

PREVALENCE AND TYPES OF DISPENSING ERRORS IN NEKEMTE REFERRAL HOSPITAL PHARMACY, NEKEMTE, EAST WOLLEGA ZONE, OROMIA REGIONAL STATE, ETHIOPIAGinenus Fekadu^{1*}, Firomsa Bekele² and Dinka Dugassa³¹Department of Pharmacy, College of Health Science, Wollega University, Nekemte, Ethiopia.²Department of Pharmacy, College of Health Science, Metu University, Metu, Ethiopia.³Shambu General Hospital, Fincha Valley Medical Collage, Shambu, Oromia, Ethiopia.

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Corresponding Author*Ginenus Fekadu**Department of Pharmacy,
College of Health Science,
Wollega University,
Nekemte, Ethiopia.**ABSTRACT**

Introduction: The purpose of dispensing is to ensure that an effective form of the correct drug is given to the right patient in the prescribed dosage and quality with clear instruction and in a container which maintain the potency of drug. However, there is limited data in Nekemte Referral Hospital showing the extent of dispensing error and their cause. Objective: To identify and describe the prevalence and types of dispensing errors and their cause in Nekemte Referral Hospital Pharmacy (NRHP). Method:- A cross sectional prospective study design using structured observational check list was conducted in Nekemte Referral Hospital Pharmacy from April to May,2018. In addition, in depth interview was conducted with the hospital pharmacists to explore the possible cause dispensing error. Result:-384 patient prescription had been analyzed and the dispensing error were obtained and had been categorized in to five groups. Those include error during checking, patient identification, content error, labeling error, counseling error. From a total of 384 prescription paper observed (75.5%, n=384), (91.6%,n=384),(98.9%,384) of prescription were dispensed without checking the patient's name, age, sex respectively and 300(78.1%) patients were receiving the verbal counseling on how much to take and when to take the dispensed drug while (21.9,n=384) are dispensed without pharmacist's counseling on how much to take and when to take the drug. From 716 dispensed drugs or items all of the drugs dispensed did not include patient name on the labeling and content error was recorded (21.8%,n=384). Conclusion:- From this it was found that in NRHP there were four major types of error, which is error during patient identification, content, labeling and counseling error. Among this labeling and counseling error take the higher figure and content error the least number. Also There were a number of factors cited by the pharmacist/druggist as potentially affecting dispensing error rate in order of their relevance these are high prescription volume, work load, stress, fatigue, storing drug with similar name near to each other many items in one prescription and the policy of the hospital pharmacy are the most common.

KEYWORDS: Prevalence, Nekemte Referral Hospital Pharmacist, Dispensing Error.**INTRODUCTION**

Medication errors are serious problem in health care service and can be a source of significant morbidity and mortality in health care setting. A report from medical institute suggested that medical error account for 44,000 to 98,000 death per year and is recognized as the eight leading cause of death.^[1]

Medication error can occur anywhere within the system of drug prescribing, distribution, administration and may be due to a mistake by pharmacist, physician, nurse, or other medical personnel.^[11]

Many prescription errors are made during the various

phase of medication usage in the hospital environment. Dispensation is one of the most sensitive phases of the process.^[3]

Dispensing medication is a core function of pharmaceutical care and it play a central role in the provision of rational drug therapy. It refers to the provision of appropriate items of prescriptions with sufficient information to use the medication properly. It may be based on prescription and/or an oral request of users depending on the type of drugs to be dispensed.^[10]

Good dispensing practices ensure that the correct drug is delivered to the right patient in the required dosage and quantities with clear instruction. Dispensing process

includes all the activities that occur between the times of the prescription and/or oral request of the patient or care provider is presented and drug or other items are issued to.^[14]

Dispensing error refers to any unintended deviation from an interpretable written prescription or medication order. Any unintended deviation from prescription or regulatory reference or guidelines affecting dispensing procedures is also considered as dispensing error.^[7,8]

