



ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF EMERGENCY MEDICINE

KNOWLEDGE, ATTITUDE AND ASSOCIATED FACTORS TOWARDS
MEDICATION ERROR AMONG NURSES WORKING AT ICU IN SELECTED
PUBLIC HOSPITALS, ADDIS ABABA, ETHIOPIA, 2023.

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A THESIS SUBMITTED TO THE DEPARTMENT OF EMERGENCY
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ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
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I, the undersigned MSc student, declare that I have submitted my original work on a title “knowledge, attitude and associated factors towards medication error among nurses working at ICU in public hospital, Addis Ababa, Ethiopia, 2023” for the examination.

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STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis.

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LIST OF ACRONYMS AND ABBREVIATIONS

ALERT=All Africa Leprosy, Tuberculosis and Rehabilitation Training

AaBET=Addis Ababa Burn, Emergency & Trauma Hospital

CI=Confidence interval

FMOH=Federal Ministry of Health

ICU=Intensive care unit

ME=Medication error

NCCMERP=National coordinating council for medication error reporting and prevention

OR=Odds ratio

PI=Principal investigator

TASH=Tikur Anbessa specialized hospital

USA=United states of America

WHO=World Health Organization

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ABSTRACT

Background: Medication errors are a significant concern in healthcare and among the most prevalent types of medical errors. Medication errors can happen at any stage of the medication use process: prescribing, transcribing, dispensing, and administering, and they can jeopardize the lives of intensive care unit patients. In particular, these errors occur more frequently in intensive care unit settings due to their unique medical framework. Currently, little is known about the knowledge and attitudes of nurses working in the Ethiopian intensive care units regarding medication errors.

Objective: The aim of the study was to assess knowledge, attitude and associated factors towards medication error among nurses working in intensive care unit at selected public hospital, Addis Ababa, Ethiopia 2023

Methods: An institution-based cross-sectional study was conducted on 122 randomly selected nurses working in the ICUs of selected public hospitals in Addis Ababa from March 15 to April 15, 2023. The data collection tool was developed by reviewing relevant literature and BSc nurses who received training were responsible for data collection. The data was input into EPI-data version 4.6 before being cleaned and analyzed with the Statistical Package for Social Science (SPSS) version 26 software. To summarize the findings, descriptive statistics were utilized, and univariable and multivariable logistic regression analysis were used to analyze the relationship between the outcome variable and independent variables using the Odds ratio. The significance of statistical associations was tested with a 95% confidence interval (CI) and p -value (<0.05). Results were presented with text, graphs, figures, and tables.

Result: The study involved 122 nurses. About 50.8% of the participants were male and the mean age was $30.16 \text{ SD} \pm 3.455$ years. A significant proportion of the respondent (75.5%) didn't have medication error reporting training before. This study showed that ($n=72, 59\%$) and ($n=67, 54.9\%$) % of nurses had inadequate knowledge and positive attitude regarding medication error respectively. Training was strongly associated with adequate knowledge of the participant at p -value < 0.05 [AOR 2.688, 95% CI (1.02, 7.03)]. Sex [AOR 4.5, 95% CI (1.7, 11.6)] and work experience [AOR 5.9 95% CI (2.1, 16.5)] were strongly associated with the attitude of the participants at a p -value < 0.05 .

Conclusion and Recommendation: Nurses were shown to have inadequate knowledge and positive attitudes towards medication errors. However, there was a significant association between

knowledge level and training. It is therefore recommended to provide in-service training for nurses to enhance their understanding of safe medication management and reporting of medication errors.

Key words: Knowledge, Attitudes, Nurses, Medication error

1. INTRODUCTION

1.1. Background

Medication error (MEs) are significant issues in health care and one of the most prevalent forms of medical errors. To prevent or treat sickness, the majority of people in the globe will take medications at some time in their lives. Even if a medicine is taken incorrectly, it can occasionally cause major harm, disability, and even death. MEs can occur during prescribing; dispensing and administration of medications, and in primary, secondary and tertiary care settings. Drug therapy is the most common intervention prescribed by physicians, and the distribution and administration of medication represents a major duty of hospital-based pharmacists and nurses(1).

Nurses are primarily responsible for ensuring the safe administration of medications, even though there are several steps in the process of administering medications to patients that call for coordination between doctors, registered nurses, and pharmacists.(2).

Medication administration is a fundamental nursing role, with nurses spending up to 40% of their time doing it. It necessitates advanced understanding, decision and expertise anchored in pharmacological concepts, but regrettably, mistakes can have catastrophic effects for patients and legal ramifications for nurses.(3)

Medication error, as defined by the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) is characterized as “any preventable event that may cause or lead to inappropriate medication use or patient hurt while the medication is in the control of the health care professional, patient, or consumer. Such events can be related to professional practice, health care products, procedures, and systems, comprising prescribing, order communication, product labeling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use”(4)

Medication errors can happen at any stage of the medication usage process, including prescribing, transcribing, distributing, and/or administration. However, previous research has shown that medication errors most typically occur during the administration phase.(5). The most common forms of administration errors found were wrong dose, wrong time, wrong drug, wrong route, omission of doses, wrong patient, lack of documentation, and technical errors(6, 7). Nurses can promote patient safety by preventing medication error before they reach to the

patient by adhering to the eight rights of medication administration as well as reporting medication administration errors. (6, 8). The eight medication administration rights are the right patient, right drug, right time, right route, right dose, right reason, right response and right documentation (9).

Nurse medication administration errors can have a substantial impact on a patient's health care costs, quality of life, and the way nursing care is delivered. As a result, it is critical to improve nurses' awareness of medication errors and their implications in order to address these issues. (10). According to certain study findings, nearly fifty percent of medical errors were caused by a lack of understanding and performance. Additionally, medication error has been linked to nursing care negligent conduct. (10) .

When nurses give nursing care with a positive attitude, patient safety and safe practices are ensured. Nurses with a positive attitude are continually on the lookout for exceptional nursing practice. Nurses who saw their profession as “just a job” were more likely to make medication error.(10, 11).

As a result, the intention of this study is to determine the levels of knowledge and attitude of nurses working in ICUs at selected public hospitals in Addis Ababa, Ethiopia, regarding medication error.

1.2. Statement of the problem

Medication errors are a leading cause of preventable harm in healthcare systems around the world, accounting for about 50% of all preventable harm in medical care. Prescription and monitoring errors are the most common causes of medication-related harm. The estimated cost of medication errors is \$42 billion per year globally.(12). According to the World Health Organization (WHO), medication errors result in one fatality per one million individuals. (13). The impact of these errors includes loss of human life, decreased confidence in the healthcare system, and reduced quality of life for patients. Additionally, medication errors can result in lower satisfaction, morale, and dissatisfaction among healthcare workers.(14). Medication errors are common in critical care, with patients receiving twice as many drugs as non-ICU patients.(15).

On an average day, severely ill patients admitted to an ICU experience 1.7 medical errors (16). Medication error made up 78% of all medical errors in US intensive care units, according to research by Rothschild et al (17). Similarly a study done in Addis Ababa public hospitals and Jimma university specialized hospital exhibited that the prevalence of medication administration error in ICU were 61.1% and 51.8% respectively (18, 19). The patient's state, the healthcare professionals, the medicine, the ICU environment, or the organization are some of the variables that might lead to medication mistakes in the ICU (20). However, the person who prepares and administers the drug may also have a significant impact on the mistakes. These responsibilities are primarily performed by registered nurses. Errors in medication were significantly predicted by an inadequate level of knowledge among ICU nurses (21). Additionally, ICU nurses' poor attitudes regarding the use of medications, such as negligence disregard for rules, and malpractice, are linked to a rise in medication errors (21).

