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ASSESSMENT OF MEDICATION ERRORS IN PSYCHIATRY PRACTICE IN A TERTIARY CARE HOSPITAL

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ABSTRACT: Objectives: To determine the incidence, causes, patterns, outcomes and predictors of medication errors (ME) in psychiatric practice. **Methodology:** A prospective observational study was conducted in the psychiatry department of a tertiary care hospital over a period of 6 months. Patients of either sex and aged ≥ 18 years receiving at least one psychotropic agent were included in the study and analyzed for the ME. The collected data was analyzed for the incidence, causes and patterns of medication errors. Predictors of medication errors were determined using bivariate non parametric analysis. The variables considered to determine predictors were age, gender, length of hospital stay and number of medications. **Results:** During the study period 215 medication errors were identified from 166 patients and the incidence of medication error was found to be 1.3 per patient. The average number of ME in a patient was 2.1. The most common types of medication errors observed were dose omission (42.12%), wrong technique (11.57%) and wrong administration (10.60%). Factors responsible for medication errors were performance deficit of nursing staff, lack of training of nursing staff and knowledge deficit of physician which accounted to 33.33%, 26.38% and 11.57% respectively. Male gender and ≥ 6 medications were observed to be the predictors of MEs. **Conclusion:** Majority of errors that occurred in our study patients reached the patients but did not cause any harm. Conducting awareness and education programs for Health Care Professionals (HCPs) especially nursing staff regarding the safe handling of drugs can minimize the incidence of ME.

INTRODUCTION: Medication Error (ME) is defined as any preventable error that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of health care professional, patient or consumer.¹ The problems and sources of medication errors are multidisciplinary and multi factorial and are committed by both experienced and inexperienced staff.

The risk factors for occurrence of medication errors include inexperienced and inadequately trained staff, increased number or frequency of medications per patient, environmental factors like lighting, noise, and frequent interruptions, increased workload of staff, stress, poor communication among health-care providers, dosage form (e.g., injectable drugs are associated with more serious errors), improper storage of drugs, confusing drug product nomenclature, packaging, or labeling, poor handwriting, verbal orders and lack of effective policies and procedures².

Most commonly seen risk factor of ME is poor communication among health-care providers, illegible prescriptions, ambiguous order, use of less

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common abbreviations and incomplete directions on medication use.²

MEs are associated with significant morbidity and mortality and are responsible for injury in 1 out of 25 hospitalized patients. Medication error rates in hospitals ranges from 4.4 to 59.1% worldwide. The reporting of medication errors worldwide is less than 5%. MEs are also associated with financial burden to the patients. Worldwide billions of dollars are being spent in managing medication errors while Americans spent 37.6 billion dollars each year to manage medication errors and about 17 billion dollars spent on preventable errors.³

Patient related factors contributing to medication errors include non-adherence to medication, failure of patient to inform care providers about their medications, symptoms of psychiatric illness etc. Provider related factors contributing to medication errors include clinical practices associated with prescribing, transcription, dispensing, administration and monitoring.⁴

Medication being the main treatment in patients with severe mental illness, a good quality primary care is vital in such patients.⁵ Administration of wrong drug is the most common type of medication error in health care. A system to verify that the proper drug is delivered to the right patient is both basic and essential for ensuring patient safety and improving quality of care. Psychiatric patients, especially in long term care facilities are often trained in self-administration of medications to increase their self care and improving their compliance.⁶

However, psychiatry patients are extremely vulnerable to medication errors as they are prescribed with complex medication regimen, may be non-compliant, resist medication administration and even be violent. Administration of medication to psychiatry inpatients presents different challenges from that to the patients in general hospitals.⁷

Evidence is available from many sources that a substantial number of adverse drug events (ADE) are caused by psychotropic drugs are due to medication errors.⁵ ADEs like preventable ADE and ameliorable ADE are associated with

medication errors and all potential ADEs are usually medication errors.⁸

MATERIALS AND METHODS:

The study was conducted in both in-patients and out-patients of psychiatry department of JSS Hospital, Mysore which is a 1,200 bed tertiary care hospital providing health care facilities to the people residing in and around Mysore district. This prospective observational study was conducted over a period of 6 months from November 2012 to April 2013. Patients of either sex aged 18 years and above who were treated in the psychiatry department either as Inpatient or Outpatient, receiving atleast one psychotropic agent were included in the study. All the relevant information were collected.