Dispensing errors can arise at any stage during the dispensing process. Any error or failure in dispensing process can seriously affect the care of the patient and also with economic consequences. Some of the undetected errors may cause serious patient harm and occasionally death.^[17]

Dispensing errors could be classified into preventable dispensing error and unpreventable dispensing. Preventable dispensing errors are errors occurring during the process of dispensing medication and that could be deducted within the pharmacy before the medication has been issued to the patient and unpreventable dispensing errors for those errors that are occurring when the medication has been issued to the patient and the patient left the pharmacy.^[7]

Dispensing procedures for outpatients' include five major steps that should be performed in the dispensing cycle during the dispensing process.^[10,16] the first step is Receiving and validating prescription and/or verbal request. On this step the pharmacist should ask the patient to give his/ her name and check the name on the prescription. If there is doubt ask for identification card for cross checking the name and identity of the patient. This must also be done when issuing the items. The second steps is Understanding and interpreting the prescription, this step involves verifying the written prescription and make necessary correction in the prescriber's consent and correctly perform any calculation of doses and the quantity to be issued. The third one is preparing items for issue. On this step collecting the correct drug, counting or pouring, correct packing and labeling the drug should be done. The forth step is recording, documentation and reporting. Issue drugs to patient with clear instruction and advice is the last step in this step the prepared, packed and labeled drug is handed over to the right patient or care provider with appropriate drug information including when and how to take the drug, frequency and duration of the treatment.etc.^[17]

During dispensing patients not only receive the items that are prescribed by physicians or other authorized professionals but also to get a lot of information about their medication. Since pharmacists are medication experts, they are expected to analyze the prescription before dispensing the items and should provide enough information related to drug including the common side

effect of the drug unless the patient will be forced to discontinue the medication and if the patient tries to take the drug in another time it may lead to resistance.

Dispensing error also has an impact on patients' economy. the appropriate drug with enough information could not be delivered to the patient, the drug that the patient invested on could not be effective so that the patient may also be forced to invest money to get another medication for his problem even though that drug also may not work unless the dispenser fix the problem up related to drug information. The impact of dispensing error is not limited to the patients' health and economy. But it will also seriously affect the nation in different aspects. Since the resource invested on medication will not bring the required result and the resistance that could develop due to discontinuation of the drug will also affect the nation's economy as a whole.

The dispensing process is an integral part of the quality use of medicines and together with patient counseling form the core professional activity of a pharmacist. The process of dispensing and counseling is compared of a sequence of steps, which if interrupted or completed incorrectly could result in poor quality outcome to the patient and less than desirable.^[25]

Any failure in each step of dispensing will seriously affect the health of the patient even could lead to death, unless the pharmacist dispense the correct medication with a correct dose and provide enough information about the drug.

Dispensing error also affects patients' health and country's economy in different aspects. The sequel to serious dispensing error may be far reaching, including patient morbidity and mortality, increase health expenditure due to hospitalization and treatment, and loss of credibility and professional standing for the pharmacist a long with the risk of litigation and financial loss. If there is an error in dispensing, this may lead patients for prolonged disease, more expensive treatment and loss of productivity. The combined effect of the time spent for seeking medical attention and the loss of productivity challenges country's economy.^[25]

Worldwide, there are growing concerns about the number of patients harmed by medication errors and the volume of research on this subject is also growing exponentially. However, majority of research is focused on prescribing and administration error. While dispensing error can also result in significant patient harm, there is relatively less research work done in this area.^[6]

There was also no study conducted in Nekemte Referral Hospital showing the extent of medication error particularly the dispensing error. This coupled with the high patient load and few numbers of pharmacists demanded to assess the extent of dispensing error in

NHP.^[25]

The significance of this research will be to estimate the extent of dispensing error, to identify the cause or factors. The output of this finding will be useful for the hospital, policy makers to take appropriate and feasible interventions. In addition the zonal health bureau may share the experience from Nekemte Referral Hospital and employ the appropriate intervention. In addition, it serves as baseline to measure future progresses after taking all the necessary intervention. Last but not least, patients will be benefited from improved quality of care and minimal dispensing error.