A complicated ICU setting may be the source of distraction that causes nurses to make more medication mistakes, according to a research conducted in Italy (22).

A study conducted in Punjab, India to examine Nurses' Knowledge Regarding Medication Error discovered that 61% of nurses had an average knowledge score, 32% had a poor score, and 7% had an good score (23). A study done in Nigeria to investigate Knowledge and attitude Of ME among nurses shows that significant number (73.6%) of the nurses employed in the study had

adequate knowledge about medication error, and the more than half (72.6%) had a positive attitude regarding the prevention of medication error in the hospital (24).

Saudi Arabian research that looked at tertiary hospital physicians and nurse's knowledge, attitudes, and practice about reporting medication errors discovered that more over half of the participant had a clear knowledge. of these errors and positive attitudes regarding reporting them (11). Furthermore, the study discovered that females and nurses had higher positive attitudes about reporting medication errors than males and physicians (11).

Perhaps the majority of existing literatures cover the incidences and implications of medication errors. As a result, the objective of this study is to determine nurses' knowledge and attitudes about medication error in the ICU.

1.3. Significance of the study

Medication errors are seen as a serious problem that can compromise patient safety, lengthen hospital stays, raise expenditures, and increase the patient fatality rate. These outcomes could lead to patients and their families losing faith in the healthcare system and being less satisfied with it. Medication error impacts not only individual patients but also the whole health-care system. Nurses are the first health care personnel to offer treatment to patients and are in charge of administering medicines and managing patients in the event of unintended outcomes

Nevertheless, little research has studied this critical problem in developing countries including Ethiopia to help reduce its impact on health and economic systems. To my knowledge, no previous studies were conducted in this area. Therefore, this study aimed to investigate knowledge and attitudes towards medication error among nurses in the ICU and assess their differences according to certain variables.

In addition, this study will serve as a baseline for other researchers who wish to undertake additional research in the field of medication error prevention. Furthermore, it will help to bridge the information gap by providing information needed to enhance nurses' knowledge and attitudes towards medication errors.

2. LITERATURE REVIEW

2.1. Knowledge of nurses towards medication error

A study conducted in Punjab, India on 100 nurses aimed at assessing Knowledge about medication error among nursing staff discovered that 61% of nurses had an average knowledge score, 32% had a poor score, and 7% had a good score (23). A similar study done in India to measure the awareness about medication error among health care professional (n=456) discovered that 39.48% of respondents were having good knowledge regarding the fundamentals of medication error. Additionally knowledge regarding reporting medication errors was excellent in 56.65% of respondents (25).

A study with a cross-sectional design carried out in major Jeddah hospitals among 408 nurses approximately 55% of the participant shown a good knowledge (26). Another study done in Saudi Arabia, among health practitioners regarding medication error reporting in a tertiary care setting over fifty percent of participants(Nurses= 303) claimed to have a clear knowledge of the definition of medication errors (56.6%) (11).

A study conducted in four Palestinian hospital intensive care units found that the majority of nurses (88.5%) had unsatisfactory knowledge as a pretest score regarding eight rights of medication administration, this improved after the educational booklet introduction and related sessions, with 92.3% of critical nurses having satisfactory knowledge as a post test score. In terms of IV drug administration recommendations, 58% of research subjects had satisfactory knowledge score pre-test, which increased after the instructional booklet to 96.2% who have satisfactory knowledge (27).

A research conducted at Al Minia University Hospital in Egypt in the critical care units found that the majority of nurses had unsatisfactory knowledge levels (91.7% and 80%,) on general knowledge and drug administration errors respectively. In contrast, (58.3%) only got a satisfactory score for drug preparation errors. (28). A similar study done at kafrelsheikh university hospital, Egypt had unsatisfactory levels of knowledge regarding all components of medication safety (29).

A study done in Nigeria to assess knowledge of nurses shows that all (100%) respondent had good knowledge of medication error .Only 195 (75.3%) are aware that Medication Errors must be reported whereas 115 (44.4)% are aware of existing institutional departmental medication

error reporting system and how to report in the hospital (30). A comparable research conducted in Calabar, Nigeria among nurses in neuropsychiatric hospitals found that the majority (73.6%) of the nurses employed in the study had adequate knowledge about medication error (24).

A cross-sectional study done in educational and therapeutic hospitals of Khorramabad, Iran among 85 randomly selected nurses 62.8% of the cases had moderate knowledge regarding medication error (31). Another survey conducted in Czech Republic found that 23 % of the nurses had sufficient knowledge and in 63 % relatively sufficient knowledge regarding medication error (32).

A study done in Sik hospital north Malaysia, up on 48 registered nurses, 54% had medium, 46% had high and none had low scores regarding medication (33). A cross sectional study done in Saudi Arabia (n =89) shows that majority of the attending nurses(46%) lack sufficient knowledge about pharmacology and pharmaceutical calculations (34).

2.2. Nurses attitude toward medication error

A study done among 100 staff nurses working in Kanchi Kamakoti Childs Trust Hospital, Chennai showed that 62% of them had a favorable attitude towards medication error prevention(35). A study done in Malaysia among nurses towards medication error reporting a large proportion of the participants showed a positive attitude (36).

A Study conducted in Major Jeddah Hospitals in Saudi Arabia revealed 50% of the individuals polled had a positive attitude about medication error (11). A cross sectional study undertaken in Taiwan show that participants' attitudes towards the reporting of MAEs were inclined towards positive (agree: 67.8%), with their most negative attitude being that whether or not to disclose should depend on the scenario; when the patient is unhurt, it is not necessary to report (37).

A study done Calabar ,Nigeria on nurses in neuropsychiatric hospital found that 74 (72.5%) out of the 102 respondents had positive attitude towards medication error, whereas 28 (27.5%) had negative attitude (24). A study done Northwest Bank Governmental Hospitals shows that 78% of the nurses disclose medication error they commit verbally and 59% of them said that they write an incident report too if they commit a medication error (38).

According to a study done in Georgia respondents acknowledged the importance of reporting errors 94% strongly agreed that medication errors should be reported even when no harm resulted to the patient and 77% were generally supportive of the idea that the patient or family

member has a right to know(39). A study done in the Kingdom of Saudi Arabia the degree of attitude was high among the majority (41%) and average among 37% towards medication error reporting (40).

2.3. Factor associated with KA of nurses towards medication error

A study on the knowledge, attitude, and practice of nurses in the kingdom of Saudi Arabia regarding medication error reporting, only the greater years of experience revealed a significant influence on the higher level of knowledge and attitude (40). According to a study done in Czech Republic regarding medication errors at intensive care units nurses' knowledge and attitudes revealed that University-educated nurses achieved an average grade of 1.86 while secondary-educated nurses achieved an average mark of 2.02 ($p < 0.05$) (32).

A study to assess staff nurses' knowledge of medication errors at SGRD Hospital in Amritsar, Punjab, discovered a significantly significant relationship between knowledge and the average number of patients seen per day and any in-service education on medication errors (23).

According to a study done in Calabar, Nigeria towards KA of nurses regarding medication error in Neuro- psychiatric hospital ,the factors discovered to significantly influence safe medication among nurses in the hospital were individual negligence, excessive workload, inadequate staff strength, poor working environment, lack of staff and training, lack of equipment and supplies, non-regular review of patient's drugs by doctors, and prescription of under dosage drug by doctors (24).

A study done in Major Jeddah Hospitals factors associated with medication error include age groups of less than 25, 25 to 35 years old, type of hospital, previously attending a MER training, poor knowledge and negative attitude (26).

A study done in India shows that there was a significant relationship between level of knowledge, attitude and practice towards prevention of medication error in demographic variables such as age, educational status, total years of experience as staff nurse and total years of experience in the unit/ward (35).

