WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCE

DEPARTEMENT OF NURSING

MAGNITUDE AND CONTRIBUTING FACTORS OF MEDICATION ADMINISTRATION ERRORS AMONG NURSES ON, GURAGE ZONE, ETHIOPIA, 2023

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List of Abbreviations and Acronyms

AIDS	Acquired Immune-Deficiency Syndrome
AOR	Adjusted Odds Ratio
Bsc	Bachelor Science
CI	Confidence Interval
ETB	Ethiopian Birr
ICU	Intensive Care Unit
IRB	Institutional Review Board
MAEs	Medication Administration Errors
ME	Medication Error
NPSA	National Patient Safety Agency

PADR	Potential adverse drug reaction
PME	Potential Medication Errors
RMS	Right of Medication Administration
SPSS	Statistical Program for Social Science
UK	United Kingdome
US	United State
WHO	World Health Organization
WKUSH	Wolkite University specialized hospital

ABISTRACT

Background: A Medication administration error [MAE] is any preventable act that contributes to the failure of proper medication use in the treatment process resulting in harm for the patient to the extent of disability and death. A Medication error listed in the top ten causes of mortality worldwide. Globally, Medication errors [MEs] present a substantial contribution to ill health, and even death and are listed as one of the five medical error categories classified by the American Institute of Medicine in Ethiopia. An institution-based, cross-sectional study conducted in two public hospitals in Southern Ethiopia indicated that 71% of nurses made MAE. However, however, only a few relevant studies were conducted in Ethiopia to assess this problem.

Objective: To assess the magnitude and contributing factors of medication administration errors among nurse on, Gurage zone, Ethiopia, 2023.

Methods; Crosse sectional study design was conducted. The study includes 348 nurses from four hospitals nurses were selected by systemic random sampling technique. Data was cleaned, checked for inconsistencies and missed values, coded and entered for analysis to SPSS (SPSS Inc. version 25).multi variable logistic regression was done to identify factors associated with medication administration errors.

Result; A total of 320 nurses participated in this study, with 91.9% response rate. Of which 219(68.4%) nurses made Medication administration error in the last 12 months. In this study medication administration error was significantly associated with unavailability of guideline for MA [AOR=1.64; 95% CI (1.01, 2.64)], interruption during medication administration [AOR = 1.94, 95 % CI (1.12, 3.36)], low nurses to patient ratio [AOR = 5.19 % CI (1.74, 15.41)], and administering medication during night time [AOR = 2.75% CI (1.11, 6.84)].

Conclusion and recommendation: Medication administration error was highly prevalent in four selective hospitals in Gurage zone. This study showed that there is a significant association between medication administration error and factors such as Availability of guideline for MA, work load, interruption during MA, nurse to patient ratio, and Night shift. Develop appropriate guidelines for safe medication administration, minimizing distracters during medication administration, increase nurse to patent ratio and work load would be helpful for minimizing medication administration errors.

Keywords; Medication errors, Magnitude, Nurses, medication administration, Gurage zone

1. Introduction

1.1. Background

A medication [medicine, pharmaceutical drug medicinal drug or simply drug] is a drug used to diagnose, cure, treat, or prevent disease. Every person around the world will take medications at some point in their life to prevent or treat illness. However, medicines do sometimes cause severe harm, disability, and even death if taken incorrectly, as a result of an error, Medication errors are the leading causes of avoidable patient harm in the health care system across the world(1). In African health care setting medication errors are common health problems (1, 2). The administrations of medication are primarily the nurse's responsibility, and they spend up to 40% of their time through administering medications (3). Nurses represent the last safety check in the chain of events in the medication administration process and they are the last safeguard of patient wellbeing (4).

The United States (US) National Coordinating Council for Medication Error Reporting and Prevention defines a medication error 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 professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labeling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use (5)

Medication errors are the most common types of medical errors. There are different approaches to classifying medication errors. One approach is based on stage in sequence of medication use process such as ;prescribe ,transcribe, dispending, administration or monitoring other approach classified based on type of error such as; wrong dose ,medication ,frequency, administration route and patient. Other approach classifies errors according to whether they occur from mistakes made when planning actions (knowledge-based or rule-based mistakes) or errors in the execution of appropriately planned actions (action-based errors, known as "slips", or memory-based errors, known as "lapses"). (6)

A MAE was defined as 'a deviation from the prescriber's medication order as written on the patient's chart, manufacturers' instructions or relevant institutional policies'(7).A 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 healthcare professional, patient, or consumer,

The accountability of medication administration, safety shared between nurses and health care institute built on the goals of the Institute for Safe Medication Practices, which occurred by approving necessary "7 rights" of medication administration: right patient, right drug, right dose, right time, right route, right education and the right documentation. (6)

Given the high human fatalities and financial cost of medication errors, the World Health Organization (WHO) launched its third Global Patient Safety Challenge – *Medication without Harm* – in March 2017 and announced that one of its major goals is to reduce the level of severe, avoidable harm related to medications by 50% over 5 years, globally (8).

1.2. Statement of the Problem

Medication errors are the most common type of medical errors that occurred in hospitals and the eighth leading cause of death higher than car accidents, breast cancer, and AIDS combined (9, 10). Medication errors, specially made during the administration of medications were highly prevalent. Each medication and each patient had at least one type of MAEs (11).

Medication administration errors are the most common types of medication errors affecting patient safety and posing dangerous consequences for patients (2, 12).Globally, MEs present a substantial contribution to ill health, and even death and are listed as one of the five medical error categories classified by the American Institute of Medicine. Out of estimated patients' deaths of 6000 to 20,000 each year from medical errors in Taiwan, 10% of medical lawsuits were because of MEs where the majority of the errors were grossly underreported. A prospective cross-sectional study conducted in an intensive care unit of Gonder specialized hospital in Ethiopia showed a ME of 51.8% (13).The prevalence of MAE in the intensive care unit (ICU) and pediatric ward of Jimma University, Ethiopia was 51.8 and 90.8 %, respectively (14, 15).

Medication administration errors are a significant global concern and can cause serious medical consequences for patients. The majority of MAE involved either dose omissions (42 %) or wrong time administration (50%).(16)The Institute of Medicine estimates that, on average, hospitalized patients are subject to at least one medication error per day. The National Patient Safety Agency (NPSA) of UK revealed that, MAE is common, and this occurs in 50 % of all drug medication administrations in hospitals. In the United State, MAE occurs in 5 to 20 % of all drug administrations, costing the healthcare system an extra $380 million and estimated to harm at least 1.5 million patients per year, with about 400,000 preventable adverse events, medication errors have been estimated to account for 7,000 deaths per year, also The Institute of Medicine Committee on Identifying and Preventing Medication Errors estimates that at least 1.5 million preventable adverse medication events occur annually in the United State, warning that this is likely to significantly underestimate the problem (6).

Nevertheless how huge or insignificant the incidence, it is difficult to have a general concept of MEs in less developed and developing countries due to inefficient documentation and error-reporting systems and insufficient research in the area. Analysis and appreciation of the root

causes of MEs allows developing complex medication error prevention mechanisms which improve patient safety (4, 7, 13).

There are deferent cause medication administration errors like slips and lapse, unsafe act, knowledge and rule based mistake, latent condition, health and personality, training and experience, communication, work load and skill mix, distraction and interpretation, general wok environment, medicine supply and storage, local working culture, organizational diction(7, 13).

Types of medication administration errors are like wrong time, wrong route, wrong dose, wrong patient, wrong medication, wrong documentation, and other type's error like omission.

As far as the investigators‟ knowledge little research activities on medication administration errors and contributing factors have been conducted in our country and there is no research on this particularly topic in proposed study area (7, 13)This particular study was done to narrow this gap with having aim in determining proper identification medication of administration errors

1.3. Significance of Study

This study hopefully contributes to the effort for improvement in safe medication administration and standard health service delivery in general. Knowing medication administration errors and contributing factors will provide a best way to empowerment of the nurses to overcome these barriers(13).The study have significant to the patient assess the prior to administer medication to ensure the patient receiving the correct medication for the correct reason and at correct time.

It helps to identify opportunity to improve services in medication administration and also provide as additional information to program managers, researcher on-government organizations and policy makers working on reducing medication administration errors and contributing factors.

2. Literature Review

2.1. Prevalence of Medication Administration Error

The WHO, 2017 report indicates that medication errors occur when weak medication systems and/or human factors such as fatigue, poor environmental conditions or staff shortages affect medication process from prescription to administration of medications. Medication errors occur most frequently during the administration of medications (1). According to a systematic review of 91 direct observational studies, the overall prevalence of medication administration errors (MAEs) was 19.6% or interquartile range between 8.6% and 28.3% of total opportunities for error in healthcare settings worldwide (7).

