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A Retrospective Study on the Types & Frequency of Medication Errors in a Tertiary Care Hospital, Guwahati, Assam

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Abstract: ***Introduction: In any hospital the most important aspect of Quality Care involves Correct Medication of the patients. Medications are the integral part of the treatment and care plan of any patient. One important hindrance of the treatment care plan is occurrence of medication errors. Medication errors which do happen in all setup are one of the most common as well as preventable reason of iatrogenic harm. Medication errors can happen at multiple stages starting from Transcribing error, indenting error, Dispensing error or administration error. Proper vigilance and multilevel checking is required to ensure right medication, right dose, right strength, right time and right patient. Both the pharmacy and Nursing staff should play a responsible role in ensuring prevention of any medication errors. Objectives: The current study was conducted in a reputed multispecialty hospital in Guwahati. It was conducted to find the frequency of medication errors as well as to study the types and distribution of the medication errors and resolving them for better patient care. Methodology: A Retrospective study was conducted where all the data on various types of medication errors reported in the last 2 years were collected, classified into types of error, data was analyzed using appropriate tools and interpretation was drawn. The study period was 2024 and 2025 in a 155 bedded superspeciality hospital. Results: During the study period, in total 12148 Indoor admissions took place. During the same period in total 17 instances of medication errors were reported and incident reporting was done to higher management. The number of incidents in 2024 was 10 and number of medication errors in 2025 was 7. The most type of error that was reported was Administration error (12/17; 70.5%). The most common age group of patients who were involved in the medication errors belonged to 55-69 (9/17) Majority of errors happened in patients admitted in ICU followed by patients admitted in SICU. Conclusion: From the study it can be concluded that although the incidence of Medication errors is low in the hospital, still it is a concern. If we implement Early detection appropriate timely intervention of all types of Medication errors, it can vastly improve the treatment outcome. It is very important for any hospital to implement appropriate reporting of all types of medication errors in a timely basis with proper incident reporting system with RCA and CAPA. The management should take upon themselves the onus of educating pharmacists as well as nursing staff regarding effects of medication errors. They should be made aware that proper control on medication errors plays a important part in reduction of overall cost of treatment as well as positively impacting and improving the standard of patient care and safety. [1] Medication errors have been shown to directly affect patient safety with the potential to cause adverse drug events (ADEs). They having been proven to be directly linked with increase in overall morbidity and mortality. Any such event is associated with prolonged hospital stays. [2]***

Keywords: RCA, CAPA, Medication Errors, Dispensing Errors, Indenting error, Administration error

1. Introduction

In any hospital, whether inpatients or outpatients, Medications play a very Important role in the overall treatment care plan. Patients are treated based on the clinical symptoms and diagnostic findings ad clinicians prefer to use the effective medications for best treatment outcomes. But it has to be noted that in any good hospital, the clinicians only prescribe the medication. The responsibility lies on the nursing staff/ward nursing in charge to ensure that the prescribed medicines are informed to the Hospital pharmacy and the pharmacy delivers all the required medications to the correct patients in acceptable time interval for correct administration of drugs. As multiple people a/system is involved from the prescription generation to medicine administration, there can occur intentional error in any of these stages which all are known as Medication errors.

Medication errors might happen at any step starting from handling a medication prescription i.e. prescribing, indenting, drug dispensing from pharmacy till administration.it has to be remembered that any kind of Medication related errors do have the potential to result in patient harm which might lead to morbidity or even mortality. They also carry substantial cost impact for both the care provider as well as patient. They also cause patient dissatisfaction and loss of trust on the current medical care.

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) has defined 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 labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use". Few of the reasons for medication errors as per cited American Hospital Association are incomplete information about patient or drug, illegible prescriptions, duplication, abbreviations which are inappropriate, any kind of miscommunication and lack of proper labelling [3]. Medication errors can be unintentionally committed by any concerned hospital staff from the clinician to the hospital pharmacist to the patient care nursing staff [6]. Near misses' act as source of information which can help in making strategies for error prevention strategies. Such events can be attributed to professional practice, care products, treatment procedures. [7,8]. Medication errors are also defined as any events which are totally preventable but carry the risk of inappropriate medication or potential harm to the patient [3] These errors happen during the time of prescription, transcription, dispensing, and administration. It is proved that any Medication error can lead to increased chance of morbidity, mortality, and increased duration of hospital stays. [9,10].