2.4. Conceptual framework

The conceptual framework below illustrates various factors and how they are related to nurses' KA of medication errors. Socio-demographic, professional, and organizational characteristics were among those considered.

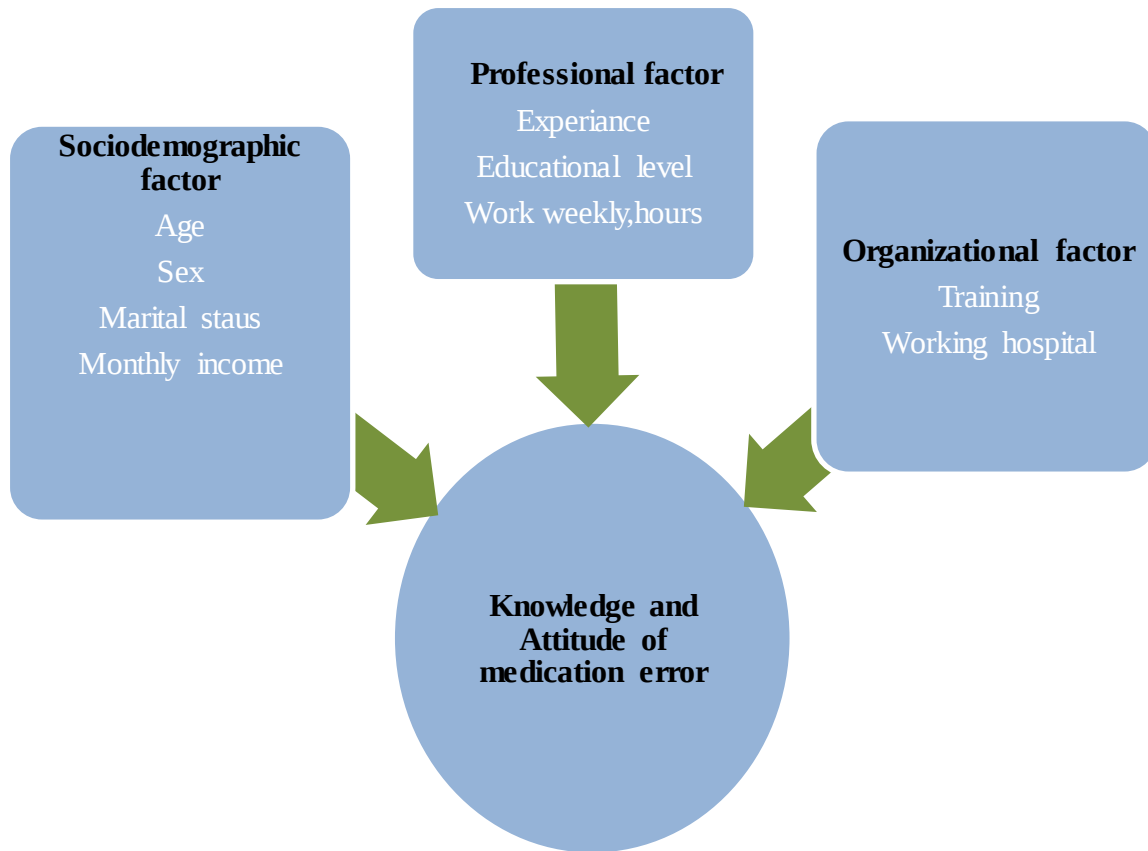


Figure1: conceptual framework reflects the knowledge, attitude and associated factor in medication error towards nurses working in ICU (24)

3. OBJECTIVE

3.1. General objectives

- ✓ To assess knowledge, attitude, and associated factors towards medication error among nurses working in ICU at selected public hospitals, Addis Ababa, Ethiopia 2023.

3.2. Specific objectives

- ✓ To assess the knowledge towards medication error among nurses working in ICU at selected public hospitals, Addis Ababa, Ethiopia 2023.
- ✓ To assess the attitude towards medication error among nurses working in ICU at selected public hospitals , Addis Ababa, Ethiopia 2023.
- ✓ To identify factors associated with knowledge and attitude towards medication error among nurses working in ICU at selected public hospitals , Addis Ababa, Ethiopia 2023.

4. METHOD AND MATERIAL

4.1. Study setting

The study was carried out at six different public hospitals in Addis Ababa. Tikur Anbessa specialized hospital (TASH), Zewditu Memorial Hospital, Addis Ababa Burn Emergency and Trauma hospital (AaBET), Eka Kotebe general hospital, All Africa Leprosy and Rehabilitation training center (ALERT), and Yekatit 12 hospital medical college are among the institutions. These hospitals are selected by lottery method and because of the availability of ICU service.

TASH: The country's largest referral hospital has over 800 beds. In addition, the major teaching hospital for most fields' clinical and pre-clinical training. The ICU has 12 adult bed capacity and has 36 nurses working at ICU.

ALERT: one of the other specialized hospitals. Has 273 beds from which 11 beds are in ICU and has 30 nurses working in ICU.

AaBET: is the biggest trauma facility found in Addis Ababa that is an affiliate of SPHMMC. The hospital has a total of 190 beds and has 30 nurses working in the ICU.

Eka kotebe: located in yeka sub city. The hospital was built as part of an expansion to Amanuel mental specialized hospital. Since March 13th 2020 the hospital converted into covid-19 treatment center for this purpose the hospital capacity for inpatient service has been maximized to 600 beds including 20 functioning ICU beds with 30 nurses working in ICU.

Zewditu memorial: is a teaching and general referral hospital linked with college of health science Addis Ababa university. it has 156 beds of which 10 ICU beds and has 28 nurses working in ICU.

Yekatit 12: is one of the governmental hospitals which gives different services like medical, surgical, pediatrics, OR and ICU. The hospital has a total of 265 beds out of which 10 beds are found in ICU and 26 nurses working on it.

The study was carried out between March 15 and April 15, 2023.

4.2. Study design

An institutional based cross-sectional study was undertaken between March 15 and April 15, 2023 GC.

4.3. Population

4.3.1. Source of population

All nurses who are working in ICU at a public hospital in Addis Ababa city, Ethiopia.

4.3.2. Study population

All nurses who are working in ICU at selected public hospitals in Addis Ababa city, Ethiopia.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

Nurses who are working in the ICU of selected public hospitals in Addis Ababa during the data collection period and have at least 6 months' experience in ICU.

4.4.2. Exclusion criteria

- ✓ Nurses on sick or maternity leave, as well as those on yearly leave, were not eligible.
- ✓ Nurses who refused to participate in the study were excluded.

4.5. Variable of the study

4.5.1. Dependent variables

- ✓ Knowledge of nurses regarding medication error
- ✓ Attitude of nurses regarding medication error

4.5.2. Independent variable

- ✓ Socio-demographic factor (Age, sex, Marital status, Monthly income)
- ✓ Organizational factors (Training, Institution currently working)
- ✓ Professional factor (Work experience, Educational level, Working hr. per week)

4.6. Sample size determination

The study's sample size was obtained using a single population proportion formula and from Umoh et al(24) P value taken for knowledge proportion 73.6% and attitude 72.6% for the study with Z= standard normal deviation of 1.96 corresponding to 95% confidence interval.

- ✓ Confidence interval= 95%
- ✓ Margin of error (d) = 5%
- ✓ Non-response rate = 10%
- ✓ The formula for calculating the sample size (n) is:

$$n = \frac{(Z\alpha/2)^2 p x (1 - p)}{d^2}$$

Where

- ✓ n= sample size
- ✓ $Z\alpha/2$ = Z-score at 95% confidence interval = 1.96
- ✓ p=proportion
- ✓ $1-P=Q$
- ✓ d= marginal error=0.05 (5%)

Therefore, n for knowledge becomes

$$n = \frac{(1.96)^2 0.736 x (1 - 0.736)}{(0.05)^2} = 299$$

Number of nurses calculated using proportion of attitude, 72.6%

$$n = \frac{(1.96)^2 0.726 x (1 - 0.726)}{(0.05)^2} = 306$$

So, the largest number took and Since the population is less than 10,000 then, correction formula was implemented, $nf=n/(1+n/N)$, $nf = 306/ (1+306/180) = 116$

The final sample size was 128 after a 10% non-response rate applied.

