ACUTE NARCOXA AMONG PEDIATRIC IN PATIENTS IN REGIONAL REFERRAL HOSPITALS

Kindly receive & provide the necessary assistance in order to enable the student/organization to fulfill the activities comfortably.

Best wishes.


MUNICIPAL MEDICAL OFFICER OF HEALTH
KINONDONI MUNICIPAL COUNCIL
RESEARCH COORDINATOR
KINONDONI MUNICIPAL COUNCIL

N:B Please share research report with MMOH Office at the end of your study.

ILALA MUNICIPAL COUNCIL

ALL COMMUNICATIONS TO BE ADDRESSED TO THE MUNICIPAL DIRECTOR

P.O. BOX 20950
PHONE NO: 2128800
2128805

FAX: 2128805

REF. IMC/DR.6/Vol.VI/362



MUNICIPAL OFFICE,
1 MISSION STREET,
P.O.BOX 20950,
11883, DAR- ES- SALAAM

20th July 2018

Medical Officer in-charge
Amana Regional Referral Hospital
ILALA MUNICIPAL COUNCIL.

RE: PERMISSION TO CONDUCT RESEARCH

Kindly refer to the heading above

This is to introduce Mrema Anunsiatha Peter a student at Muhimbili University of Health and Allied Science pursuing a Master degree in Public Health.

He requested permission to conduct research titled "**Assessing prescribing and medication administration errors management of acute diarrhoea amongst paediatric in patients in Regional Referral Hospitals in Dar es Salaam**".

Permission has been granted to him to conduct such study within Ilala Municipal with an agreement of bringing feedback to MMOH office.

I kindly request your assistance.

FOR MUNICIPAL MEDICAL OFFICER (A) HEALTH
ILALA MUNICIPAL COUNCIL

Dr.Mwanahamisi Hassan

For: **MMOH-ILALA MUNICIPAL COUNCIL**

Copy: Researcher