Nursing staff is considered to be a vital player in medication administration process. Any poor calculation in the competency of nursing staff, poor adherence to standard protocols and inadequate knowledge of medications are found to be the important reasons which lead to medication administration errors. [11]. It has to noted that the economic impact of such medication errors is huge globally. This expense includes all the additional costs for treatments, re-admissions, legal litigation expenses, and loss of productivity [12]. In Saudi Arabia, many studies have concluded that medication errors do strain the local healthcare system's financial resources severely [13]. The World Health Organization (WHO) has also initiated the third global patient safety challenge back in 2017, its target was 50% reduction in medication-related harm over the next five years. Some common factors behind medication errors, are lack of proper drug information, lack of patient education, any miscommunication due to poor handwriting, any external factors such as increased workload, work stress, inadequate training and careless handling of sound alike look-alike drugs [5,6]. Several studies conducted in Saudi Arabia for investigating the overall incidence of medication errors, different types, and frequency [10,7,8]. In Saudi Arabia, studies identified high rates of medication errors, commonly in administration. [2]

To do a valid comparisons of different studies based on types of medication errors is difficult because of differences in study variables, measurement scales and methods The pharmacy staff of any hospital should ensure that there is no mistake on their part in terms of dispensing of correct medications in the correct doses and in correct time interval to the correct patient. [9]Studies done in Uttarakhand and Karnataka have found Medication Error rate to be as high as 25.7% and 15.34% [10,11] It is important to calculate the expenses associated with any medication errors although this is not in the preview of this study, calculations done in The Institute of Medicine, USA has estimated approximately $37.6 billion/year extra expense against medication error.[12] The goal of appropriate medication use is to ensure proper therapeutic outcomes resulting in improved quality of life and reduced patient risk.[9]

In India, where private as well as government hospital are in huge numbers, there is still lack of adequate information on correct reporting of any prescription errors The importance of medication errors can be understood by the fact that around 28% of all the adverse drug reactions are due to medication errors in USA [14]. The current will aim to find out the total incidence of medication errors over the last 2years in a 155 bedded superspeciality hospital and will also try to classify the errors among various types. Also the level of awareness among the nursing and pharmacy staff will be assessed regarding medication errors. This will enlighten us to take proper steps to prevent the medication errors**.**

Objectives

This study was designed with the following primary objectives:

1) To assess the frequency of medication errors.
2) To classify the types of medication errors occurring in a tertiary care hospital setting.
3) To evaluate the distribution of errors across hospital departments, especially ICU, wards and SICU.

2. Methodology

The current study was done in a 155 bedded multi-specialty hospital. The hospital is a NABH accredited hospital with all type of multi-specialties. For doing the study we followed Retrospective data collection approach, we tried to find the total number of medication errors in the last 2 years. For sample collection we went for census sampling. A standard questionnaire was also prepared after proper verification through relevant authorities. The questionnaire contained standard questions to access the knowledge and awareness of pharmacy staff and nursing staff regarding medication errors and probable cause of medication errors.

All the cases which reported any medication error were selected in the study. In the inclusion criteria all IPD patients were included in the study group who experienced any kind of medication errors. In the exclusion criteria all daycare patients and all OPD patients were excluded from the study. It was a retrospective and observational type of study. The study was conducted over a period of two years in a tertiary care hospital including departments such as ICU, wards, SICU. The period of study was 2 years i.e. 2024 and 2025. For the standard questionnaire 30 nurses and 20 pharmacists were selected randomly. For selection of nursing staff, the minimum criteria taken was a minimum experience of 3 months in the place of study. For the pharmacists also the minimum experience taken was 3 months as a pharmacist in the place of study.

Inpatients are followed from day of admission to discharge. Type of Medication errors, causes, contributing factors of medication errors, outcome of events, and percentage of errors reaching the patient are evaluated and intervention is done. The data collected was evaluated through MS excel and MS word and appropriate charts were prepared.
The collected data was entered into Microsoft Excel.

3. Results

Table 1: Frequency of Medication Errors

Total medication error	Total IPD patients	Percentage
17	12148	0.13%

In the current study a total number of medication errors were found to be 17. In the same period the total number of IPD admissions were 12148. The incidence of medication errors was 0.13%. It can be said that the incidence rate is on the very lower side.

Table 2: Year wise frequency of medication errors

Year	No of cases	Total IPD patient	Percentage
2024	10	7456	0.13%
2025	7	4692	0.14%

In the current study where data was collected and analyzed over the previous 2 years, the number of medication errors in 2024 were 10 cases out of total admissions 7456 in 2024 but the total number of medication errors were 7 in the year 2025 out of total admissions 4692. It can be noticed that there is a decline in the number of total medication errors which can be attributed to regular trainings and awareness talks.

Table 3: Age distribution of the patients who had medication errors.

Total patient	25-39	40-54	55-69	70-85
17	2	2	9	4

We tried to classify the medication errors into age based classification among the patients involved. In the current study, out of 17 patients who were involved in medication errors, the most common age group of patients belonged to 55-69 Years (9/17;52.9%). This was followed by age group 70-85 years (4/17;23.5%)

Table 4: Department wise distribution of medication errors.