4.7. Sampling procedures

Six public hospitals were chosen randomly using lottery method out of 12 public hospitals with ICU set-up in Addis Ababa town but Amanuel specialized hospital is excluded because of unavailability of ICU setup. The final sample size was assigned to each hospital depending on the number of nurses working in the ICU. Based on the information given from each public hospital, the overall numbers of nurses working in ICU were 338.

Table 1:Nurses working in intensive care units in selected public hospitals in Addis Ababa, Ethiopia, in 2023.

S.NO	Name of hospital	Number of nurses
1	TASH	36
2	Zewditu Memorial Hospital	28
3	ALERT	30
4	Eka kotebe general hospital	30
5	AaBET Hospital	30
6	Yekatit 12 hospital medical college	26
	Total	180

Using the formula below, the total sample size was assigned proportionally using stratified proportional allocation for each selected hospital.:

$$n_i = \frac{N_i \times n}{N}$$

Where:

n_i = Total sample size in each hospital

N_i = Total Number of nurses working at ICU of each selected hospital

n = Total sample size calculated in the selected hospitals (128)

N = Total Number of nurses working at ICU in the selected hospitals (180)

Total sample size using the aforementioned formula:

For TASH was $(36 \times 128 \div 180) = 25.6 = 26$

For Zewditu memorial hospital was $(28 \times 128 \div 180) = 20$

For ALERT was $(30 \times 128 \div 180) = 21.33 = 21$

For Eka kotebe general hospital was $(30 \times 128 \div 180) = 21.33 = 21$

For Yekatit 12 hospital was $(26 \times 128 \div 180) = 18.5 = 19$

For Aabet Hospital was $(30 \times 128 \div 180) = 20.53 = 21$

Finally, the study's participants were chosen using a simple random sampling procedure.

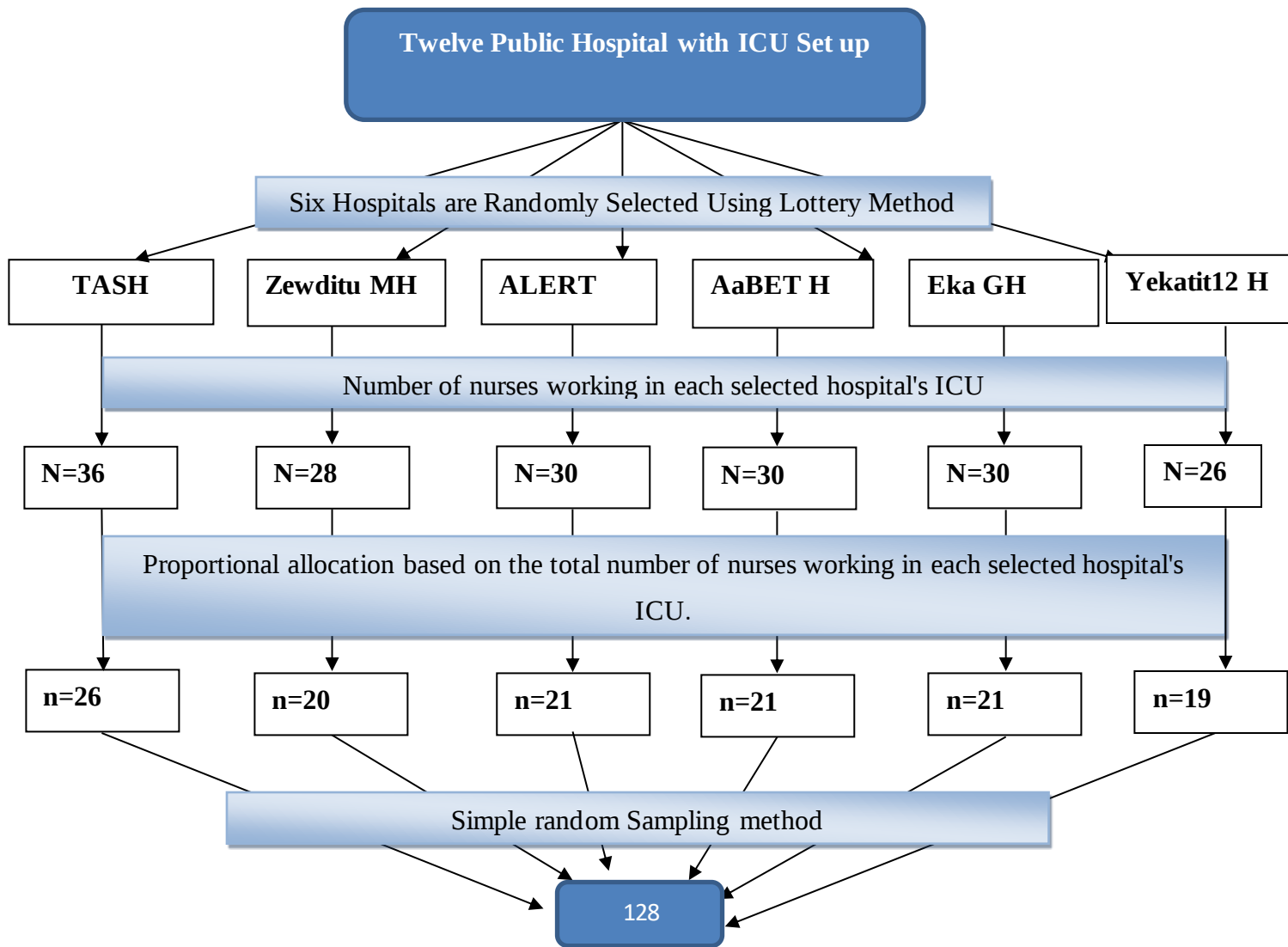


Figure 1: Diagrammatic presentation of sampling method of the study on the assessment KA towards medication error among nurses working in ICU at selected public hospital in Addis Ababa, Ethiopia 2023.

4.8. Operational definition

Adequate knowledge-defined as respondents who have scored above the mean (17.07) for knowledge assessment tool.

Inadequate knowledge- defined as respondents who have scored below the mean (17.07) of knowledge assessment tool.

Positive attitude-represents those respondents who have scored equal or greater than the mean (69.48) of the attitude statements.

Negative attitude-represents those respondents who have scored less than to the mean (69.48) of the attitude statement.

4.9. Data collection tools and procedure

A self-administered standardized structured questionnaire was used to collect data. The Questionnaire was adapted from previous studies KA of nurses towards medication error (26). And, based on the input obtained, required changes were made to the phrasing of several questions that were ambiguous to the respondent. The questionnaire is divided into three sections: socio-demographic and professional characteristics of nurses (age, gender, marital status, education level, experience, monthly income, and working hours per week), organizational factors, and knowledge and attitude (KA) on medication errors.

Multiple-choice and trichotomous questions were used to assess nurses' knowledge: The instrument has 30 items (Multiple-choice = 9, Trichotomous = 21), and responses were graded "1" for right answers and "0" for incorrect ones. Meanwhile, the option "I do not know" received a "0". Based on the mean of the total score, nurses' knowledge of medication error was classified as adequate or inadequate for the dependent variables. To measure nurses' attitudes towards errors in medication, a total of 22 questions were employed. The questions were presented on a five-point Likert scale, with 5 indicating a strong agreement and 1 indicating strong disagreement. Based on the mean of the overall score, the attitude was further classified as positive or negative.