METHODOLOGY

Study Area

The study was conducted in Nekemte Referral Hospital Pharmacy which is located in Nekemte town, Oromia region, west part of Ethiopia, and 331 km away from Addis Ababa. The hospital is the only referral institution in the western part of Ethiopia.

The hospital gives various services for outpatient, inpatient and emergency patients through outpatient department service, emergency service, laboratory, radiology, internal medicine e.g. gynecology, psychiatric. Of which pharmacy department is one of the crucial components of the hospital having. [Outpatient pharmacy, inpatient pharmacy and ART pharmacy].

Study period

The study was conducted from March-April, 2018

Study Design

The study was employed Cross sectional study design using observational checklist to estimate the prevalence and describe the types of dispensing error and in-depth interview with pharmacy staff (pharmacist and druggist) to explore the perceived cause of the error.

Population

Source of Population

All the prescriptions which were processed in Nekemte Referral Hospital Pharmacy during the study period.

Study Population

All the prescriptions which were processed in Nekemte Referral Hospital Pharmacy that are actually dispensed during the study period.

Inclusion and Exclusion Criteria

Inclusion Criteria

All the prescriptions papers with drug that were actually dispensed and all the staff members who were volunteer were included.

Exclusion Criteria

All drugs that were prescribed in NRH but not available in NRHP for dispensing

All prescribed supplies and equipment.

Sample Size and Sampling Technique

Sample Size

In this survey, total population is greater than 10,000. The sample size was determined by the following statistical formula $n = z^2 p (1-p) / d^2$

Where, n is sample size required for study

Z is standard deviation at 95% confidence interval and $d = 0.05$ which is 1.96

p is absolute sampling error that can be tolerated which is 0.5 since it's not known. Thus $n = (1.96)^2 * 0.5 * 0.5 / (0.05)^2 = 384$

Sampling Technique

Systemic random sampling was used to select 384 prescriptions and every other prescription was observed.

Study Variable

Dependent Variable

Types of dispensing error

Perceived cause of dispensing error

Independent Variable

Socio-demographic characteristics -age, sex, work experience, qualification.

Data collection, Instrument and Methodology

Checklist and in-depth interview was used to collect information on the types of dispensing error and causes of dispensing error respectively. The checklist was for assessing dispensing indicators including, patient identification, dispensed medications, labeling and patient instruction and counseling. Data was collected by participatory observation process without telling the exact title of the research to the dispensers and without interfering with the dispensing process. Moreover, in-depth interview with pharmacy staff (pharmacist and druggist) to explore the perceived cause of the error.

Data Quality Assurance

The check list was pretested in Nekemte Referral Hospital Pharmacy and any modification was incorporated. During data collection the completeness and consistency of the collected data was checked by principal investigator on daily basis.

Data Processing, Analysis and Presentation

The data was organized using dummy tables and tally sheets and it was analyzed manually using simple descriptive statistics and presented using tables, texts and graphs.

Operational Definition

Content error: Content error comprised all errors; incorrect drug, incorrect strength, incorrect dosage form, incorrect quantity, expired medication and any other

error involving incorrect content.

Deteriorated medication: dispensing medication that exceeded its expiry date or has been stored or for which the primary packaging is damaged.

Direction for use: the frequency and dose of the drug dispensed

How long it should be taking: The entire course of the drug therapy.

How to take drug: the way the drug is taken (with water, chewing or swallowing) **How to store the drug:** The place at which the drug is stored (avoid heat, light and dampness and to keep drug out of reach of children).

Incorrect drug: dispensing a drug that is different to that of prescribed. excludes generic or therapeutic substitution authorized by written hospital policy.

Incorrect dosage form: dispensing a dose unit containing the wrong amount of the correct drug without an appropriate adjustment to the dosing instruction.

Labeling error; Labeling error include; ignoring drug name, ignoring drug strength, ignoring patient name, ignoring drug quantity, ignoring expiry date, ignoring dispenser name on the label and dispensing without labeling are errors under labeling.