Department	Total no of errors
Neurology	6
Neurosurgery	4
General medicine	1
Pulmonology	2
Critical care	1
Nephrology	3

The department wise classification was done among all the medication errors. The department which had the highest errors was Neurology department (6/17;35.2%) & the second highest errors occurred in the Neurosurgery department (4/17;23.5%). Such departments usually cater to serious patients and any kind of medication can be drastically increase the morbidity/mortality.

Table 5: Classification among types of medication errors

Type of Error	Total no of errors
Administration	12
Dispensing	2
Transcribing	2
Indenting	1

We divided all the errors into 4 types. In the current study he most common types of error happened during Administration with 12 errors & dispensing and transcribing Stages Each recorded 2 errors, while the indenting stage had the lowest occurrence with 1 error.

Table 6: Types wise distribution of medication errors

Types of errors	Total no of errors
Medication not given at the right time	4
Medication not given	4
Wrong Medication Administered	5
Wrong dose Administered	1
Dilution (mixing) error	2
Newly Prescribed order not initiated properly	1

In the current study wrong medication administered is the most frequent, with 5 cases, followed by medication not given & medication not given at the right time (4 cases each). Dilution (mixing) errors recorded 2 errors, Wrong dose administered & newly prescribed order not initiated properly errors recorded (1 cases each).

Survey among Pharmacist and nurses.

Table 1: Based on the Area of work

Area	Total no of individual
ICU	23
Cabin	5
Pharmacy	20
SICU	2

In the current study a total of 23 nurses feedback were taken from ICU, followed by 5 nurses feedback from cabin & 20 pharmacists feedback from pharmacy & 2 nurses feedback from SICU.

Table 2: Based on the Common Causes of medication errors

Common Causes	Nurse	Pharmacist	Total no of responses
Work Overload	7	0	7
Look Alike Sound Alike (LASA)	12	11	23
Lack of communication	2	2	4
Inadequate Knowledge/training	5	3	8
Poor handwriting of doctors	4	4	8

In the current study the highest number of common cause of medication errors according to both the Nursing and Pharmacy staff combined is Look alike and Sound Alike drugs (LASA),with a total of 23 responses (46%) [12 nurses (40%) out of 30 and 11 pharmacist (55%)out of 20] & it was followed by Inadequate knowledge /training, with a total 8 responses (5 nurses and 3 pharmacist) & poor handwriting of doctors was responses equally by nurses and pharmacist, with a total of 8 responses (4 of each) & Work overload is a causes only among nurses (7 nurses responses) & Lack of communication was felt equally by nurses and pharmacist, with a total 4 responses (2 of each).

Table 3: Based on the types/ frequency of medication errors

Types of errors	Nurse	Pharmacist	Total no of responses
Prescribing	5	6	11
Omission	3	0	3
Wrong dose	9	1	10
Wrong route of administration	3	5	8
Timing	7	0	7
Dispensing	1	0	1
Documentation (Wrong label)	2	8	10

In the current study the prescribing errors were thought to be the most frequent error, with a total of 11 responses (5 nurses and 6 pharmacist) & followed by wrong dose, with a total 10 responses (9 nurses and 1 pharmacist) & Documentation (wrong label), with a total 10 responses (2 nurses and 8 pharmacist) & wrong route of administration, with a total of 8 responses (3 nurses and 5 pharmacist), & Timing errors, omission errors, dispensing errors are quoted only by nurses, with no pharmacist responses, whereas timing errors had (7 nurses responses), omission errors had (3 nurses responses), dispensing errors had (1 nurses responses).

Table 4: Based on the stage where most errors occur

Stage	Nurses	Pharmacist	Total no of responses
Prescribing	7	11	18
Transcribing	3	0	3
Dispensing	0	0	0
Administering	20	9	29

In the current study the stage where medication error occurs more often is Administering stage, with a total 29 responses (20 nurses and 9 pharmacists) & followed by prescribing stage, with a total 18 responses (7 nurses and 11 pharmacists) & transcribing Stage is only responses by nurses (3 nurses responses), with no pharmacist's responses, & dispensing stage was responses as "0" by both nurses and pharmacists.

Table 5: Based on the types where most medication administration errors occur

Types	Nurses	Pharmacist	Total no of responses
Wrong dose	15	10	25
Wrong time	9	2	11
Wrong route	6	8	14
Wrong patient	0	0	0

In the current study the types where medication administration errors occurs more often is wrong dose, with a total 25 responses (15 nurses and 10 pharmacists), & followed by wrong route, with a total 14 responses (6 nurses and 8 pharmacist), & wrong time, with a total 11 responses (9 nurses and 2 pharmacist), & wrong patient was responses as "0" by both nurses and pharmacists.