Four trained BSc nurses were recruited for data collection and participated throughout the process.

4.10. Data Quality Assurance

Before the real data collection began, a pretest was performed on 5% of the sample size of randomly selected nurses from Menelik II referral hospital. Training for data collectors was given before the data collection period. The principal investigator provided one-day training on the instrument and data collecting techniques. The study's aim, confidentiality issue, and signed consent were all discussed and ensured to all study participants. At each site, data collectors were overseen by the principal investigator. On a daily basis, the principal investigator collects completed questionnaires and rechecks them for missing values and completeness.

Cronbach's alpha was calculated to assess the tool's internal consistency. And Cronbach's alpha resulted in 0.807.

4.11. Data processing and Analysis

The collected information was cleaned and coded before being loaded into Epi-data 4.6 and exported to SPSS 26 for analysis. Descriptive statistics were used to the socio-demographic data of the participants, calculating measures of central tendency and dispersion (mean and standard deviation) for the quantitative variables (age and income), and frequencies and percentages for the categorical variables. The binary logistic regression method was employed to examine the association between dependent and independent variables. Variables having a p-value of less than 0.25 in univariable analysis were subjected to multivariable analysis. Variables with p-values less than 0.05 are considered statistically significant with an adjusted odd ratio and a 95% confidence interval in multivariable analysis. The findings were presented in the form of narrative texts, tables, and graphs.

4.12. Ethical Consideration

Ethical clearance was obtained from Addis Ababa university departments of emergency medicine and critical care. The willingness of the respondents and written consent was obtained from study participants before enrollment into the study. A letter of approval was obtained from hospital administrative entities to contact with appropriate bodies in the health institution.

4.13. Dissemination of result

The completed research thesis will be submitted to Addis Ababa University's department of emergency medicine and college of health science. The findings will be an essential source of future study. Finally, the findings will be published in national or international peer-reviewed publications. And also, the result will be disseminated to the hospital in which the study was conducted.

5. RESULTS

5.1. Socio-demographic distribution of the respondent

The study involved the participation of 122 nurses working in six public hospitals, giving a response rate of 95.31%. Among the respondents, 50.8% were male. The majority of respondents (51.6%) fell between the ages of 24-29 years, with an overall mean age of 30.16 ± 3.45 (SD). A larger proportion of respondents reported being single (54.1%), having a bachelor's degree (83.6%), and earning a monthly income between 6000-8000 Ethiopian Birr (77.9%). Additionally, most respondents reported no specific training (72.4%), and worked more than 40 hours per week (81.1%).

Table 2: sociodemographic and professional distribution of nurses working in ICU at selected public hospital Addis Ababa, Ethiopia

Variables	Categories	N (%)
Sex	Female	60(49.2)
	Male	62(50.8)
Age	24-29	63(51.6)
	30-34	40(32.8)
	35-39	19(15.6)
Marital status	Married	56(45.9)
	Single	66(54.1)
Name of the institution	Black lion	24(19.7)
	Eka kotebe	21(17.2)
	ALERT	20(16.4)
	Yekatit 127	17(13.9)
	AaBET	21(17.2)
	Zewditu memorial	19(15.6)
Monthly income	6000-8000	95(77.9)
	8001-10,000	23(18.9)
	>10,000	4(3.3)
Work experience in ICU	6 months-1 year	44(36.1)
	2-6 years	78(63.9)

Professional qualification	Degree	102(83.6)
	Masters	20(16.4)
Training on MER	Yes	30(24.6)
	No	92(75.4)
Working hr. per week	≤40hr	23(18.9)
	>40hr	99(81.1)

MER=Medication error reporting

5.2. Level of knowledge towards medication error

The study found that out of the participants, 72 (59%) had inadequate knowledge about medication errors while 50 (41%) had adequate knowledge (figure 1). In terms of identifying important aspects during medication administration, 74 (60.7%) correctly identified the most critical characteristic, which is delivering medication to the correct patient, while 83 (68%) properly replied that providing medication at the appropriate time is the least important characteristic. Only 33 (27%) correctly recognised medication-related adverse events as the most prevalent avoidable adverse events. (Table 3)

Table 3:knowledge of nurses towards medication error

s.no	Knowledge questions	Correct answers	Frequency	Percentage (%)
1	The MOST important consideration while providing drugs	Right patient	74	60.7
2	The LEAST important aspect of medicine administration	Right time	83	68.0
3	The most common avoidable adverse events linked to	Medications	33	27.0
4	The majority of medication administration errors go unreported because	The nurse is unaware an error has occurred	16	13.1
5	The use of direct observation for medication administration accuracy assessment is:	More reliable than adverse event reporting systems, when	78	63.9

		combined with medical record review.		
6	The medication administration accuracy assessment includes:	All the above	81	66.4
7	Not one of the six safe practices observed in the medication administration accuracy evaluation.	The nurse asked the patient to verify the purpose of the medication	66	54.1
8	Medication errors might occur during	Drug prescription	53	43.4
		Drug dispensing	58	47.5
		Drug administration	88	72.1
9	Medication error should not be reported to the patient or family	False	52	42.6

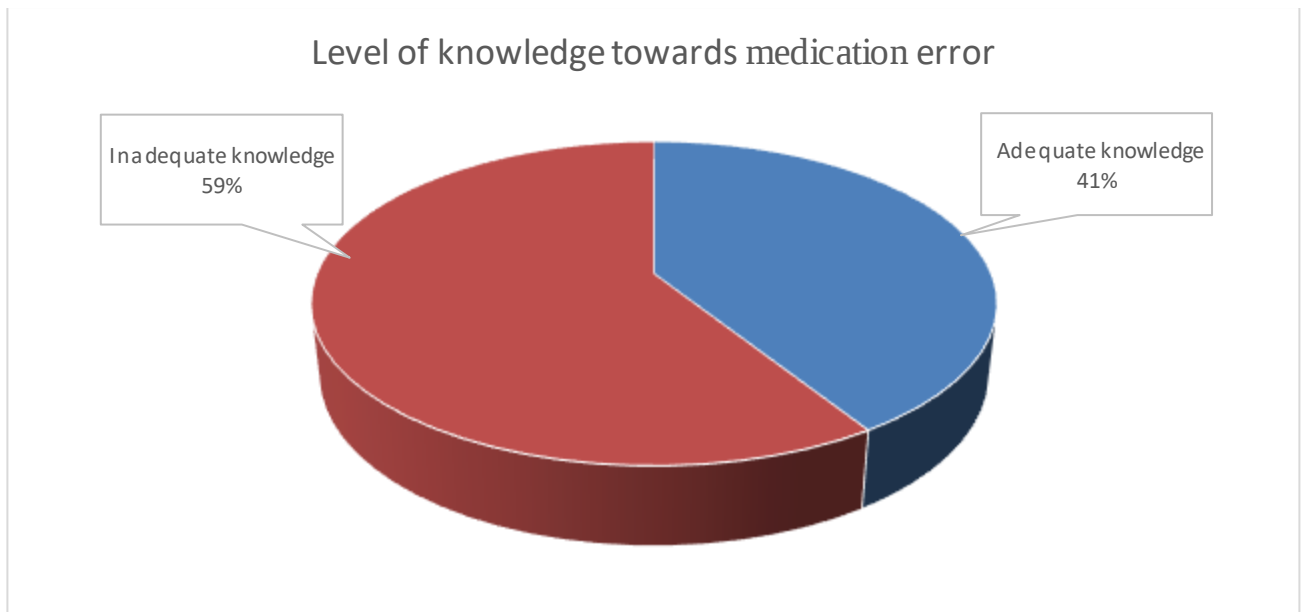


Figure 2: knowledge of nurses towards medication error

Regarding knowledge related questions on contributing factors for medication error the majority of the respondents considered that high workload (87.7%), high patient to nurse ratio