Identification and assessment of medication error:

All inpatients reviewed on daily basis and outpatients reviewed on alternate days were enrolled in the study upon meeting the inclusion criteria. All the required data of the patients enrolled was reviewed to detect ME. In detecting the ME, various information resources were utilized as appropriate to confirm the identified error.

When a ME was detected, all the necessary data pertaining to error including but not limited to description of suspected ME involved, date of problem identified, type of formulation involved were collected. Personnel involved, human factors and contributing factors leading to ME were collected from various data sources like case notes/ OPD cards, medication charts/ prescriptions and documented in a suitably designed ME assessment form.

The patterns of identified ME were categorized as prescribing error, administration error, and dispensing error and the outcomes were categorized based on the severity according to National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP).¹ and their respective percentage was calculated.

RESULTS:

From a total of 318 patients (144 inpatients and 174 outpatients) who visited psychiatry department of

JSS Hospital over 6 months study period, 170 reviewed, wherein all inpatients and 55 outpatients met the study criteria. Among which 90 patients were male and 76 were female. 30.12% of the patients enrolled into study belonged to the age group 21-30 years. Among the study population 65.06% of them received 1-5 medications.

The average number of medications prescribed per patient was identified as 4.77. Of the 166 patients, more than one co-morbid condition was found in 28 patients [15 inpatients and 13 outpatients] and average length of hospital stay was found to be 8 days. Among the study population, 27.71% were diagnosed as depression (n= 46) followed by alcohol dependent syndrome [n=40(24.1%)]. Antipsychotics were found to be predominantly prescribed class of drug which accounted to 235.

A total of 215 ME were found in 102(61.44%) patients, of which 90 in-patients and 12 out-patients

patients (111 inpatients and 59 outpatients) were had 202 errors and 13 errors respectively. 62 (60.78%) patients among 102 were male and 40(39.21%) were female. Majority (31.37%) of errors occurred in patients of age group 21-30 years. Of the study population, 51.97% patients received 6-9 medications. About 76.67% of medication errors were observed in patients whose length of hospital stay is ≥ 5 days. Average number of errors in a patient was found to be 2.1.

Antipsychotics were associated with highest number of medication errors which accounted to 76(39.11%) in inpatients and 11(84.62%) in outpatients. Among 215 errors, more number of errors were found to be at the level of drug administration which accounted to 133(61.86%) in 88 patients. Following which were prescribing and dispensing errors. The patterns of medication errors are presented in **Table 1**.

TABLE 1: PATTERNS OF MEDICATION ERRORS

Pattern of medication errors	Number (%)			
	Type of patient	No of patients with medication errors (n=102)	Number of ME	Total (%) (n=215)*
Prescribing errors	In-patient	47 (46.08)	59	72 (33.48)
	Out-patient	12 (11.76)	13	
Dispensing errors**	In-patient	8 (7.84)	10	10 (4.65)
Administration errors**	In-patient	88(86.27)	133	133(61.87)

*There may be more than one ME in a patient.

** Dispensing errors and administration errors were not assessed in outpatients

There may be more than one ME in a patient. 2, 3 Dispensing errors and administration errors were not assessed in outpatients. Of the prescribing errors, 50% were attributed to wrong technique followed by an error due to improper dose which accounted for 23.61%. Among dispensing errors, 90% of them were due to dispensing of wrong

brand. Dose omission error was observed in 68.42% of patients from a total of 133 administration errors in inpatients. The details of the prescribing, administration and dispensing errors were shown in the **Table 2, 3 and 4** respectively.