When to take the drug: The time at which the drug is taken (eg. before or after meals)

Dissemination of the Result

The result of the study will be sent to Wollega University School of pharmacy program, Nekemte referral hospital and other concerned bodies to update information on dispensing error.

Ethical Consideration

Ethical approval was obtained from the ethics review committee of School of Pharmacy, Wollega University, and the study was conducted in the outpatient pharmacy, after obtaining the permission from the relevant bodies. Participants of the study were also asked for consent before participating in the study. During the consent process, they were provided with the information regarding the purpose of the study, why and how they will be selected to be involved in the study, and what is expected of them and that they can withdraw from the study at any time. Participants was assured about confidentiality of the information Obtained in the course of the study by not using personal identifiers and analyzing data in aggregates.

Limitation of the Study

The main limitation perspective study is risk of observer bias by influencing the staff performance (Hawthorne effect) and again observer may fail to detect error.

The limitation of this study is it does only emphasize on the outpatient dispensary, excluding dispensary for in patients. And the observation only focused on the errors that are encountered during dispensing without considering the other errors related to the pharmacy set up. And since the study was done only in Nekemte Referral Hospital the result of the study couldn't be used for generalization as country.

RESULT

In this study total of 384 patient prescription have been analyzed and the dispensing error obtained and have been categorized in to five groups this include error during patient identification, content error, labeling error, counseling error.

Part 1. Dispensing errors associated with patient information

From a total of 384 prescription paper observed (75.5%,n=384),(91.6%,n=384), (98.9%,n=384) of prescription were dispensed without checking the patients name, age, sex respectively.

Table 1: Distribution of Dispensing errors associated with patient information and its percentage relating with number of prescription observed from Nekemte Referral Hospital Pharmacy, Nekemte Referral Hospital April 2018.

	N	% with no prescription observed (384)
Patient information		
Dispensing without checking the patient's name	290	75.5
Dispensing without checking the patient's age	352	91.6
Dispensing without checking patient's sex	380	98.9

Part 2.Content error

For 384 patient 716 drugs were dispensed from this (21.8%,n=716) of content error was reported out of which (0.83% n=716) was incorrect drug,(1.7%,n=716) was incorrect strength,(17.6%,n=716) was incorrect quantity,(1.6%,n=716) was incorrect dosage form and deteriorated medication was (0%,n=716).