(77.9%) and interruption during medication rounds (75.4%) were correctly identified. (Table 4)

Table 4: knowledge of nurses on the contributing factor for medication error

No	Knowledge questions	Yes Frequency (%)	No Frequency (%)	I don't know Frequency (%)
A	Interruptions during medication rounds	92(75.4)	20(16.4)	10(8.2)
B	Lack of familiarity with the medications	79(64.8)	39(32)	4(3.3)
C	Lack of supervision for inexperienced staff	92(75.4)	25(20.5)	5(4.1)
D	Inadequate initial nurse training	93(76.2)	28(23.0)	1(0.8)
E	Poor quality control and management	84(68.9)	35(28.7)	3(2.5)
F	High workload	107(87.7)	14(11.5)	1(0.8)
G	Lack of medication skills competence	70(57.4)	47(38.5)	47(38.5)
H	High patient-to-nurse ratio onwards/units	95(77.9)	95(77.9)	95(77.9)
I	High levels of patient need	58(47.5)	56(45.9)	8(6.6)
J	8 rights are not followed *	91(74.6)	28(23)	3(2.5)
K	Unclear verbal instructions	75(61.5)	41(33.6)	6(4.9)
L	Poor handwriting by the doctors	85(69.7)	33(27.0)	4(3.3)
M	Drugs that have similar sounding names	85(69.7)	36(29.5)	1(0.8)

*8 rights= the right patient, the right drug, the right dose, the right route, the right time, the right documentation, the right reason, and the right response.

5.3. Attitude level of nurses towards medication error

Of all the respondents, 67 (54.9%) showed a positive attitude towards medication errors, while 55 (45.1%) exhibited a negative attitude. The respondents' mean (SD) attitude score was 69.48 ±9.15. The nurses' attitude towards medication errors was divided into positive and negative categories based on their attitude scores, Positive scores are larger than or equal to the mean, while negative scores are less than the mean. (Figure 4)

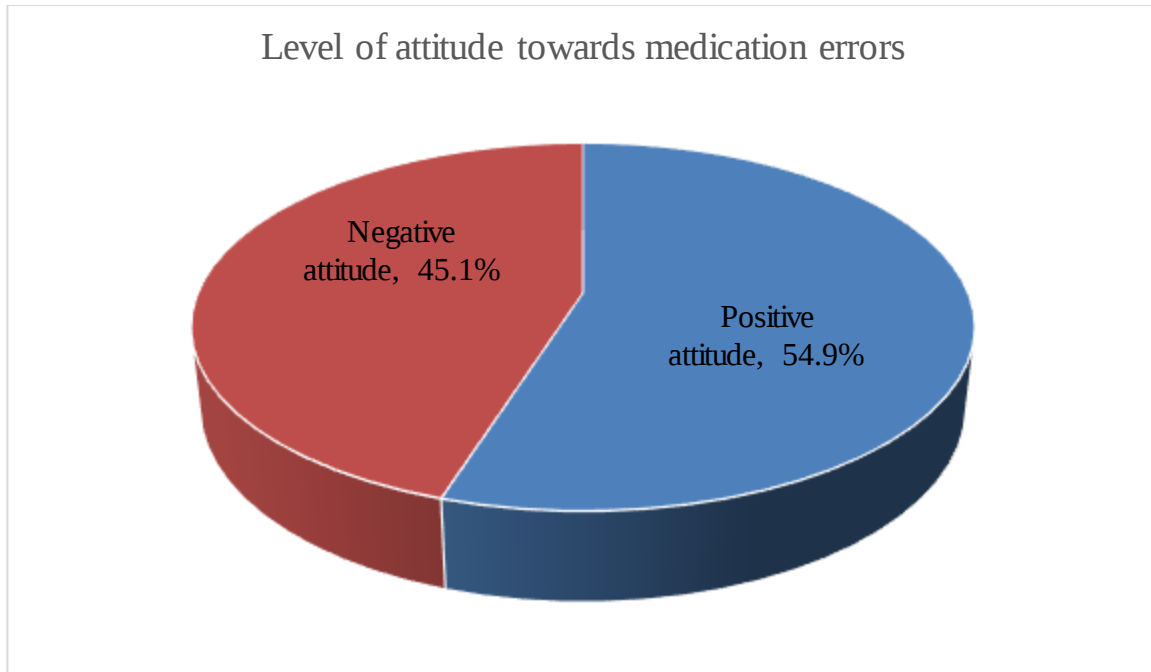


Figure 3:Attitude of nurses towards medication error

A majority of the participant stated that they would not report medication errors due to the fear of blame (54; 44.3%), being labelled as troublemakers (53; 43.4%), concern about their manager's reaction (63; 51.6%), and reluctance to appear incompetent in front of co-workers (60; 49.2%). On the other hand, the percentage of nurses who disagreed with these claims fell between 14% to 21%. (Table 5)

Table 5: Attitude question towards medication error

Attitude questions		S.disagree	Disagree	Neutral	Agree	S.agree
		N (%)	N (%)	N (%)	N (%)	N (%)
1	Fear of being blamed	5(4.1)	21(17.2)	16(13.1)	54(44.3)	26(21.3)
2	Fear of being a troublemaker	4(3.3)	21(17.2)	20(16.4)	53(43.4)	24(19.7)
3	I fear my manager's reaction	4(3.3)	13(10.7)	15(12.3)	63(51.6)	27(22.1)
4	Being appearing incompetent	4(3.3)	18(14.8)	15(12.3)	60(49.2)	25(20.5)

5	I worry about malpractice lawsuits	16(13.1)	44(36.1)	24(19.7)	33(27.0)	5(4.1)
6	I fear media exposure	24(19.7)	28(23.0)	22(18.0)	42(34.4)	6(4.9)
7	Can lead to negative attitudes towards the profession.	19(15.6)	19(15.6)	26(21.3)	47(38.5)	11(9.0)
8	Could cost my professional registration.	19(15.6)	30(24.6)	28(23.0)	32(26.2)	13(10.7)
9	Could cost my honor and dignity.	8(6.6)	29(23.8)	28(23.0)	38(31.1)	19(15.6)
10	Could cost me my job	20(16.4)	36(29.5)	18(14.8)	39(32.0)	9(7.4)
11	Some nurses are afraid of being punished if they disclose errors.	13(10.7)	17(13.9)	19(15.6)	56(45.9)	17(13.9)
12	Some nurses might not report errors because of cultural differences in what constitutes an error.	13(10.7)	24(19.7)	26(21.3)	51(41.8)	8(6.6)
13	Sanctions should be proportionate to consequences and self-reported errors.	14(11.5)	32(26.2)	30(24.6)	44(36.1)	2(1.6)
14	In some cases, it's better to ignore medication errors.	3(2.5)	20(16.4)	18(14.8)	50(41.0)	31(25.4)
15	Medication errors are inevitable and unavoidable	4(3.3)	42(34.4)	23(18.9)	32(26.2)	21(17.2)
16	Errors in medication can be reduced by educational initiatives and training sessions.	9(7.4)	16(13.1)	14(11.5)	50(41.0)	33(27.0)
17	More studies and modern methods are needed to increase scientific and practical skills.	12(9.8)	11(9.0)	15(12.3)	54(44.3)	30(24.6)

18	Bar-coding technology can help reduce medication error.	9(7.4)	16(13.1)	35(28.7)	45(36.9)	17(13.9)
19	Dispensing technology can help reduce medication errors.	10(8.2)	18(14.8)	27(22.1)	48(39.3)	19(15.6)
20	Report medication error whether or not the patient is harmed.	16(13.1)	16(13.1)	21(17.2)	49(40.2)	20(16.4)
21	Patients and families have a right to be told about medication errors.	13(10.7)	25(20.5)	23(18.9)	46(37.7)	15(12.3)

