

A Prospective Observation Study on Medication Errors among Surgical Gastroenterology In-Patients in Tertiary Care Hospital

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ABSTRACT

Background: A Medication Error (ME) is a preventable adverse event in medical treatment. The main objective of the study is to classify, categorize, evaluate, monitor, and assess the severity of medication errors and report among the inpatients in tertiary care hospitals. **Materials and Methods:** This prospective observational study was conducted among 100 surgical gastroenterology inpatients on medication error in tertiary hospitals. For this study, the data were collected by using patient demographic details, a reconciliation form, a medication error form, and a medication audit check review form where the medication. The outcome was expressed as mean percentages and risk. Regression analysis is used to assess the impact of different risks on the prevalence of medication error. **Results:** The study was conducted among 100 inpatients. Total medication errors were included $n=83$. Among the most common medication errors were found prescribing errors 31 (37.30%), followed by documentation errors 28 (33.70%). Nursing errors were more than the doctor errors. Most of the errors were reported on day 28 (33.75%). Factors responsible for medication error were no usage of generic names, no documentation, and incomplete reconciliation; the risk was observed among the age group of people ≥ 60 but not significant. **Conclusion:** This study establishes the effective medication error evaluation, assessment, and reporting of medication error. These errors can be prevented by implementing a Computerized Physician Order Entry system (CPOE), and the results of this study demonstrate the role of clinical pharmacists in the identification and reporting of medication errors.

Keywords: Medication Error, NCCMERP, Computerised Physician Order Entry (CPOE) system, Gastroenterology surgery, Drug Related Problems (DRP), Prescription.

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INTRODUCTION

Introduction National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) claims that medication errors are "any preventable incident that could result in improper pharmaceutical usage or patient injury while the patient, healthcare provider or consumer oversees the medication (Cousins & Heath, 2008). The global health care sector is now facing a tremendous revolution in technology. Medication mistakes are frequent despite all attempts to prevent them (Agrawal, 2009). Each patient has the potential to make at least

one drug mistake per day; even most medication errors don't cause the harm. In fact, it's possible that no health care system is entirely resistant to medication errors (Patel & Balkrishnan, 2010).

As reported by the IOM study (2000) in the USA and the National Safety Agency report (2004) in the UK, a significant number of fatalities each year are attributed to medication errors. Based on IOM studies, medication errors constitute one of the eight leading causes of fatality in the USA, accounting for 44,000 to 98,000 unnecessary deaths annually, with approximately 7,000 directly attributed to medication errors (Arun Kumar *et al.*, 2011; Leape *et al.*, 1991). There are between 210,000 and 440,000 fatalities yearly, according to the most recent survey, which was conducted in 2013. According to the latter statistic, prescription errors rank third in terms of causes of death, behind cancer and heart disease (Karthikeyan & Lalitha, 2013).



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An estimated 237 million medication errors happen in England annually at some step in the medication process (Merry & Wahr, 2021). Globally, the cost of ME is estimated at \$42 billion USD annually, and it states that 5% of inpatients are affected by ME. In India, the potential of adverse medication events happening on a prescription is as high as 8.2% in Delhi. According to national statistics, up to 5.2 million medication errors arise every year (Abdullah *et al.*, 2004; Gaur *et al.*, 2012; World Health Organization [WHO], 2016).

This study focuses on comprehensively studying medication errors among inpatients in surgical gastroenterology. The objectives include assessing baseline rates, identifying sources of errors, implementing preventive measures, classifying error categories, and evaluating severity and root causes. By addressing these facets, the current study aims to contribute valuable insights toward minimizing medication errors and increasing patient safety services in the field of surgical gastroenterology. The goal is to establish a foundation for proactive error management that safeguards patient well-being and augments the overall quality of healthcare delivery.