Medication administration errors are prevalent both in developed and developing countries. In high-income countries like England, seven hospitals of South Korea, Turkey and three teaching hospitals of South Korea it was highly prevalent 54.4%, 63.6%, 61.7% and 69.6% respectively (14,17,); Whereas, in France, drug administration error rate was relatively low (27.6%) (17)Incidence and prevalence of medication errors in the UK: Error prevalence rates range widely across the included studies from 0.2% to 90.6%, (18)On the other hand in Iran a cross-sectional survey of 500 nurses‟ in7 teaching hospitals carried out to examine the prevalence and types of medication errors indicated that the prevalence of MAE among nurses within the past 3 months was 17.0% (19).

A prospective study conducted on six wards in two urban public hospitals in Vietnam to determine the prevalence and potential clinical outcome of medication preparation and administration errors, and to identify factors associated with errors indicated that the medication administration error rate was 39.1% (21). A similar study conducted in Indian tertiary care hospital showed that medication error rate was 68.5% (22)

A study conducted in Southern Iran with the purpose of determining the frequency of MEs in an emergency department of a teaching hospital revealed that 96.5% of patients had experienced at least one medication error, making the rate of errors 3.5 per patient (13)A descriptive survey of 300 nurses working in hospitals affiliated to Iran University of Medical Sciences using stratified

multistage sampling disclosed a mean of 19.5 medication errors that the nurses acknowledged within 3-months period however the mean of error reporting was only 1.3 of error cases (13).retrospective study conducted in Iran, the majority of pADRs were reported by nurses (71.57%), while the least number of reports among healthcare professionals was submitted by medical specialists (3.74%) (8). An observational study conducted in the emergency department of southern Iran tertiary hospital showed that 68.5% medication errors recorded (20).

A prospective observational study conducted in a 'private hospital' for six months at Warangal, Telangana, medication errors, were observed in PME types of errors. Among them incorrect doses are high (42.18%) followed by drug-drug interactions (40.3%) (16).A retrospective study by Al Khaja et al found that in Bahrain the proportion of incorrect prescriptions amounted to 90%, and this was as high as 90.5% for infants (23).

A Nigerian report on medication administration errors among pediatrics nurses revealed that only 30% of nurses reported errors committed in their practices (24).In Nigeria, 63.5% of the nurses made ME 1-2 times in a month (4). A descriptive direct observational study of drug administration errors carried out at medical wards of Ain Shams University hospital of Egypt indicated that the overall medication error rate was 37.8% (25). A similar study done in Ghana tertiary care hospital adult emergency department showed that MAE rate was 27.2% (26).

A cross-sectional study conducted at three Federal Ministry of Health level governmental hospitals located in Addis Ababa, the proportion of medication error reporting among nurses was found to be 57.4% (13).A cross sectional quantitative study at University of Gondar Hospital, The estimated medication administration error reported was found to be 29.1 %. The perceived rates of medication administration error reported for non intravenous medications were ranged from 18.1 to 28.4 % and 20.6 to 33.7 % for intravenous related medication (7).

The prevalence of MAE in the intensive care unit (ICU) and pediatric ward of Jimma University, Ethiopia was 51.8 and 90.8 %, respectively (14, 15). A cross-sectional study done at the Felege Hiwot Referral Hospital showed that out of 360 medication administration interventions, the majority (98.1 %) of medications had at least one type of medication administration error. Among this, 42 (11.9 %) had perpetrated only one type medication administration error, 112 (31.7 %) had perpetrated two type of errors, 168 (47.6 %) had perpetrated three types of errors and the rest 31 (8.8 %) had perpetrated more than three types of medication administration error.

From the total medication administration intervention, more than half (56.4 %) were labeled as medication administration errors. (11).

An institution-based, cross-sectional study conducted in two public hospitals in Southern Ethiopia indicated that 71% of nurses made MAE in the previous 12 months. 46% of the respondents perpetrated MAE at least four times while (35%) of the participants made MAE two or three times during the specified period. From the observed doses (0.7%) of medications were administered without any breach in any of the six rights of medication administration (28) A prospective observational study conducted in western Ethiopia indicated that 75.1% of patients exposed to medication errors (27).

2.2. The contributing factors to errors in medication administration

A descriptive cross-sectional study done in Turkey to assess factors contributing to medication errors indicated that the first factor contributing to medication errors was the nurses write an order in place of a physician (70%), The second frequent factor was an oral order given to the nurse in a non-emergency situation for medication administration (53.1%), Following these were physicians not writing the order for medication in time (46.9%), physicians not writing an medication administration order (45.3%), physicians not updating medication orders (43.2%) and most physicians writing orders for medication illegibly (40.7%). Medication orders that did not specify the route of administration of the drug were responsible for 34.2% of the contributing factors, Additionally not specifying the time period for the administration of an intravenous fluid contributed to 35.4% of frequently encountered errors, Also interruption by telephone and a question being asked during medication administration time contribute MAE While preparing a medication was responsible for 31.3% of errors (18).

Another observational study conducted in France showed that medication errors were significantly associated with administration route (error was higher for administrations by injection (OR versus the oral route and number of patients at under the nurse's care (17). A cross-sectional study conducted in South Korea to assess factors contributing to medication errors found that, about half (45.5%) of the participants answered the contributing factors of medication administration error is unfamiliarity with the drug. Participants ranked advanced drug preparation and administration without rechecking (45.0%), heavy workload (40.9%), miscommunication while conveying verbal orders (38.2%), miscommunication among clinicians

(34.1%), and failure to be alert while checking prescription (33.6%), respectively contributing factors for medication errors (29).

A similar study conducted in Iran showed that fatigue caused by excessive work hours and type of shift work were the two most important factors causing MEs among nurses. Being male and fixed shift work were significantly associated with an increased number of MEs made by nurses (19). A prospective study conducted on six wards in two urban public hospitals in Vietnam to determine the prevalence and potential clinical outcome of medication preparation and administration errors, and to identify factors associated with errors indicated that factors associated with medication administration errors were drug characteristics (administration route, complexity of preparation, drug class), and administration time (drug round, day of the week), Nurse experience was not significant (21).

A systematic review to investigate the extent of medication errors and adverse drug events in African Hospitals showed that the major contributing factors for medication errors were individual practitioner factors (fatigue and inadequate knowledge/ training) and environmental factors, such as workplace distraction and high workload (2). A descriptive direct observational study conducted in Egypt indicated that 85% of the observations had at least one error, and the overall MAE rate was 37.68%. All nurses had no training courses on medication administration techniques, and no policies and procedures were made available for them (25).

A cross-sectional study conducted in Nigeria aimed To identify the causes of medication administration errors among nurses showed that exhaustion due to work pressure was the most common cause of MAEs followed by wrong dose calculation with Other causes of MAEs mentioned by respondents include poor labeling and packaging, illegible 10 physician's prescription, distraction, misinterpretation of prescription, confusion between two similar drug names and poor knowledge of drugs (4). A cross-sectional study conducted in Egypt showed that time of shift (day or night), days of the week (weekends or regular work days), the number of shifts per month, elderly and illiterate patients are significantly associated with medication administration error(25). Cross-sectional nonparticipant observational study conducted at Ghana tertiary care hospital adult emergency department aimed to determine the incidence, types, clinical significance, and potential causes of medication administration errors shows that occurrence of MAE was significantly associated with number of patients under the nurse's care (26).