5.4. Factor affecting knowledge and attitude of nurses

In bivariable logistic regression analysis, the factors shown to be significantly associated with knowledge of medication error with a p-value<0.25 were age, sex, professional qualification, work experience and training. Out of the variables entered into multivariable logistic regression training was significantly associated with the level of medication error knowledge at the p-value < 0.05. The odds of having adequate knowledge towards medication errors among those who took training was three times as compared to those who didn't take it. Those who took training were three times more likely to have good knowledge [AOR= 2.68, 95% CI (1.02,7.03) P-value=0.044]. (Table 6)

In bivariable logistic regression analysis, factors that revealed to be significantly linked with a degree of attitudes towards medication error with p-value< 0.25 were sex, marital status, job experience, and working hours per week. At p-value <0.05, sex and work experience were shown to be significantly linked with the level of attitude towards medication error among the factors incorporated into multivariable logistic regression. The odds of having negative attitude toward medication errors among female nurses were 4.5 times as compared to male nurses [AOR= 4.5, 95%CI (1.75,11.66) P-value=0.002] and the odds of having a negative attitude towards medication errors among nurses who had work experience of 2-6 years were 5.9 times as compared to nurses those had work experience of 6month-1year [AOR =5.9 ,95%CI (2.11,16.58) P-value <0.001]. (Table 6)

Table 6: Factor associated with level of KA of nurses towards medication error

Variables	AOR with (95%CI)	P-value
6a. Knowledge		
Training: yes ^a	2.6(1.027,7.030)	0.044*
6b. Attitude		
Sex: female ^b	4.5(1.758,11.663)	0.002**
Work experience: 2-6year ^c	5.9(2.119,16.583)	<0.001***

AOR; adjusted odds ratio reported; confidence interval in parenthesis. Variables in bold are factors that have statistically significant association with outcome variables. *p<0.05, **p<0.01, ***p<0.001, ^athose who attained training compared with who doesn't attend, ^bfemale with male, ^c2-6years work experience with 6month-1year.

6. DISCUSSION

Medication error endanger patient safety. In addition to the financial cost, patients suffer psychologically and physically as a result of medication errors. Last but not least, medication errors have a substantial impact on patient satisfaction and contribute to a rising loss of trust in the healthcare system. This study revealed important information on the level of knowledge, attitude, and associated factors towards medication error among nurses working in ICU at selected public hospitals, Addis Ababa, Ethiopia.

The response rate of the current study recorded 95.31%, which is lower than a study done in Major Jeddah Hospitals and Saudi Arabia 100%(26, 41). The high response rate they acquire might be attributed to the data gathering approach, which was done using online platforms. All of the study's participants were under the age of 40, which is consistent with studies performed in other countries (26, 41).

This finding indicates that about 41% (95% CI= 32%-50.8%) of the nurses working in ICU had adequate knowledge on medication error. The results of this study were greater than a study conducted in the ICU at Minia University Hospitals in Egypt, which was reported that about 1.7% (n=60) of study participants were having satisfactory knowledge of medication errors(28).Furthermore , it was lower than the study conducted in Nigeria (100%) and Saudi Arabia(54.9%) (26, 30). This disparity could be explained by the difference in educational curriculum in nursing programs and the provision of in-service training for nurses by their organizations. And also, the different types of assessment tools used.

According to this study to assess their knowledge about the various stage that medication error could happen most of the participant's mentioned drug prescription (43.6%), drug dispensing (52.5%) and drug administration (72.1%) which is lower than similar study done in federal neuro-psychiatric hospital in Calabar, they mentioned drug prescription (64.7%), drug dispensing (79.7%) and drug administration (92.2%)(24).This discrepancy might be due to the gap in their knowledge about the medication error definition and what constitutes an error.

According to the findings of this study the leading factor contributing to medication error was high workload (87.7%). This finding is in parallel to a study done in Zahedan hospitals and northwest bank hospitals where 97.8% and 80% of medication errors in nursing were related to tiredness due to high workload respectively(38, 42). Another finding of the current study on

contributing factors for medication error was drugs that have similar-sounding names accounts for 69.7%, this result is comparable with a study done in Saudi Arabia (41).

On multivariable logistic regression, training shown that statistically significant predictor of degree of the knowledge regarding medication error. The odds of having good knowledge towards medication errors among those who took training were three times as compared to those who didn't take it. This finding is supported by a study done in Saudi Arabia, nurses who doesn't attend training on MER were more likely prone to medication error (26).

The present study discovered that around 54.9% (95% CI=46%-67%) of respondent have a positive attitude towards medication errors, which was quite similar to a study done in Major Jeddah Hospitals (50%) (26). At contrast, this study revealed a lower attitude when compared to another comparable study done at Calabar Hospital (72.5%) (24).

This study revealed that 51.6%, 44.3% and 43.4% of nurses hesitate to report medication errors because of fear of their manager reaction, being blamed and labeled as trouble maker respectively. This result is relatively higher compared to a study done in Saudi Arabia. (41). This can be due to a lack of awareness or misunderstanding of the effect of reporting medication on patient safety and it might be the difference in policies and procedures regarding medication error reporting.

Only 40.2% of nurses think that all medication errors should be reported, regardless of whether they result in death or permanent injury and even if the error did not cause harm to the patient. This study yielded a lower outcome as than a similar study conducted by Major Jeddah Hospitals (66.9%) (26). This difference may be due to a lack of accessibility or familiarity with reporting systems in the institutions.

Sex and work experience were revealed to be statistically significant determinants of the degree of attitude towards medication error in multivariable logistic regression. The odds of having a negative attitude toward medication errors among female nurses were 4.5 times as compared to male nurses. The possible explanation may be the differences in the way that men and women perceive and respond to mistakes or errors in their work. The odds of having a negative attitude towards medication errors among nurses who had work experience of 2-6 years were 5.9 times

as compared to nurses who had work experience of 6month-1year. The possible explanation might be that nurses with 2-6 years of work experience may have had more exposure to medication errors and may have faced more challenges in preventing them. This could lead to feelings of frustration or burnout, which may influence their attitudes towards medication errors.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusion

Medication errors can have a negative impact on patient outcomes, and are considered a key indicator of patient safety that is directly related to nursing care. According to the findings of this study, the majority of nurses had inadequate knowledge and positive attitude towards medication errors. The study also discovered that training is a significant factor associated with adequate knowledge among nurses. Therefore, offering nurses regular training sessions may aid in enhancing their knowledge and lowering the frequency of medication errors.

It was also shown that being female and having work experience of 2-6 years are factors associated with negative attitudes towards medication errors. This finding suggests that interventions targeted at changing attitudes should be customized to specific demographic groups. Overall, boosting nurses' knowledge and attitudes regarding medication error is crucial to improving patient safety and minimizing medication errors in healthcare settings.

7.2. Recommendations

To hospitals

- ✓ Develop and implement regular training programs for nurses on medication safety and error prevention. These training programs should be mandatory for all nurses and should cover topics such as medication administration procedures, error reporting protocols, and methods for lowering the danger of medication errors.
- ✓ Promote a culture of openness and transparency regarding medication errors. Without fear of punishment or criticism, nurses should feel free to report errors and discuss them openly with their coworkers and managers.
- ✓ Last but not least, commend and praise nurses who show a strong dedication to drug safety and error avoidance. Nurses who report errors, take part in training programs, and take proactive measures to lower the risk of medication errors may get incentives including bonuses, promotions, or public recognition

8. STRENGTH AND LIMITATION OF THE STUDY

Like previous KA studies, this one has certain limits. Because the questionnaire employed in the study was self-administered, it had a significant self-reported bias due to participants' propensity to indicate what they think to be "socially acceptable" replies rather than genuinely. Despite these limitations, it is a multicenter study. Furthermore, it can be utilised as a baseline for future research.