MATERIALS AND METHODS

Study Design and Site

A prospective observational study focused on investigating medication errors among inpatients in the department of Surgical Gastroenterology at Sri Venkateswara Institute of Medical Sciences (SVIMS), a tertiary care hospital in India.

Sample size

Convenience sampling, a non-probability sampling technique, was used for the sample size calculation. The sample size of 100 participants was included in this study.

Sources of the data

The data was collected from the inpatient department of the surgical gastroenterology department. Patient demographic details, including age, gender, weight, body mass index, and medication chart, were taken from the case sheets of inpatient care records & nursing charts. Patients and their representatives were interviewed.

Study duration and Criteria

A 6-month study period was done between December 2022 and May 2023. All inpatient demographic data forms (Annexure-2) were completed for each patient admitted to the Surgical Gastroenterology ward during the designated 6-month study period were included. Patients transferred to another department for further management, and outpatients were excluded from the study.

Study Procedure

Data collection involved obtaining written informed consent from all participating subjects. A Patient Demographic Data form (Annexure-2) was completed for each patient. Medication chart review audit checklists (Annexure-3), medication error forms (Annexure-4), and medication reconciliation forms (Annexure-5) were employed for systematic data collection.

Statistical Analysis

All the information will be input and stored in the Microsoft Windows Excel program. The mean as well as the standard deviation will be applied to evaluate clinical, laboratory, and demographic data on continuous variables; comparison of means will be made by chi-square test. Descriptive data will be presented as numbers and percentages. Results with $p < 0.05$ will be considered significant.

Ethical Clearance

Prior ethical approval for the study was obtained from the Institutional Ethics Committee at SVIMS, Tirupati, Andhra Pradesh. The study adhered to ethical standards outlined by the committee, with the Institutional Ethical Committee (IEC) No. 1441 serving as the reference.

RESULTS

During the 6-month study period, a total of 100 inpatients in the department of Surgical Gastroenterology were included in the analysis. The patient demographic characteristics revealed that 61% were males ($n=61$), and 39% were females ($n=39$). Age distribution among the study population showed percentages across different age groups: 10-20 years (7%, $n=7$), 21-30 years (8%, $n=8$), 31-40 years (15%, $n=15$), 41-50 years (24%, $n=24$), 51-60 years (23%, $n=23$), 61-70 years (14%, $n=14$), 71-80 years (7%, $n=7$), and 81-90 years (2%, $n=2$).

A total of 83 errors were identified; among them, 45 (54.2%) were male and 38 (45.8%) were female. Errors occurred most frequently in the age groups 41-50 and 51-60 (23% each, $n=19$), followed by the age groups 61-70 (13%, $n=11$), 71-80 (11%, $n=9$), 31-40 (11%, $n=9$), 10-20 (11%, $n=9$), 21-30 (7%, $n=6$), and 81-90 (1%, $n=1$) in Figure 1.

In the analysis of 83 medication errors identified, the distribution by type included prescribing errors (37.3%, $n=31$), dispensing errors (9.6%, $n=8$), administration errors (18.07%, $n=15$), transcribing errors (1.2%, $n=1$), and documentation errors (33.7%, $n=28$). Medication errors were further categorized into four categories (A-D): category A (48.20%, $n=40$), category B (18.07%, $n=15$), category C (32.5%, $n=27$), and category D (1.2%, $n=1$) were shown in Table 1.

The healthcare professionals associated with medication errors were doctors (36.1%, $n=30$), pharmacists (10.84%, $n=9$), nurses

(48.2%, $n=40$), and patients (4.81%, $n=4$). Error occurrence exhibited variations over the study period, with the highest percentage observed on the second day (33.75%, $n=28$), followed by the first day (16.86%, $n=14$), the third day (13.2%, $n=11$), and subsequent days showing declining percentages (Figure 2).