A prospective, observation-based, cross-sectional study conducted at the Felege Hiwot Referral Hospital inpatient department showed that the factors found to be significantly associated with medication administration errors were, age of the nurses, age of the patient, nurse's working experience, interruption of the nurses at the time of medication administration, shift of medication administration, nurse to patient ratio of 7–10 and nurse to patient ratio greater than 10 were found to be significantly associated with medication administration error at p-value of 0.05 (11). An institution-based, cross-sectional study conducted in two public hospitals in Southern Ethiopia indicated that lack of sufficient training (68.5%), inadequate staffing (66.9%), and distraction (50.8%) were the three most common factors for the MAEs mentioned by nurses. Factors like looking-like drugs and distraction were significantly associated with the MAEs at a p-value of 0.05 (28)

2.3. Conceptual Frame Work

Concepts that are directly and indirectly related to the major variables of the study adapted from the literature reviews (2,4,9,11,17,18,19,21,24,25,26,28,29)

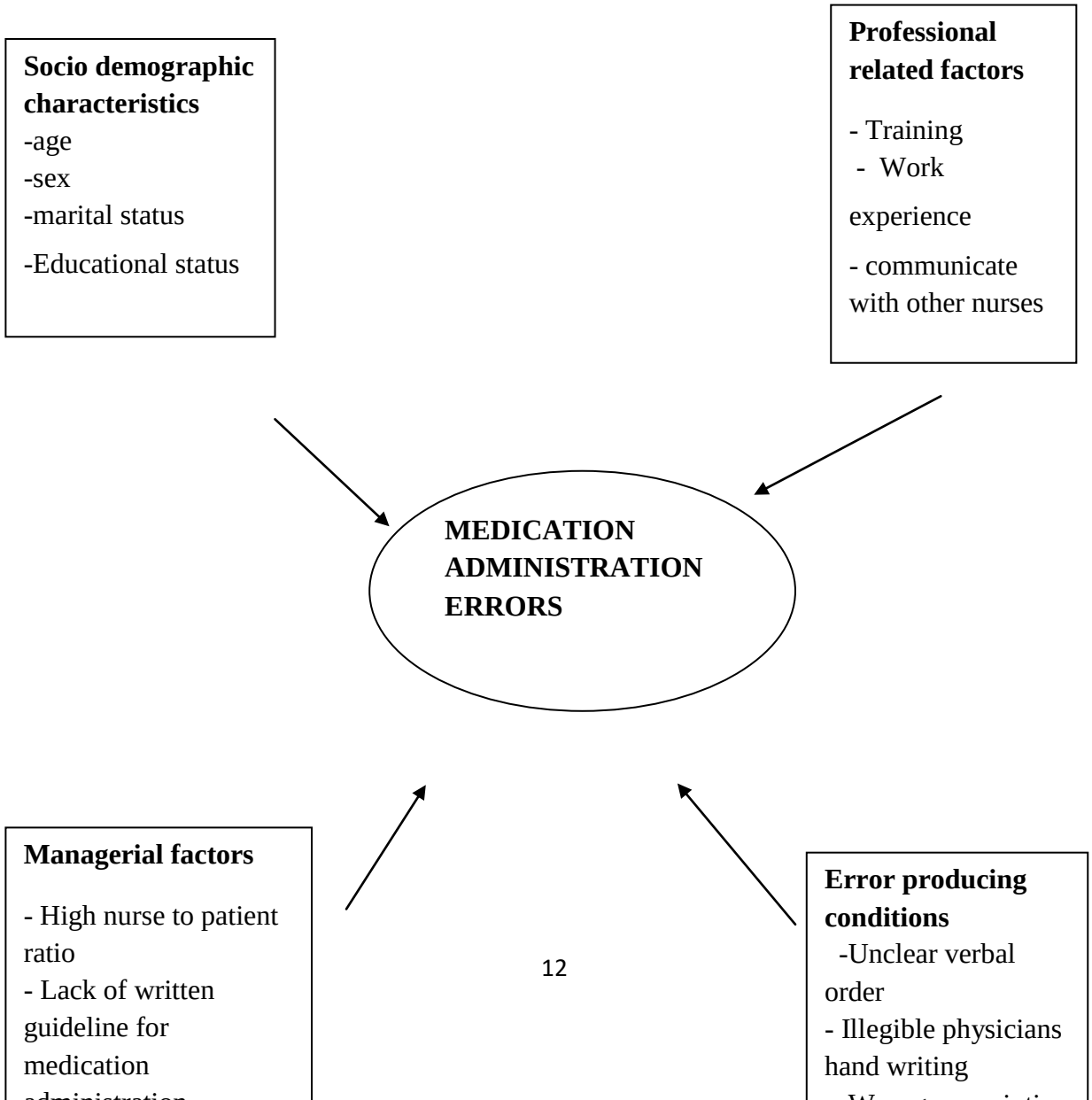


Figure 1; conceptual frame work adapted from literature shows that the interaction between medication administration and its factor

3. Objective

3.1 General Objective:

To assess the magnitude and contributing factors of medication administration error on Gurage zone, Ethiopia, 2023.

3.2. Specific Objectives

- To determine the magnitude of medication administration errors in Gurage zone, Ethiopia, 2023.
- To determine contributing factors of medication administration errors among nurses in Gurage zone Ethiopia, 2023.

4. Method and Materials

4.1. Study Area

The study was conducted in on Gurage zone from May to June 2023, southern region, southern west, Ethiopia. Gurage zone was found around 158 km far from Addis Ababa (capital city of Ethiopia) and also there were seven hospitals found. We select hospital randomly four hospitals namely Wolkite University teaching specialized hospital, Butajira General Hospital, Attat lured meryem primary hospital and Gunchire primary hospital. WKUSH was found on Gubre town which was established in 2009. It has total staff number of 229 which are 119 nurses. Attat lured meryem primary hospital was found on Attat town, the hospital was established in 1969. It has

72 total staff number which are 33 nurses. Butajira general hospital is found on Butajira town, which was found on Butajira town, it has 365 total staff number which are 178 nurses. Gunchire primary hospital was found on Gunchire town, it has total staff number of 70 which are 32 nurses.

4.2. Study period

This study was conducted from May17/09/2015-June18/10/2015.

4.3. Study design

Cross-sectional study design was employed.

4.4. Population

4.4.1. Source population

The source populations were all nurse professionals who given services in, Gurage, Ethiopia.

4.4.2 Study Population

The study populations were nurses selected randomly.

4.4.3. Inclusion criteria

Nurses who were involved in direct patient care were included.

4.4.4. Exclusion criteria

Nurses those who are on annual leave during the study period was excluded.

Nurses who are less than one month work experance.

4.5. Sample size determination and sampling technique

Single population proportion formula was used to determine the sample size with the following assumptions: The estimated proportion of medication administration error among nurses was 71% study done in two public hospitals in Southern Ethiopia (28), the margin of error 5%, confidence interval 95% and non-response rate 10%.

The required sample size (n) was calculated as follows:

$$n = \frac{z^2 p(1-p)}{w^2}$$

Where

n- Minimum sample size

P-Estimated proportion of medication administration error (71%)

w-the margin of sampling error tolerated (5%)

Z= critical value for normal distribution at 95% confidence interval which is equal to 1.96

$n = \frac{(1.96)^2 0.71(1-0.71)}{0.05^2} = 316$

Then finally we considering 10% non-respondents from the participant

i.e.$nf = n + 10/100(n)$

$nf = 316 + 10/100(316) = 348$

4.5.1 Sampling technique

To select four hospitals from Gurage zone hospital use simple random sampling method. To select 348 nurses from four hospital, all hospitals were listed down with their respective nurse number, and then the number of nurses in each hospital were proportionally allocated to sample size; we use stratified sampling method was select total number of nurses from each hospital and systemic random sampling method was used to select or list nurses from each hospital.

(nj = (n/N) x Nj),

Nj = the population size on j hospital

nj =the sample size on j hospital

n =the total sample size n=n1+n2+n3+n4 =348

N = the total population size N= N1+N2+N3+N4 =362

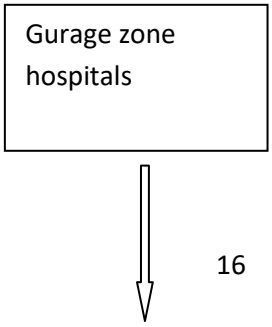
Wolkite university specialized hospital =348× 119/362 = 114