4. Discussion

Medication Errors can happen at any period of medication usage cycle which starts from physicians prescribing the drugs, process of indenting by the nursing staff, medication dispensing by the pharmacy staff, and finally administration of a right drugs to the right patient. In the present study, a total of 17 medication errors (MEs) were recorded during the study period of last two years, with 10 errors occurring in 2024 and 7 in 2025. Similar studies done by Kumar et al. in 2020, India and Mitra and Basu et al. in 2020, in India reported higher incidence of medication errors ranging between 6–10%, Similarly, Patel et al. in their study in 2016 India documented a prevalence of around 6%. In comparison, review conducted by Tobaiqy and MacLure et al. in 2024 in Saudi Arabia found wide range of 1–50% in their study. It can be concluded that that hospitals with structured systems were able to capture significantly more errors. It demonstrates higher reported numbers indicate better surveillance rather than poor safety. In our study, majority of the medication errors occurred in older age group with 52.94% in the 55–69-year group and 23.53% in those aged 70–85 years, while younger adults contributed to less than 25% of cases. This finding reflects the increased risk faced by elderly patients. Similar studies done by Suthar et al in 2021 in Gujarat reported that geriatric patients in a metropolitan private hospital were particularly vulnerable. Similarly, Gaur et al. in 2012 in Hill State, India found higher incidences among elderly patients in medicine wards of a tertiary teaching hospital. In Malaysia, Karuppannan et al. 2013 Malaysia documented that adverse drug event–related orders were most common in elderly populations. The current focus on Age distribution in the present study strongly supports Indian, Malaysian, and global findings that the elderly remain the most affected group for MEs. Errors in the present study were most frequently associated with Neurology (6 cases), Neurosurgery (4), and Nephrology (3). This distribution contrasts with earlier Indian findings where Medicine wards accounted for maximum errors. For instance, Sinha et al. (2016, South India) and Gaur et al. (2012, Hill State, India) both reported the Medicine wards as primary contributors. However, Mitra and Basu (2020, India) also identified Neurology alongside Medicine and Pediatrics. Tobaiqy and MacLure in their study in 2024, Saudi Arabia highlighted that high-risk departments such as Intensive Care, Neurology, and Oncology were most error-prone due to frequent use of high-alert medications. The clustering of errors in Neurology and Neurosurgery in this study therefore resembles international findings, where complex drug regimens and critical illnesses increase risk.

During the present study it was found that majority of errors i.e. 70.59% occurred during administration, with dispensing and transcribing contributing 11.76% each, and indenting 5.88%. In previous studies like the one done by Kumar et al. in 2011 in a tertiary hospital in India reported that administration errors were the most frequent. Patel et al. in 2016, India) and Sinha et al. in 2016 in South India similarly found prescribing and administration to be the riskiest stages. Study done by Williamson in 2009 in United Kingdom also emphasized that any event of near-miss reporting during administration stage is important to prevent any patient harm. So proper checklist should be maintained before administration of drugs.

In our study we found the most frequent error type was wrong medication (29.41%), followed by omissions (23.53%) and wrong timing (23.53%). Less common were dilution errors (11.76%), wrong dose (5.88%), and order not initiated (5.88%). These findings differ somewhat from earlier Indian studies, where wrong dose was often dominant. Study done by Kumar et al. in 2020 India and Mitra Basu et al in 2020 in India found wrong dose and wrong drug as the most common. Gaur et al. in 2012, Hill State, India emphasized

documentation and wrong-time errors, while Kumar et al. in 2011, India identified wrong dose and wrong route as predominant. It can be summarized that medication errors are an unwanted event associated with hospitals and healthcare providers. And proper trainings and follow ups are required by the management to keep them as minimal as possible.

5. Conclusion

From the study it can be concluded that Medication error is an issue which requires proper planning and sincere approach from the hospital management. Standard operating procedures should be prepared specific to the operational workflow of the hospital to avoid any kind of errors. In the current healthcare system, medication errors are common in any multispecialty hospital. Most of such medication errors are in some part attributed to complex health care system. We can prevent such errors by giving proper training and education to the physicians, nursing staff and the pharmacy staff regarding the possible areas of medication errors during the inpatient days. The electronic prescription system for physician entry, adopting automated medicine dispensing, scanning bar code for medication administration, double checking before medicine administration and personnel health records can play substantial role to prevent medication errors.

The current study gave us the idea that medication errors can occur even in those hospitals with well-established standard policies for ensuring Safe Handling and judicious use of Medications. However, by having a well-structured plans and standard operating plans medications errors can be minimized from reaching the patient. The primary aim should be safety of medication handling. The quality department of the hospital should be actively engaged in in-depth studies. Such real time prospective studies will can shed light on various possible gaps in the current medication indenting to delivery process. Those insights can be used in devising strategies to plan, implement and follow through the hospital. Having a sound system to prevent medication errors will ensure quality driven care for all the patients and improvement in patient satisfaction scores.

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