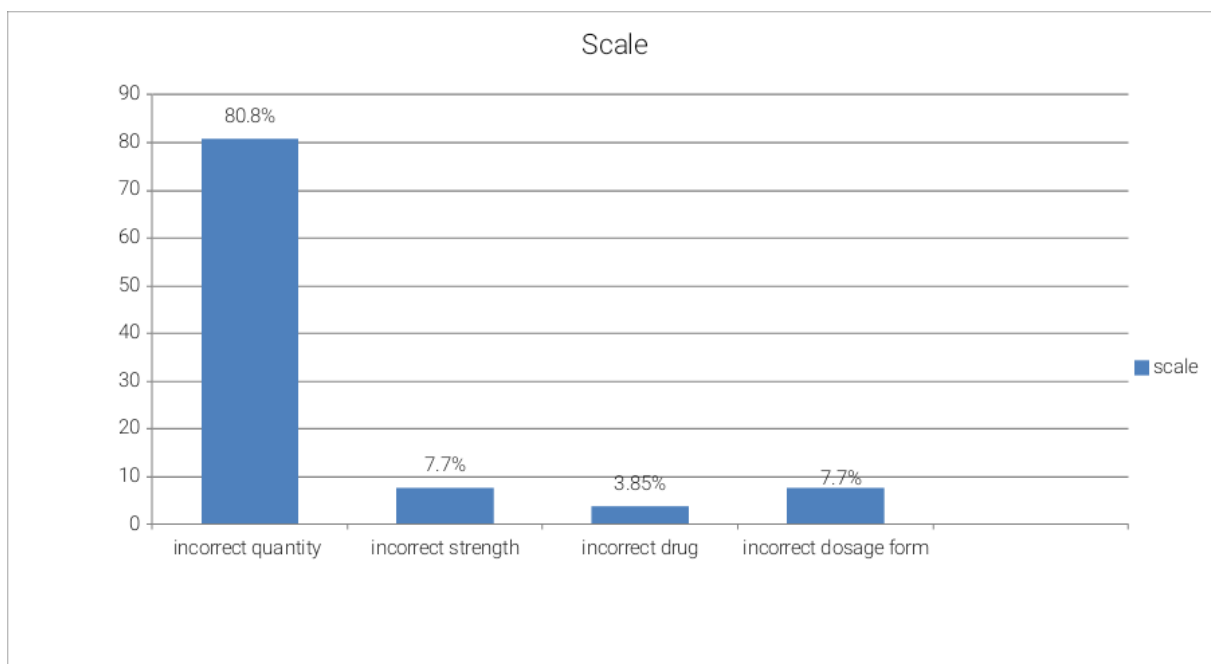


Figure 1: Distribution of content error and its percentage relating with number of prescription observed from Nekemte Referral Hospital Pharmacy, Nekemte Referral Hospital April 2018.

Part 3. Labeling error

From 716 dispensed drugs or items all of the dispensed drugs did not include patient name on the labeling. It was observed that the majority of dispensed drug were dispensed in their original package and the rest were dispensed by already prepared plastic envelops.

Table 3: Distribution of labeling error (absence of labeling) and its percentage relating with number of drug dispensed observed from Nekemte Referral Hospital Pharmacy, Nekemte Referral Hospital April 2018.

Labeling pattern	No_ error	% with no of drug dispensed
Patient name	716	100
Drug name	16	2.23
Drug strength	76	10.6
Direction for use	716	100
Cautionary on label	716	100
Expiration date	716	100

Part 4. Error during Patient instruction and counseling

(78.1%,n=384) patients were receiving the verbal counseling on how much to take and when to take the drug and the rest 21.9% n=384 did not receive counseling on how much and when to take the dispensed drug,(74%,n=384) did not receive a verbal counseling on how long it should be taken, (46%,n=384) receive counseling on how to take the dispensed drug,(3.9%,n=384) patient receives counseling on the drug side effect, warning and/or precaution with their managements and 13%,n=384) of patient receive counseling on where to store the drug.

Table 4: Distribution errors during patient instruction and counseling and its percentage with total prescription observed from Nekemte Referral Hospital Pharmacy, Nekemte Referral Hospital April 2018.

Patient counseling and instruction	counseled		Not counseled	
	No_	%	No_	%
How many/much to take	300	78.1	84	21.9
When to take the drug	300	78.1	84	21.9
How long it should be taken	100	26	284	74
How to take	180	46.9	204	53.1
SEs, warnings and/or precautions with their management	15	3.9	369	96.0
Where to keepit	50	13	334	87
Confirm the patient understood the instruction provided	72	18.75	312	81.25

Part 5. Cause of dispensing error.

Table 5: Socio demographic characteristics of the respondents from Nekemte Referral Hospital Pharmacy, Nekemte Referral Hospital April 2018.

Variables	No	Percentage	
Age	20-25	1	12.5
	26-30	4	50
	31-35	2	25
	36-40	1	12.5
	40		
Sex	F	2	25
	M	6	75
Qualification	Pharmacist	5	62.5
	Druggist	3	37.5
Experience	1yr	2	25
	1-3yr	2	25
	4-6yr	1	12.5
	6	3	37.5

Based on the information obtained from the interview regarding the determinant of dispensing error from 8 worker of the pharmacy department 6 of them were working on average 8 hr per day and the rest 10 hrs per day and almost all of them work more than the recommended daily working time. 8 of them feel fatigue, stress and other activity impairment while dispensing more often. Most of time they manage as this situation by drinking coffee and tea. 3 of the dispenser were satisfied as they have been working as dispensary pharmacist/pharmacy technician in NRHP while 5 of them were not satisfied.