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ANNEX: QUESTIONNAIRES

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF EMERGENCY MEDICINE

My name is----- . I am working as a data collector for the study being conducted on the assessment knowledge and attitude of nurses in ICU towards medication error in some selected public hospital in Addis Ababa, Ethiopia 2023.

The Aim of this study is; to assess knowledge and attitude of nurses towards medication error in some selected public hospitals in Addis Ababa, Ethiopia 2023.

Risk/Discomfort: There is no risk in participating in this research project.

Benefits: If you participate in this research project, there may not be direct benefit to you and you will not be provided any incentives to take part in this project, but your participation is likely to help us in assessing knowledge and attitude of nurses towards medication error and this will help the concerned bodies for developing appropriate interventions.

Confidentiality: The information collected from this research project will be kept confidential and information about you that will be collected by this study will be stored in a file, without your name, but a code number assigned to it and it will not be revealed to anyone except the principal investigator.

Right to refuse or withdraw: You have full right to refuse from participating in this research. You can choose not to respond to some or all questions if you do not want to give your response. You have also the full right to withdraw from this study at any time you wish.

Do you agree to participate?

Yes ☐ continue to the next page No ☐ thank the participant

Individual Consent Form

First, I would like to thank you for taking your time and participating in our study.

I the undersigned participated in the study on “assessment knowledge and attitude of nurses in ICU towards medication error in some selected public hospital in Addis Ababa, Ethiopia 2023.” on my free will and interest after being oriented about the purpose of the study.

Can you sign for your voluntariness?

Yes ----- NO-----

Signature.....

Data collector name: ----- Signature -----

Date -----

Person to Contact: If you want more information and check about this project you can contact the following people.

Principal Investigator Name and Address:

Name: Miraf Endale Tolossa Phone number: +251960080740

Email: endalemiraf@gmail.com

Do you have any questions that you want to ask me about the study?

Date

Instructions: Read each question carefully and circle the option that best suits your response.

Part I: Socio Demographic Data

S/N	Questions	Responses	Remark
1	Name of the institution	a) TASH b) ALERT c) AaBET H d) Eka kotebe GH e) Zewditu MH f) Yekatit 12 Hospital	
2	Sex	a) Male b) Female	
3	Age	----- year	
4	Marital status	a) Married b) Single c) Widow d) D) Divorced	
5	Monthly income	----- ETB	
6	Work experience in ICU	a) 6 months-1-year b) 2- 6 years c) 7- 10 years. d) >10 years	
7	Professional qualification	a) Diploma. b) BSC. c) MSC. d) Other.....	
8	Do you attend training on medication error reporting?	a) Yes b) No	

9	Working hr. per week	a) ≤ 40 hr. b) > 40 hr.	
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PART II: Knowledge assessing questions about medication error

S/N	Questions	Responses	Remark
1	Which one of the following do you consider to be the MOST important when administering medication?	(a). Right Patient (b). Right dose (c). Right route (d). Right time (e). Right medication	
2	Which one of the following do you consider to be the LEAST important when administering medication?	(a). Right Patient (b). Right dose (c). Right route (d). Right time (e). Right medication	
3	The most common preventable adverse events were related to:	(a). Culture of Safety (b). Medications (c). Administrative oversight (d). Poor communication	
4	Most medication administration errors go unreported because:	(a). The nurse is unaware an error has occurred. (b). They did not harm the patient. (c). Adverse event reporting systems are not designed to capture these data. (d). The nurse is embarrassed and avoids reporting.	
5	The use of direct observation for medication administration accuracy assessment is:	(a). Not as reliable as adverse event reporting systems. (b). More reliable than adverse event reporting systems, when combined with medical record review. (c). Strictly a research method.	

		(d). None of the above.	
6	The medication administration accuracy assessment includes:	(a). Systematic observation of eight selected fundamental practices performed by the nurse during preparation, administration, and documentation of medications. (b). Review of the medical record to extract relevant medication orders. (c). Comparison of medications administered and medications ordered to determine medication administration accuracy. (d). All the above.	
7	Which of the following is not one of the eight safe practices observed in the medication administration accuracy assessment?	(a). The nurse compared the medication with the medication administration record. (b). The nurse ensured the medication was labeled throughout the process from preparation to administration. (c). The nurse asked the patient to verify the purpose of the medication. (d). The nurse charted/documented medication administration immediately after completion	
8	Medication error could result during (choose as many as possible)	a) Drug prescription b) Drug dispensing c) Drug administration d) None of the above	
9	Medication error should not be reported to the patient and family	a) True b) False c) I don't know	
10. Based on your experience as a nurse, what do you consider to be the contributing factors to medication errors?			

No	Item	yes	No	I don't know
A	Interruptions during medication rounds			
B	Lack of familiarity with medications			
C	Lack of supervision for inexperienced staff			
D	Inadequate initial nurse training			
E	Poor quality control and management			
F	High workload			
G	Lack of medication skills competence by nurses			
H	High patient-to-nurse ratio onwards/units			
I	High levels of patient need			
J	8 rights not followed ("eight rights": the right patient, the right drug, the right dose, the right route, the right time, the right documentation, the right reason, and the right response).			
K	Unclear verbal instructions between doctors and nurses			
L	Poor handwriting by the doctor			
M	Drugs that look alike or have similar sounding names			
11 Based on your experience as a nurse, which of the following sentences is correct?				
A	Forgetting to administer medication on time is an example of unethical behavior.			
B	The first thing you should do if you make a medication error is to watch the individual closely.			
C	Medication errors must be documented only in a medication error report form.			
D	ALL medication may be crushed.			
E	You should sign off on the medication that you administer before successfully administering the medication.			
F	You should refuse to give the medications that your colleague prepare			
G	You should erase or "white out" the error if you accidentally mark the Medication Administration Record (MAR) for medication for the wrong time of the day.			

H	You should complete a medication error form before the end of the shift if you discover I did not make the error after informing the charge nurse			
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Part III: Attitudes of ICU nurses toward medication errors.

Instructions: Read each question carefully and tick (✓) the option that best suits your response.

No	Statement	S.disagree	Disagree	Neutral	Agree	S.agree
1	I would rather not to report a medication error than being blamed when I report it					
2	I would rather not to report a medication error than risk being labeled a troublemaker					
3	I would rather not to report a medication error for fear of my manager's reaction					
4	I would rather not to report a medication error than look incompetent in front of my coworkers					
5	I fear judicial issues					
6	I fear malpractice suits					
7	I fear media exposure in public					
8	I believe reporting medication errors makes patients or their families develop negative attitudes toward my profession					
9	I believe reporting a medication error could cost me my professional registration					
10	I believe reporting a medication error could cost me my honor and dignity					
11	I believe reporting a medication error could cost me my job					
12	I believe some nurses do not report errors because they fear punishment					
13	I believe some nurses do not report errors because of different cultural views about what constitutes an error					
14	I believe sanctions against nurses should be proportionate to the consequences of the error and whether the nurse has self-reported					
15	I believe in some circumstances it is better to ignore a medication error					
16	I believe most of medication errors are inevitable and unavoidable					
17	I believe educational interventions and training courses can reduce medication					

	errors and consciously approach adverse drug events.					
18	I believe more studies and the use of modern methods for drugs information are essential for increasing scientific and practical skills					
19	I believe the use of bar-coding technology on medication labels can reduce medication error					
20	I believe the use of dispensing technology can reduce medication errors					
21	I believe it is important to report medication errors even whether or not harm to the patient may occur					
22	I believe that patients and families have the right to be told about medication errors and whether or not harm to the patient may occur					