Attat lured meryem primary hospital=348×33/362 =32

Butajira general hospital =348×178/362 =171

Gunchire primary hospital =348×32/362=31

Then all sample size nurse will be interview with self administer question



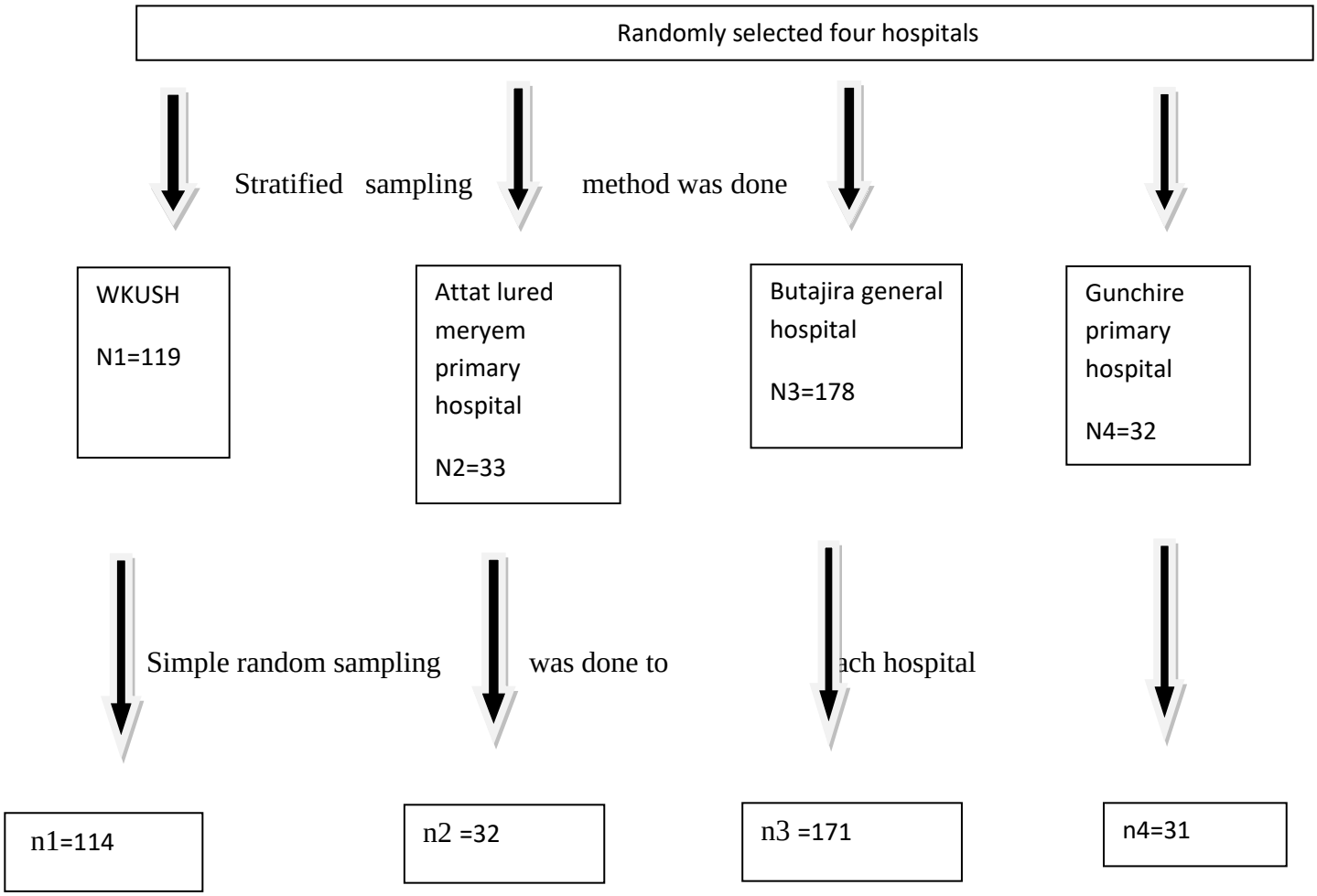


Figure 2; schematic representation of sampling procedure in Gurage zone four selective hospitals, 2023.

4.6 Study Variables+

Dependent variables

- Medication administration error

Independent variables

Socio demographic variables of nurses:

- Age
- Sex
- Marital status
- Educational status

Professional related factors

- Training
- Work experience
- communicate with other nurses

Managerial factors

- - High nurse to patient ratio
- - Lack of written guideline for medication administration
- - Current duty shift
- - Duration in specific unit

Error producing conditions

- Unclear verbal order
- Wrong prescription and dispensing
- Interruption during medication administration
- Look like drug

4.7. Data Collection Tools and Methods

Data were collected using a self-administered structured questionnaire that was adopted from a questionnaire developed by a previous study (28). The questionnaire contains 49 questions arranged into five sections; the first section contains eight questions regarding the socio demographic characteristics of the participants, the second section contains six questions regarding the work-related questions of nurses. The third section contains thirteen questions regarding the prevalence of MAE and medication error reporting trends of nurses, the fourth section contains ten questions regard to types of MAE, the fifth section contain twelve question regard to contributing factor of MAE.

Self –administered questioners was collected by our self and we were done from May to June on four selective hospitals, Gurage zone, Ethiopia.

4.8. Data Quality Control

Attention was give to check all questionnaires for completeness and accuracy.

Pretest of the questionnaire was carried out among nurse the self-administered questionnaire was test with pretest by taking 5% of the sample size at Gubre health center on May, which is not `included in the study .During the pretest, the questions which were frequently asked and documented for further consideration.. Amendments on the instrument, such as unclear questions, and ambiguous words were made accordingly. The pretest will be also used to see how much time it takes to administer the entire questionnaire. We were assessing for clarity, understandability and completeness of questions. After the result of the pretest, some correction and changes was done made as necessary.

4.9. Data Processing and Analysis

Data was cleaned, checked for inconsistencies and missed values, coded and entered for analysis to SPSS (SPSS Inc. version 25). Bi variety analysis was used to see the unadjusted effects of each predictor. Accordingly, variables that fulfilled P-Value less than, 0.25significancelevels at bi variety analysis were selected as candidate variables for multiple regression models. All possible confounding effects of covariates were controlled by incorporating them in the final fitted model. Multi variable Binary logistic regression was done to identify factors associated with medication administration errors. Variables having a P value ≤ 0.2 in bivariate analysis In the multivariable analysis statistically significant at p-value <0.05.

4.10. Ethical Consideration

The study was conducted after ethical approval from Wolkite University. Ethical approval and support letter will be obtained from Wolkite university and submitted to Wolkite university specialized hospital and respective ward, Butajira General Hospital, Attat lured meryem primary hospital and Gunchire primary hospital. In addition, all the responses are kept confidential and anonymous.

4.11. Operational definition

Medication administration Error: any type of medication administration error which occurs at the time of medication administration to the patient by the nurse when occurs within the last 12 months which is ≥ 1 times (time, patient, medication, dose, route, and documentation errors).

Wrong medication: Medication administered to the patients that were not on the patient's medication chart or not ordered medication within the last 12 month.

Wrong dose error: Medication dose or quantity different from that of the ordered dose which is under dose or over dose with 12 month.

Wrong time error: Administration of medications 30 minutes earlier or later from its scheduled administration time with 12 month.

Wrong route error: The actual route of medication administration differs from the recommended route of medication administration with 12 month.

Wrong patient: Patient misidentification during medication administration with 12 month.

Wrong drug preparation: Drug product incorrectly formulated or manipulated before administration with 12 month.

Documentation error; all given medication are not documented and the condition of patient during medication administration with in 12 month. (30).

5, Result

5.1. Nurses' socio-demographic characteristics

A total of 320 nurses participated in this study, with 91.9% response rate. The socio demographic profile of nurse population showed that majority 186 (58.1%) of respondents were male. On the other hand, 183 (57.2%) of respondents were single. The mean age of the respondent was 28.87 ±4.49 SD years (range from 22 to 48). With regard to the educational level majority of the respondents, 259 (80.9%) were BSc nurse and 53 (16.6%) were diploma nurses (Table 1).

Table 1; socio demographic characteristics of nurse in four selective hospitals, Gurage zone, Ethiopia, 2023

no	Variable	Response	Frequency	Percentage (100)
1	Age	20-24	49	15.3
		25-29 years	163	51
		30-34 years	62	19.5
		≥35 years	46	14.2
		Mean =28.87 years, SD =4.49		
2	Sex	Male	186	58.1
		Female	234	41.9
3	Marital status	Single	183	57.2
		Marred	128	40
		Widowed	5	1.6
		Divorced	4	1.2
4	Educational status	Diploma nurse	53	6.6
		BSC nurse	259	80.9
		MSC nurse	8	2.5
5	Educational award from	Governmental institution	209	65.3
		Private institution	99	30.9
		Both private and government	12	3.8
6	Current work unit	Medical ward	32	10
		Surgical ward	48	15

		Pediatric ward	32	10
		Oby/Gyne	5	1.6
		Emergency	59	18.4
		ICU	24	7.5
		OPD	47	14.7
		Other (nicu, Psychiatry ward, minor And major OR)	73	22.8
7	Current duty shift	Day shift	273	85.3
		Night shift	10	3.1
		Alternative shit	37	11.6

5.2 Work-related nurse characteristics

The median work experience of respondent was 3years (ranges from 1 to 32 years). And most of them were working in inpatient departments. Majority 267 (83.4%) of nurses working more than six months in their assigned Unit. Regarding the use of guideline 197(61.6%) of nurses had medication administration guidelines. Among the respondents, 188(58.8%) doesn't took training on safe medication administration practice. Majority 308 (96.3%) of the participants communicate with other nurses when faced doubt during medication administration (Table 2).