Root cause analysis identified illegible handwriting (7.2%, $n=14$), non-usage of generic names (17%, $n=14$), and non-usage of capital letters (4%, $n=3$) as contributing factors to medication errors. Other factors included the use of abbreviations (1.2%, $n=2$), wrong spelling (2-4%, $n=2$), wrong dose/no dose (5%, $n=4$), wrong time of drug (8.43%, $n=7$), wrong route of drug (5%, $n=4$), wrong frequency of drug (1.2%, $n=1$), wrong route (1.2%, $n=1$), wrong drug (1.2%, $n=1$), incorrect drug dispensed (1.2%, $n=1$), delay in dispensing (7.2%, $n=6$), missed dose (6.2%, $n=6$), no

documentation time of medication administration (17%, $n=14$), and incomplete documentation of reconciliation forms (14.04%, $n=12$) (Figure 3).

Risk analysis indicated that the occurrence of medication errors was not significantly associated with patient gender ($RR=0.91$; $p=0.4$), age ≥ 60 years ($RR=1.1$; $p=0.4$), or comorbidities. However, polypharmacy was associated with a significant risk ($RR=0.76$; $p=0.01$) (Table 2). These findings provide insights into the prevalence, types, and contributing factors of medication errors among inpatients in surgical gastroenterology, emphasizing the need for targeted interventions to enhance patient safety.

DISCUSSION

Medication errors may arise at any point of the prescription, dispensing, transcription, administration, monitoring, and documentation processes (Karuppannan *et al.*, 2013). The most occurred medication errors in our study were during prescribing 37.3% and documentation 33.7%, most of their root cause, were due to not using generic names and not maintaining the proper document regarding the administration of the drugs as shown in Figure 3. Similar results were noted in this study, with a high prescribing error of 65% Prescription errors and followed by 31% administrative error (Patel *et al.*, 2016).

ME rates have increased due to a lack of patient safety information. Moreover, a convoluted and poor patient care system places patients who are in hospitals at greater risk (Kumar *et al.*, 2024). Most of the professional cause of medication errors in current study is due to nurse 48.2% followed by doctor 36.1%, pharmacist 10.8% and patients 4.81%. (Khalili *et al.*, 2011) reported that 49.1% of physician errors, 48.2% of nurses' errors, and 2.7% of patient errors.

Table 1: Categorization of subjects based on type of Error.

Categorization	Sub-Categorization	Number (n%)
Type of Error	Prescription error	31 (37.3)
	Dispensing Error	8 (9.6)
	Transcribing Error	1 (1.2)
	Administration Error	15 (18.07)
	Documentation Error	28 (33.7)
Categorization of Error	Category A	40 (48.2)
	Category B	15 (18.07)
	Category C	27 (32.5)
	Category D	1 (1.2)
Error by Profession	Doctor	30 (36.1)
	Pharmacist	9 (10.8)
	Nursing	40 (48.2)
	Patients	4 (4.81)