2 of respond that the available staff is, the space used during working time, shelving and storage area and the equipment and packaging material is satisfactory and they are enjoyed with the working environment of the hospital pharmacy. 5 of them completely antagonize the idea related to the space used during working time, shelving and storage area of the NRHP by forwarding change and improvement. 1 partially support this idea. 2 of them respond that there is work flow system of SOP to ensure the quality and efficiency of dispensing practice in NRHP but the rest 6 said that there is were no SOP it the hospital pharmacy to ensure the quality and efficiency of dispensing practice.

8 of them respond as work load, fatigue, stress, illegible hand writing on the prescription, inadequate opportunity counseling, arrangement the drug are common determinant responsible for potential dispensing error in NRHP additional 5 revealed that the hospital policy, facility as well as and shortage of other infrastructure possible cause big error in dispensing. Most of them put forward that providing necessary facility training, adding man power and having well guided hospital policy and regulation could decrease or alleviate the dispensing error in Nekemte Referral Hospital Pharmacy.

DISCUSSION

In this study total of 384 patient prescription have been analyzed and the dispensing error obtained and have

been categorized in to five groups this include error during patient identification, content error, labeling error, counseling error.

A total of (75.5%, n=384) prescription was dispensed without checking the patient's name this means that only (24.4%, n=384) of the prescription were checked by the pharmacist which is very low. Since checking the patients name is the first in assuring good dispensing practice the pharmacist should ask the patient to give his/her name with that on the prescription if in doubt ask for identification card cross checking the name and identify of the patient must also be done when issuing the drug if not the dispensed drug could be issued to the wrong person.^[14]

From 384 prescription observed (91.4%, n=384) was dispensed without checking the patients age. Since rational selection of drug, dosage and dosage form of a drug is determined by age of the patient. That is the dose that is prescribed for the adult is not the same with that of children's so dispensing without checking the patient's age could results in either therapeutic failure or over dose.^[14]

Of 384 prescription (78.1%, n=384) of the prescription was dispensed without checking the patients sex. Since the sex determines the rational drug selection.

Out of 716 number of drugs dispensed (20.9%, n=384) content error was recorded. In the current study among 20.9 % of content error incorrect quantity take the highest percentage of this result which is 84% and incorrect drug take the least number of the result. Content errors are relatively more serious than labeling errors since it is related to the amount of drug that should be taken by the patient. If the drug is less than the expected drug amount the medication may fail to cure the patient & if more than the normal dose, it might also lead to toxicity. These all errors seriously affect the patient health.^[31]

Adequate labeling taken as a label bearing the name of drug and patient, strength, quantity, dose and duration of the treatment of the drug dispensed.^[9] and the percentage of drug adequately labeled is 0(0%) in the current study, this figure might seems exaggerated but at the time of observation in one prescription paper there are about five number of error and these error are even considered as normal in pharmacy since dispensers always ignore labeling them. The function of the labeling on dispensed drug is to uniquely identify the content of the container and to ensure the patient have clear and concise information about the use of drug. Thus, specific instruction should be placed on the package of the drug in language the patient can understand.^[16]

In this study all of the dispensed items did not include the patient name on the labeling. 700(97.8%) were labeled with their name and all of the drug dispensed out

of 716 drug dispensed. If the name of patient was not indicated on the label the drug may be used unknowingly by incorrect patient (family members, friends, neighbors, etc). But, the percentage of drugs label with the strength of the drug was considered (89.4). This value is greater than the study in Botswana (50%).^[7] The reason for this greater percentage was considered to be due to the fact that most of the drugs such as a blister of tablets, drugs in ampoules and bottle were dispensed in their original package which as already labeled with their strength. The percentage of label with the dose of the drug, frequency of administration, total quantity of the drugs and duration of treatment was very low unlike other study.^[7]