Table 2; work related characteristics of nurse in four selective hospitals, Gurage zone, Ethiopia, 2023

No	Variable	Response	Frequency	Percentage
1	Working experience	< 10 years	271	84.7
		≥ 10 years	49	15.3
		Median = 3		
2	Duration in the present unit	≤ 3 month	34	10.6
		4-5 month	20	6.3
		≥ 6 month	266	83.1
3	Nurse to patient ratio	1-6	136	42.5

		7-10	145	45.3
		>10	39	12.2
4	Have guideline for MA	Yes	197	61.6
		No	123	38.4
5	Take training in MA practice	Yes	132	41.3
		No	188	58.8
6	Communicate with another nurse when faced doubt	Yes	308	96.3
		No	12	3.8

5.3. Prevalence and types of medication administration error

From the total 320 study participants, 219 (68.4%) nurses made MAE in the last 12 months. Among this 129 (58.9%) of participants made two and greater than two times during the specified period, while 90 (41.1%) of them made it only one time (Figure 3). The majority 281 (87.8%) of the participants did not report MAE in the last 12 months (Figure 4). Regarding on working unit when error was done high prevalent at emergency 91(41.6 %) followed by medical ward 41(18.7%), surgical ward 25(11.4%), respectively. From them most of error was done at night shift131 (59.8%) and concerning to nurse to patient ratio were one to seven and above was 136(62.1%). Regarding to guide line on working unit during error was done122 (55.7%) they haven't guide line on the working unit and also122 (55.7%) has faced interruption during medication administration. other from 320 participant, 302(94.4%) know the right of medication administration. From them 182 (56.9%) list above 4 right of medication administration.

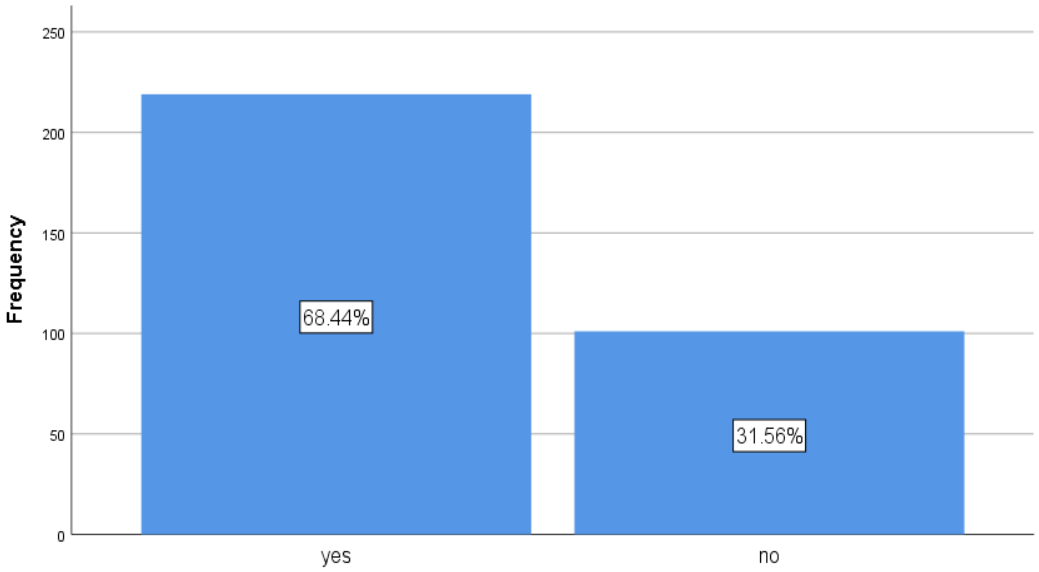


Figure 3; prevalence of medication administration error in four selective hospitals, Gurage zone, Ethiopia, 2023

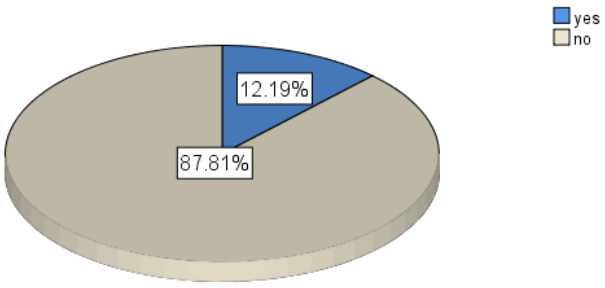


Figure 4; medication administration error reporting in four selective hospitals, Gurage zone, Ethiopia, 2023

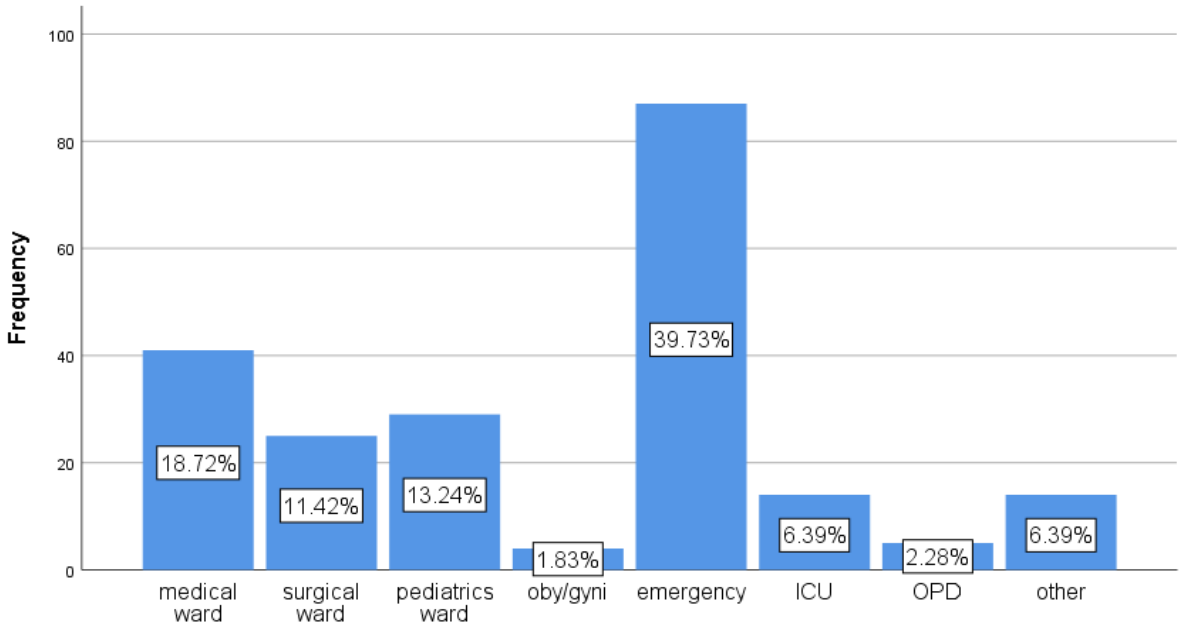


Figure 5; working unit during medication administration in four selective hospitals, Gurage zone, Ethiopia, 2023

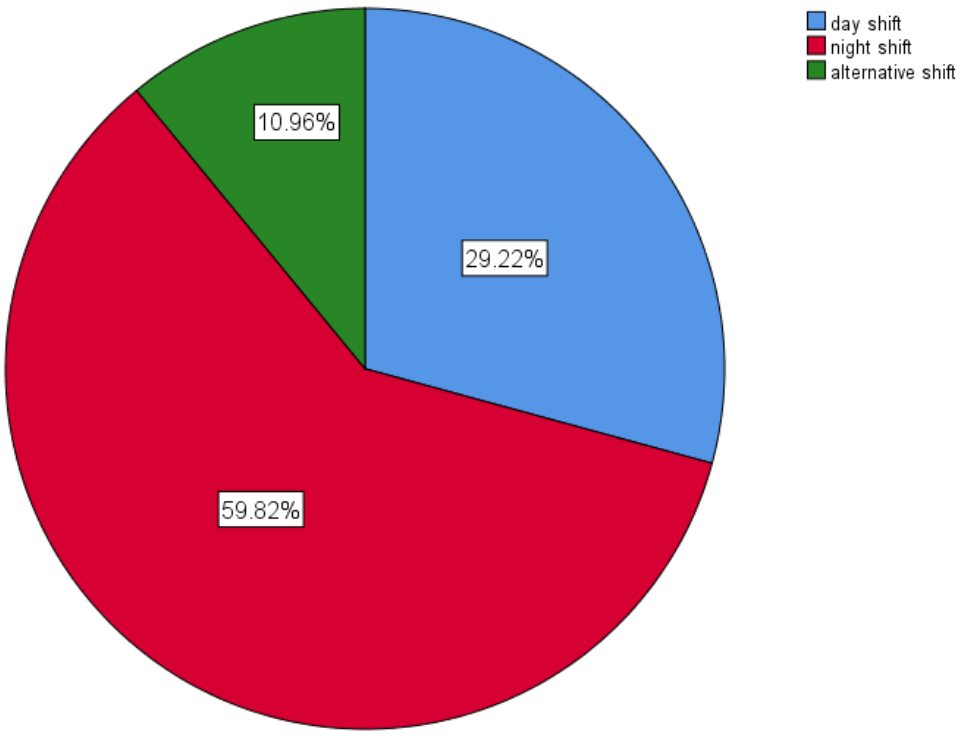


Figure 6; duty shift during medication administration in four selective hospital Gurage zone, Ethiopia, 2023