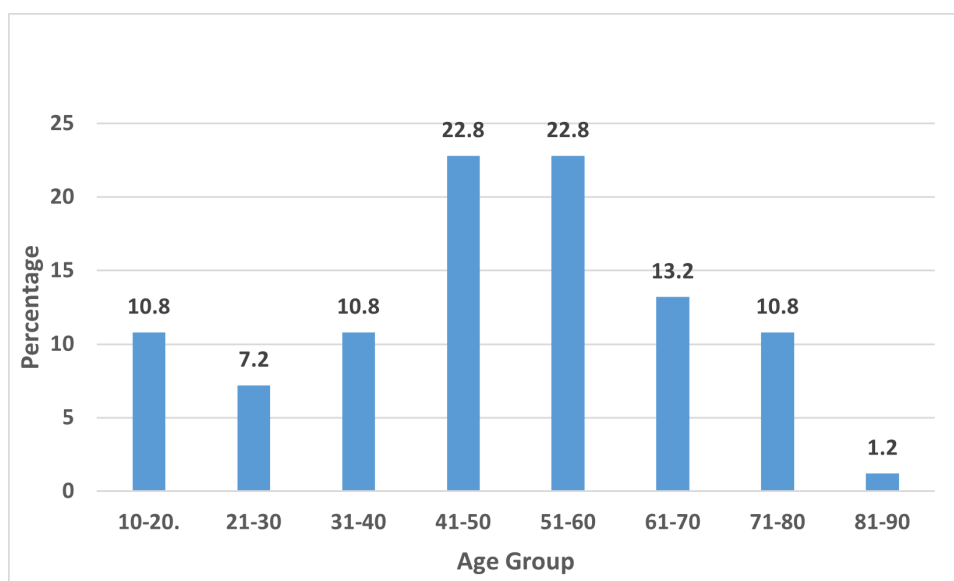


Figure 1: Age group wise distribution of medication errors.

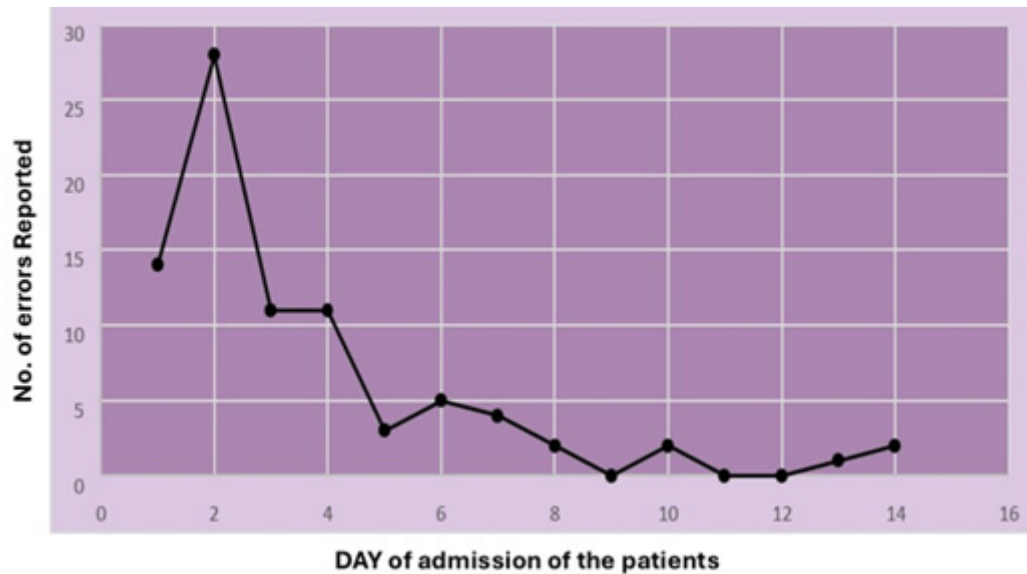


Figure 2: Day wise distribution of medication errors.