Counseling provides many benefits to the patient and a particular effective measure in reducing error. One estimate from North Carolina suggests that half of medication- related death could have been prevented by appropriate and timely counseling.^[1]

In my study 78.1% of the patient receive verbal counseling on how much/many and when to take the dispensed drug and 21.9% of the patient did not instructed on dose and frequency of the drug because the patients were chronic disease patient have a follow up for long time. In the case of patient taking repeated prescription counseling provides the opportunity to inquire if the patient is taking the medicine correctly. If the medicine is having the desired outcome or if there is unwanted effect. It offers a further opportunity to detect any error.^[31]

Only 3.5% of the patient receives verbal counseling on drug side effect, warnings and/or precaution with their management which is very low. In order to minimize drug related problems the patient should be counseled the drugs common side effect though, mentioning of a certain side effect and precaution may cause confusion even or alarm among some patients.

Patient counseling is the final checking process to ensure the correct medicine is supplied to the correct patient especially if the patient has been made aware of the name of his/her medication what it's for and how to take it. The patient who has this information is much better position to ask question during counseling by pharmacist and to help ensure that correct drug is given to them.^[1]

Based on the in-depth interview with the dispensers a number of factor were cited by the respondents as potentially affecting dispensing error rate in order of their relevance these are high prescription volume, work load, stress, fatigue, storing drug with similar name near to each other, many items in one prescription and the policy of the hospital pharmacy are the most common. From the result all the interviewed dispensers feel fatigue and stress and many pharmacists intuitively beloved that job stress can have a deleterious effect on their performance. One analysis stress has suggested that it may have four different adverse effects on the cognitive

interfere with error detection.^[8]

Therefore, the dispensers must carefully manage their work schedules to minimize fatigue and stress (via. Regular rest break) also to ensure that overly high number of prescription are not processed by one pharmacist/druggist.^[30]

CONCLUSION

From the study it is found that in NRHP there are four major types of error, which are errors during patient identification, content, labeling and counseling. Among this labeling and counseling error take the higher figure and content error the least number. So these studies conclude that the quality of dispensing in Nekemte referral hospital need an immediate attention.

There are a number of factors cited by the pharmacist/druggist as potentially affecting dispensing error rate in order of their relevance these are high prescription volume, work load, stress, fatigue, storing drug with similar name near to each other many items in one prescription and the policy of the hospital pharmacy are the most common.

RECOMMENDATION

- A particular pharmacy has to practice dispensing using the guidelines that are approved by (FMHACA).
- The pharmacy department should have its own rule & regulation to decrease the negligence of the pharmacist during dispensing practice.
- Adequate time must be allowed to dispense properly every prescription
- window size through which the drug dispensed and counseled was the barrier causing dispensing error thus, the hospital leader, and administrative should focusing another alternative way to improve size of the window for better communication.
- Clinical Pharmacists ought to interact with other members of the healthcare team to develop, implement, and monitor a therapeutic plan to achieve optimal care for each individual patient.
- The pharmacists or dispensers has always to review the data on dispensing error and try to realize the environment that could disturb the working environment so that risk reduction strategies are developed to safeguard the quality and safety of patients (16).
- The pharmacist must make sure that patients and/or their caregiver have all the necessary drug information and knowledge Prior to patient discharge, to correctly measure and administer doses.
- Strong management is required to reduce the problem related with patient flow, crowdedness of the dispensing place and to reduce interruption of the dispenser by arranging a comfortable place for the patient.

- Furthermore, the hospital leaders should always focus on dispensing problem and add necessary facilities, STG books, arranging training for pharmacist and the community should be informed by responsible body regarding dispensing error and how to improve drug utilization.
- Finally, researcher should focus on further evolution and prevention of dispensing error and interventional study must aimed at improving the quality of dispensing.

Abbreviation

NRHP Nekemte Referral Hospital Pharmacy USA United State of America UK United Kingdom FMHACA Food, Medicine, Health Care Administration and Control Authority STG Standard Treatment Guideline

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