5.4 Types of error in medication administration

Regard on the type of medication administration wrong time (71.3%) was the most frequent one, followed by wrong dose (45.6%), wrong documentation (39.7%), wrong medication (29.1%), wrong patent (16.9%), and wrong route (8.8%) respectively. From the total dosage errors under dose account (21.3%) and from the total route error Parenteral route account (8.8%).other error related to preparation of medication was (36.6%) and check expire date before administration of medication was (53.8%)(Table 3).

Table 3; types of medication administration error in four selective hospitals, Gurage zone, Ethiopia, 2023

No	Variable	Response	frequency	Percentage
1	Wrong time	Yes	228	71.3
		No	92	28.7
2	Wrong dose	Yes	146	45.6
		-under dose	45	14.1
		-over dose	68	21.3
		- both	33	10.3
		No	174	54.4
3	wrong documentation	Yes	193	60.3
		No	127	39.7
4	Wrong medication	Yes	93	29.1
		No	227	70.9
5	Wrong patent	Yes	54	16.9
		No	266	83.1
6	Wrong rout	Yes	28	8.8
		-Parenteral	28	8.8
		No	292	91.3
7	Error on preparation	Yes	117	36.6
		No	203	63.4

8	Cheek expire date	Yes No	172 148	53.8 46.3

5.5. Perceived cause of medication administration error

The participants were asked to list their perceived possible contributing factors to the MAEs. Accordingly, inadequate staffing (83.8%), illegible hand writing (79.7%), lack of sufficient training(77.2%) and interruption during medication administration (69.1%) were the three most commonly listed contributing factors for the MAEs (Table 4).

Table 4; perceived cause of medication administration error in four selective hospitals, Gurage zone, Ethiopia, 2023

No	Variable	Response	frequency(320)	Percentage (100%)
1	Lack of sufficient training	Yes No	247 73	77.2 22.8
2	Lack of experience	Yes No	207 113	64.7 35.3
3	Work load	Yes No	268 52	83.8 16.2
4	Failure to follow the 6RMAs	Yes No	195 125	60.9 39.1
5	Look like/ sound like drugs	Yes No	155 165	48.4 51.6
6	Wrong prescription	Yes No	149 171	46.6 53.4
7	Unclear verbal order	Yes No	220 100	68.8 31.3
8	Illegible handwriting by prescribers	Yes No	255 65	79.7 20.3
9	Wrong dispensing	Yes	169	52.8

		No	151	47.2
10	Interruption during medication administration	Yes No	200 120	62.5 37.5
11	Nurses write a prescription in place of physicians	Yes No	81 239	25.3 74.7

5.6. Factors associated with medication administration error

Binary logistic regression was done to identify factors associated with medication administration errors. Age, duration on specific unit, nurse to patent ratio, availability of guideline, take training, faced interruption during MA, duty shift had an association with medication administration error in bivariate logistic regression analysis. All variables that have an association with the outcome variables in bivariate logistic regression analyses were included in the multivariate logistic regression analysis models. There are seven variable eligible for multi variable logistic regression. In multivariable logistic regression analysis factors that were significantly associated with MAEs were availability of guideline for MA, nurse to patent ratio, work load interruption during MA and Night shift.

The odds of MAE among nurses who haven't guide line 1.6 times higher than among nurses with guideline for MA [AOR=1.64; 95% CI (1.01, 2.64)]. Additionally nurses interrupted during medication administration were doing MAE 1.4 odds than those nurses who doesn't interrupted during medication administration [AOR = 1.94, 95 % CI (1.12-3.36)]. Nurses to patient ratio were also one of the strong predictors of MAEs. The odds of MAE among nurse who have greater than 10 patient were 5.19 than those nurses who have less than nine patient [AOR = 5.19 % CI (1.74,15.41)]. Finally, the odds of MAE are two times higher among nurses administering medication during night time than among nurses administering medication during the day time [AOR = 2.75% CI (1.11, 6.84)] (Table 5)

Table 5; Bivariate and multivariable logistic regression analysis of factors associated with MAE in four selective, Gurage zone, Ethiopia, 2023

Variables	Medication administration error		Bivariate logistic regression	Multivariate logistic Regression	P-value
	yes	No	COR [95%CI]	AOR [95%CI]	
Age					
20-24 years	32(14.6%)	17(16.8%)			0.072
25-29 years	103(47.04%)	60(59.4%)	1.5 [0.623,3.639]	1.09[0.562,2.14]	0.364
30-34 years	50(22.8%)	12(11.9%)	1.65[0.295,3.428]	0.452[0.191,1.07]	0.179
≥ 35 years	34(15.53%)	12(11.9%)	0.68[0.273,1.691]	0.664[0.275, 1.606]	0.407
Duration in the specific unit					
≤3 month	19(8.7%)	15(14.9%)			
4-5 month	11(5%)	9(8.9%)	1.938[0.937,4.009]	1.036[0.341,3.148]	0.087
≥6 month	189(86.3%)	77(76.2%)	2.009[0.800,5.039]	0.516[0.249,1.068]	0.950
					0.074
Nurse to patent ratio					
1-6 patient	93(42.5%)	43(42.6%)			
7-10 patient	91(41.6%)	54(53.5%)	0.593[0.424,0.831]	4.046[1.352,12.103]	0.11
>10 patient	35(15.9%)	4(3.9%)	0.114[0.041,0.322]	5.192[1.749,15.411]	0.12
					0.03*
Took training					
Yes	94(42.9%)	38(37.6%)			
No	125(57.1%)	63(62.4%)	0.404[0.277,0.589]	0.504[0.374,0.682]	0.317
Have guideline					

Yes No	143(65.3%) 76(34.7%)	54(53.5%) 47(46.5%)	0.378[0.276,0.516]	1.638[1.013,2.646]	0.044*
Faced interruption Yes No	 142(64.8%) 77(35.2%)	 79(76.2%) 22(21.8%)	 0.544[0.455,0.650]	 1.947[1.126,3.368]	 0.017*
Duty shift Day shift Night shift Alternate shift	 178(81.3%) 10(4.5%) 31(14.2%)	 95(94.1%) 0(0%) 6(5.9%)	 0.194[0.81,0.464]	 2.752[1.111,6.843]	0.091 0.029* 0.999

6, Discussion

One of the strategies to improve patient's safety and the quality of nursing care is the proper administration of medications. However, the finding of this study showed that the magnitude of medication administration error was high in four selective hospitals in Gurage zone, which was 68.4% and our confidence interval was (66.13, 70.67). More than half of medication errors occurred during administrations of medication and nurses are the front line for the administrations of medication (31).

The prevalence of MAE in this self-reported study is relatively consistent with studies conducted in three university hospitals of South Korea (69.6%), a study review conducted in Iran and Indian tertiary hospital (68.5%) (70%)(20,22, 27).On the other hand, the result of this finding was higher than study conducted in Turkey state hospital (61.7%) (12). This difference might be due to a difference in the number of hospitals and number of researched clinical departments, in which some of the above studies were conducted in a single hospital and some studies were conducted in the single department. Also additional, the above studies were conducted in developed countries, in which computerized prescribing and recording system, high quality of health care institutions.

The result of this study is higher than a study conducted in Amhara region referral hospital (57.7%) and Felege Hiwot referral hospital inpatient department, which was 56.4%, (32,11). The plausible justification for the difference might be the variation in the number of hospitals and researched clinical units. The above study on the first research was conducted on five hospitals and the second one was in a single hospital inpatient department only. Additionally, the previous study used convenient sampling technique. However, the finding of this study is slightly lower than a study done in two public hospitals of southern Ethiopia (71%) (28). the possible explanation for this difference might be due to variation in the number and type of hospitals. The previous study was conducted in the two southern Ethiopia public hospitals. Additionally, there is a difference in sample size.