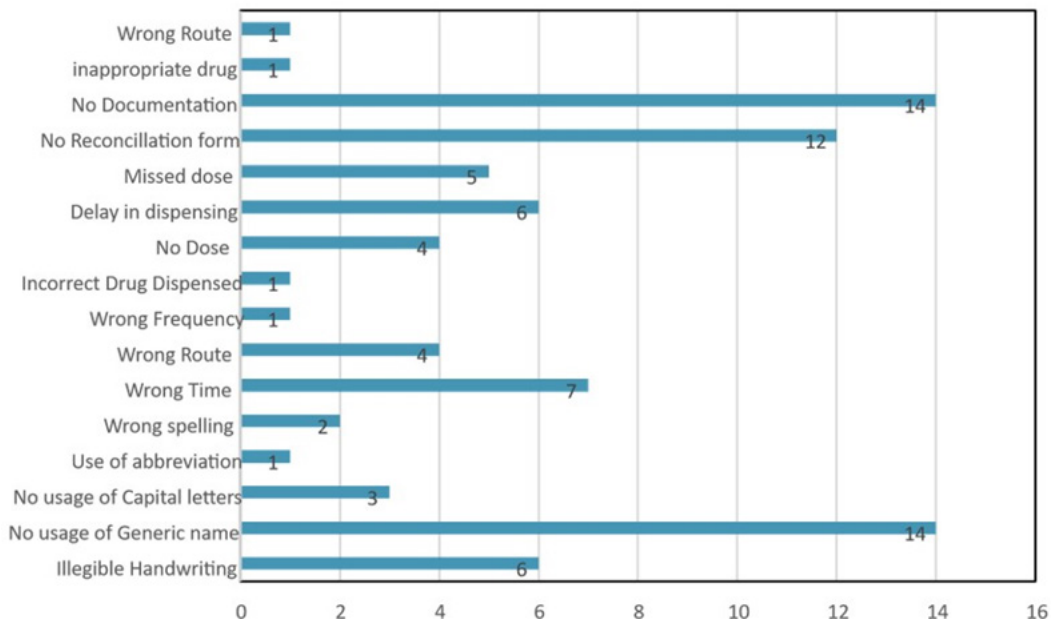


Figure 3: Root cause of medication errors.

Table 2: Risk factors associated with ME.

Variables	RR	p-value
Gender, male	0.91	0.4
Age,>_to 60	1.1	0.4
Co morbidities	1.13	0.4
Poly pharmacy	0.76	0.01

National Co-ordinated Council for Medication Error Reporting and Prevention (2001) states that Medication errors are categorized in different grades from A- Z based upon the severity of error according to in the present study, the medication error category was found to be category A-48.2%, unlikely with other studies that had shown more in category B (Berger & Sommer,

2022) is due to lack of clinical Pharmacist vigilance. Our current study had seen highest number of errors reported on Day 2 and 1 after admission is due to the doctor starting the prescription in the initial days of admitting to the hospital.is due to lack of In-patient prescription delivery system.

This study supports the risk of Medication error is more in polypharmacy with the p value <0.05 likely to this study with include other factors include that lead to ME are as follows: Polypharmacy, misuse of high-risk medications and over-the-counter medications, poor communication, the use of abbreviations by prescribers, a misunderstanding, inappropriate administration, and inappropriate drug distribution are all mentioned (Solanki & Shah, 2013; Ross *et al.*, 2000).

Majority of the Errors in our current study can be prevented by doing Medical Reconciliation, it is Forms in medication is the systematic procedure for setting up and recording a standard, conclusive list of medications during care transitions and then rectifying any discrepancies. A clinical pharmacist can play significant role in reducing the prevalence of MEs by leading programmes such as educating nursing staff and other healthcare workers about ME detection and reporting (Arun Kumar *et al.*, 2011; Al-Jeraisy *et al.*, 2011).

CONCLUSION

Medication error is a challenge in healthcare sector which impacts the safety of patient. This study contributes that the prescribing errors (31%) were very common followed by documentation errors (28%) among inpatients associated with failure to use of generic names and polypharmacy. By understanding nurses accounted for 40% of medication errors when compared to all the health care professionals. Severity of medication errors can be assessed by using the NCC MERP scale. By using the scale, our study also shows that medication errors are possible across at any point during the drug utilization process, inadequate documentation of medication errors (17%), and reconciliation forms (14% of the time) which are believed to be the root causes. These errors can be prevented by implementing the computerized physician order entry (CPOE) system. The continuous education system of this study demonstrates the role of clinical pharmacists in identifying and reporting of medication errors helps in reducing the errors, improving safety of the patient and enhance the quality of life.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

COPE: Computerised Physician Entry form; **NCCMERP:** National Coordinating Council for Medication Error Reporting and Prevention; **WHO:** World Health Organization; **CPOE:** Computerized Physician Order Entry; **SVIMS:** Sri Venkateswara Institution of Medical Sciences; **ME:** Medication Error.

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