Wrong time error (71.3%) was the most frequent type of MAE detected in this study. This finding indicates that more than half of the medications were not administered at their regular scheduled time. When medications are not administered at the regularly scheduled time the patient may develop toxicities or resistance to the drugs. The finding of this study was similar to a study conducted in France (72.6%) (17).. However, it was much higher than a study done in two southern Ethiopia hospitals (58.5%), Adiss Ababa tertiary hospital (58.7%) (28). the difference likely to be due to there was a difference in data collection method. (The above study was collect data used by both the observational and self administrative method. whereas, this study used self-administered questionnaire).

Participants were asked to list their perceived possible contributing factors to MAEs. The participants were asked to list their perceived possible contributing factors to the MAEs. Accordingly, inadequate staffing (83.8%), illegible hand writing (79.7%), lack of sufficient training(77.2%) and interruption during medication administration (69.1%) were the three most commonly listed contributing factors for the MAEs. This result is supported by a systematic review of adverse drug event and medication errors in African hospitals (2). A study conducted in seven hospitals of South Korea reinforce these findings and suggested that keeping up nurses with medication administration training, continuous replenishing of nursing staff and avoid distracters during medication preparation and administration would reduce medication error and improve patient safety(29). Study conduct on France showed to lack of nurse protocol, to incomplete / illegible prescription, number of patients per nurse and nurse workload were factors contribute to MAE(33). Similarly, a study conducted in Nigeria showed that providing continuous training to nurses on medication preparation and administration could minimize medication errors(4).

These findings were supported by studies conducted in Ethiopia Felege Hiwot Referral hospital and two public hospitals in southern Ethiopia(11,28). Similarly a study conducted in Turkey indicated that interruption by telephone and questions being asked during medication administration also contribute to MAEs (18). Medication preparation and administration need concentration. Interruption occurs when a nurse is performing an intervention and before finishing it leads to error. Interruption of these activities may lead to cognitive failure in relation to working memory and attentiveness. Moreover making the environment conducive for nurses prior to preparation and administrations of medication may reduce medication errors. The study

conducted on Addis Ababa tertiary hospital showed that Develop appropriate guidelines for safe medication administration, providing continuous training, minimizing distracters during medication administration would be helpful for minimizing Availability of guideline for MA, nurse to patent ratio, communicates to other nurse before MA, interruption during MA and Night shift were significantly associated with MAE. medication administration errors(30).

Lack of training and unavailability of guideline for safe medication administration practice were also significantly associated with medication administration errors. This finding is supported by WHO 2017 medication without harm strategies. In 2017 WHO develops strategies to improve 37 patient safety through reductions of medication error up to 50% in the next five years (1). From these strategies provide a guideline and strengthen health professionals capacity through skill building are the major ones. On the other hand, a study done in Egypt showed that MAEs was highly prevalent and all nurses had not taken training courses on safe medication administration practices and they haven't policies and procedures for medication administration procedures (25). Providing training is mandatory for medication error reduction because there is the discovery of the new disease, new medication, and new administration techniques. So to combine nursing practice with evidence training may serve as a bridge. Additionally, availability of guideline for medication administration may improve the quality of nursing care and reduce MAEs.

This study showed that medication administration time was significantly associated with MAEs. The odds of MAE are two times higher among nurses administering medication during night time than among nurses administering medication during the day time. This finding is supported by studies conducted in Felege Hiwot referral hospital of Ethiopia and Ain Shams University hospital of Egypt(11,25). Nurses during night time may experience sleep deprivation, loss of concentration and exhaustion. Nurses use different strategies like Exercise for 30 minutes, moderate caffeine consumption before night and taking nap to decrease sleep disturbance and increase attention during the night shift.

Reporting medication administration errors are just a tip of the iceberg to reduce medication administration errors. However, the findings of this study indicated that 12.19% of participants reported MAEs. The result of this study is lower than studies conducted in Iran (55%)(19). similarly Other study done in Addis Ababa tertiary hospital (16.4%), University of Gonder referral hospital (29.1%) and two public hospitals in southern Ethiopia (24.7%)(7,17,28). The

difference might be due to fear of blame for the reported errors in the working unit, variation in the administration support and encouragement, a variation of nurses willingness to report errors and variations in the nurse to patient ratio. Additionally, there is a difference in the study setting

7, conclusion and recommendation

7.1. Conclusion

Medication administration error was highly prevalent in four selective hospitals in Gurage zone. Administering medication in a wrong time was the most common type of error followed by dose and documentation respectively. Distracters, nurse to patent ratio, night shift, unavailability of the guideline were significantly associated with MAEs

7.2. Recommendation

Based on the result of this study more than half of the study participants made MAEs. So the following recommendations are forwarded by the author:

To Ministry of health (MOH):

- In cooperate with hospital managers develop guideline for safe medication administration practice.
- Provide training for nurses on safe medication administration practice.

To Ethiopian nursing association (ENA):

- The association was better to regulate and alarm the nursing professionals to practice based on the principles of medication administration practice.

To Hospital administrator:

- Retain experienced nursing staff and provide training for newly graduated nurses and additionally provide training if there will have new drug and preparation.
- In collaboration with nurses head should develop strategies to minimize distracters during medication administration; like no talk, make phone switch off, instruct attendants to leave the room etc.
- Better to develops guideline for safe medication administration and distribute to all departments.
- Encourage nurses to report and improve system for reporting when errors are happened and create a system for error reporting.
- It was better reduced nurse to patent ratio and work load of nurse also work load of nurse at night more than day time.

To nurses:

- Encourage to improve their medication administration practice through training and read recent evidence.

To future researchers:

- Further studies are recommended to identify factors that contribute medication administration errors- like- nurses attitude wards the patient

-Nurses mental health condition and also in our study use only self administrative questioners due to financial and time shortage for future use other additional technique like cheek list.

8. REFERENCE

1. WHO 0rganization. Medication without harm. World Health Organization; 2017.
2. Mekonnen AB, Alhawassi TM, McLachlan AJ, Brien J-aE. Adverse drug events and medication errors in African hospitals: a systematic review. Drugs-real world outcomes. 2018;5:1-24.
3. Dumo AMB. Factors affecting medication errors among staff nurses: basis in the formulation of medication information guide. IAMURE Int J Health Educ. 2012;1(1):88-149.
4. Ojerinde AC, Adejumo PO. Factors associated with medication errors among health workers in University College Hospital, Nigeria. Journal of nursing and health science. 2014;3(3):22-3.
5. MERP N. National Coordinating Council for Medication Error Reporting and Prevention. About Medication Errors: What is a Medication Error. 2015.
6. Mohmmed RGA, El-sol AE-SH. Nursing innovations: Medication administration errors and safety. IOSR Journal of Nursing and Health Science. 2017;6(03):75-85.
7. Bifftu BB, Dachew BA, Tiruneh BT, Beshah DT. Medication administration error reporting and associated factors among nurses working at the University of Gondar referral hospital, Northwest Ethiopia, 2015. BMC nursing. 2016;15:1-7.
8. Karimian Z, Kheirandish M, Javidnikou N, Asghari G, Ahmadizar F, Dinarvand R. Medication errors associated with adverse drug reactions in Iran (2015-2017): A P-method approach. International journal of health policy and management. 2018;7(12):1090.
9. Mahajan R. Medication errors: can we prevent them? : Oxford University Press; 2011. p. 3-5.

10. SHEET F. Medical errors: Not just a headline: National partnership for women and families. 2009.

11. Feleke SA, Mulatu MA, Yesmaw YS. Medication administration error: magnitude and associated factors among nurses in Ethiopia. BMC nursing. 2015;14:1-8.

12. Elliott R, Camacho E, Campbell F, Jankovic D, St James MM, Kaltenthaler E, et al. Prevalence and economic burden of medication errors in the NHS in England. Rapid evidence synthesis and economic analysis of the prevalence and burden of medication error in the UK. 2018.

13. Jember A, Hailu M, Messele A, Demeke T, Hassen M. Proportion of medication error reporting and associated factors among nurses: a cross sectional study. BMC nursing. 2018;17(1):1-8.

14. Feleke Y, Girma B. Medication administration errors involving paediatric in-patients in a hospital in Ethiopia. Tropical Journal of Pharmaceutical Research. 2010;9(4).

15. Agalu A, Ayele Y, Bedada W, Woldie M. Medication administration errors in an intensive care unit in Ethiopia. International archives of medicine. 2012;5(1):1-6.

16. Nikhithasri P, Ramya M, Kishore P. Assessment of medication errors in pediatricinpatient department of a private hospital. Int J Curr Pharm Res. 2017;9(6):70-5.

17. Berdot S, Sabatier B, Gillaizeau F, Caruba T, Prognon P, Durieux P. Evaluation of drug administration errors in a teaching hospital. BMC health services research. 2012;12(1):1-8.

18. Güneş ÜY, Gürlek Ö, Sönmez M. Factors contributing to medication errors in T urkey: nurses' perspectives. Journal of nursing management. 2014;22(3):295-303.

19. Fathi A, Hajizadeh M, Moradi K, Zandian H, Dezhkameh M, Kazemzadeh S, et al. Medication errors among nurses in teaching hospitals in the west of Iran: what we need to know about prevalence, types, and barriers to reporting. Epidemiology and health. 2017;39.

20. Vazin A, Zamani Z, Hatam N. Frequency of medication errors in an emergency department of a large teaching hospital in southern Iran. Drug, healthcare and patient safety. 2014:179-84.

21. Nguyen H-T, Nguyen T-D, van den Heuvel ER, Haaijer-Ruskamp FM, Taxis K. Medication errors in Vietnamese hospitals: prevalence, potential outcome and associated factors. PLoS One. 2015;10(9):e0138284.

22. Parihar M, Passi GR. Medical errors in pediatric practice. Indian pediatrics. 2008;45(7):586.

23. Aljasmi F, Almalood F, Al Ansari A. Prevalence of medication errors in primary health care at Bahrain Defence Force Hospital–prescription-based study. Drug, healthcare and patient safety. 2018:1-7.

24. Ogunleye OO, Oreagba IA, Falade C, Isah A, Enwere O, Olayemi S, et al. Medication errors among health professionals in Nigeria: a national survey. International Journal of Risk & Safety in Medicine. 2016;28(2):77-91.

25. Tehewy Ma, Fahim H, Gad NI, Gafary ME, Rahman SA. Medication administration errors in a university hospital. Journal of patient safety. 2016;12(1):34-9.

26. Acheampong F, Tetteh AR, Anto BP. Medication administration errors in an adult emergency department of a tertiary health care facility in Ghana. Journal of Patient Safety. 2016;12(4):223-8.

27. Dedefo MG, Mitike AH, Angamo MT. Incidence and determinants of medication errors and adverse drug events among hospitalized children in West Ethiopia. BMC pediatrics. 2016;16:1-10.

28. Alemu W, Belachew T, Yimam I. Medication administration errors and contributing factors: A cross sectional study in two public hospitals in Southern Ethiopia. International journal of Africa nursing sciences. 2017;7:68-74.

29. Kim KS, KWON SH, KIM JA, Cho S. Nurses' perceptions of medication errors and their contributing factors in South Korea. Journal of nursing management. 2011;19(3):346-53.

30. Adam W,Wudam A, Niguse T,Medication administration error and contributing factor among nurse;cross sectional study in tertiary hospitals, Addis Ababa,Ethiopia.2020.

31 Pearl C. Kim JJS, Alona D. Angosta, Kaitlyn Frakes, Casey Li. Errors Associated with the Rights of Medication Administration at Hospital Settings. Journal of Hospital and Healthcare Administration. 2018;2018(01).

32 Getaneh E, Hailu M, Melaku S,Magnitude and associated factor of medication administration error among nurses working in amhara rigional referal hospital,north weast ethiolpia.journal of drug assesment.2020.

9. ANNEXES

SELF ADMINISTERED QUESTIONERY

WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF NURSING

Questionnaire prepared to assess the magnitude and contributing factors of medication administration errors among nurses on four selective hospitals, Gurage zone, Ethiopia.

Dear respondents:

There is a study to be conducted in this hospital to assess the magnitude and contributing factors of Medication Administration Errors. Hence there is a need to gather data from professional nurses of this hospital using questionnaire. This questionnaire is only for research purpose. I assure you that confidentiality and anonymity will be fully maintained. To strengthen this you are not expected to write anything such as name, address… that may lead to your identification. Your participation is purely voluntary, and you can withdraw at any time after you get involved in the study without compromising your right. However, we hope that you will participate in this study since your responses are quite important. If you are willing to take part in the study, you are kindly requested to respond to all questions honestly!

Now, do you agree to participate in the study? Yes _____ No _____

PART I. SOCIO-DEMOGRAPHIC			
S.NO	QUESTION	RESPONSE	REMARK
1	Age		
2	Sex	A, male B, female	
3	Marital states	A. Single B. Married	

		C. Widowed D. Divorced E. Separated	
4	Educational status	A. Diploma Nurse B. Bsc Nurse C. Msc Nurse	
5	From where did you earn your educational award?	A. From government institutions B. From private institutions C. from both government and private institution	
6	Your current working unit	A. Medical ward B. Surgical ward C. Pediatrics Ward D. Oby/ Gyne ward E. Emergency F. ICU G. OPD H. Others (specify_____	
7	Your current duty shift	A. Day shift B. Night shift C. Alternate shift	
PART2. Work-related questions			
8	Working experience only you done the nursing?	_____	
9	Duration in the specific/present unit	_____	
10	On average how many patients do you care per shift? (in number)	_____	

11	Do you have a guideline for medication administration procedures in your working unit?	A, yes B, no	
12	Do you take training in medication administration practice?	A, yes B, no	
13	Do you communicate with another nurse when you faced doubt during medication administration?	A, yes B, no	
PART 3.Prevalence of error in medication administration and nurses reporting trends of medication administration errors			
14	Do you know the rights of medication administration?	A, yes B, no	
15	If your answer to Question 15 is yes list right of medication administration error	- - - - - -	
16	Do you think following the Rights in medication administration would avoid errors in medication administration?	A, yes B, no	
17	Have you made any medication administration errors in the last 12 months?	A, yes B, no	
	If your answer to Question 18 is yes answer the following question from 19-24		
18	How many times?	A. Once B. Twice C. Thrice D. More than three times	

19	Your working unite during error was done?	A. Medical ward B. Surgical ward C. Pediatrics Ward D. Oby/ Gyne ward E. Emergency F. ICU G. OPD H. Others (specify_____	
20	Your duty shift during error was done?	A. Day shift B. Night shift C. Alternate shift	
21	On average how many patients do you care when during error was done?	_____	
22	Do you have a guideline for medication administration procedure in working unit during error was done?	A, yes B, no	
23	Have you ever faced interruption during medication administration when error was done?	A, yes B, no	
24	Is there a system for reporting medication administration errors in your hospital?	A, yes B, no	
25	Have you reported medication administration errors in the last 12 months?	A, yes B, no	
26	If your response to question 26 is No, what was the reason for not reporting?	A. Fear of reporting B. Work load C. Unavailability of a system for reporting D. Others	

		(specify)_____	
PART4. Types of errors in medication administration			
27	Have you administered a wrong medication to patients in the last 12 months?	A, yes B, no	
28	Have you administered the wrong dose to patients in the last 12 months?	A, yes B, no	
29	If yes to Question 29, its type was/were	A. Overdose B. Under dose C. Both	
30	Have you administered a medication to wrong patients in the last 12 months?	A, yes B, no	
31	Have you made any error regarding the route of medication administration in the last 12 months?	A, yes B, no	
32	If yes to Question 32, which route?	A. Enteral route B. Parenteral route C. Topical route D. Others (specify) _____	
33	Have you administered medication 30 minutes before or after the ordered time in the last 12 months?	A, yes B, no	
34	Have you document all medications given and conditions of the patient in the last 12 months?	A, yes B, no	
35	Have you made errors during the preparation of medications for	A, yes B, no	

	administration in the last 12 months?		
36	Have you been checking the expiry date of a medication before administration?	A, yes B, no	

PART 5	**Based on your perception what are the contributing factors for errors in medication administration? Is it due to:**	*yes*	*No*
	5.1. Lack of sufficient training?		
	5.2. Lack of experience?		
	5.3. Insufficient staffing (workload)?		
	5.4. Failure to follow the RMAs?		
	5.5. Look like/ sound like drugs?		
	5.6. Wrong prescription?		
	5.7. Unclear verbal order?		
	5.8. Illegible handwriting by prescribers?		
	5.9. Wrong dispensing?		
	5.10. Interruption during medication administration?		
	5.11. Nurses write a prescription in place of physicians?		
	5.12. Others, specify_____?		

Thank you very much for taking your time to answer this questionnaire!