TABLE 2: PATTERNS OF PRESCRIBING ERRORS

Prescribing errors	Number of errors (%)		
	In-patient (n=59)	Out-patient (n=13)	Total (n=72)
Drug given without indication	1 (1.69)	0 (0)	1 (1.38)
Un-treated indication	2 (3.39)	1 (7.69)	3 (4.16)
Improper dose	17 (28.81)	0 (0)	17 (23.61)
Drug duplication	10 (16.94)	0 (0)	10 (13.89)
Wrong duration	3 (5.09)	0 (0)	3 (4.16)
Wrong technique	24 (40.67)	12 (92.30)	36 (50)
Over dose	2 (3.38)	0 (0)	2 (2.78)

TABLE 3: PATTERNS OF ADMINISTRATION ERRORS

Administration errors	Number (%)	
	No of patients (n=88)	No of administration errors(n=133)*
Dose omission	51 (57.96)	91 (68.42)
Wrong administration	21 (23.86)	23 (17.29)
Wrong time	8 (9.09)	10 (7.51)
Compliance error	8 (9.09)	9 (6.76)

*More than one error may be found in a single patient.

TABLE 4: PATTERNS OF DISPENSING ERRORS

Type of dispensing error	Number (%)	
	Number of patients (n=8)	Number of dispensing errors* (n=10)
Wrong formulation	1 (12.5)	1 (10)
Wrong brand	7(87.5)	9(90)

*More than one error may be found in a single patient

Majority of patients with medication errors fell under category C [n=172(80.00%)], wherein an error occurred that reached the patient but did not harm the patient. The categories of medication errors are outlined in **Figure 1**. Of the 215 medication errors, 136 were identified to be due to human factors and 113 errors to be due to system related factors. Among total errors due to human factors 52.94% were attributed to performance deficit and 50.44% of errors due to system related factors were attributed to lack of training. Human factors and system related factors leading to medication errors are presented in **Figure 2** and **3**.

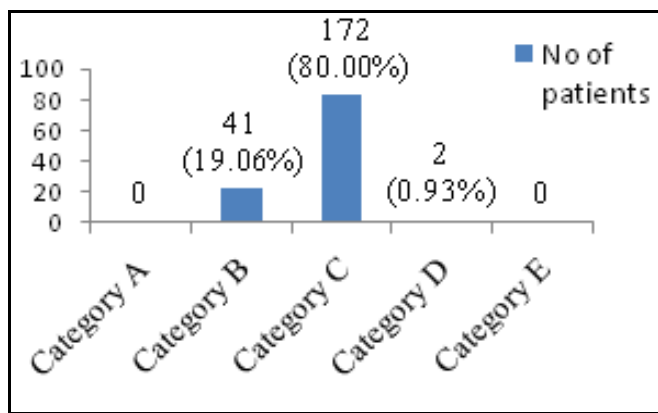


FIGURE 1: OUTCOMES OF MEDICATION ERRORS

Description on category

Category A: Circumstances or events that have the capacity to cause error; **Category B:** An error occurred but the error did not reach the patient; **Category C:** An error occurred that reached the patient, but did not cause patient harm; **Category D:** An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm; **Category E:** An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention.

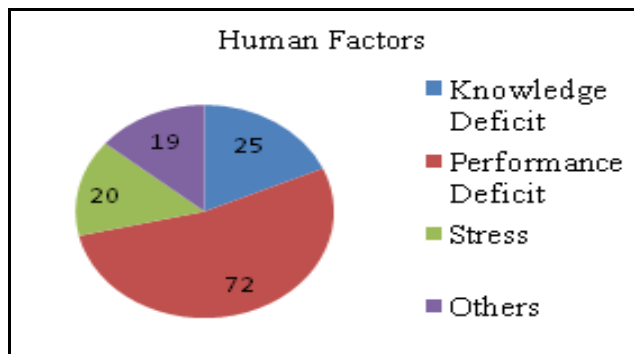


FIGURE 2: HUMAN FACTORS

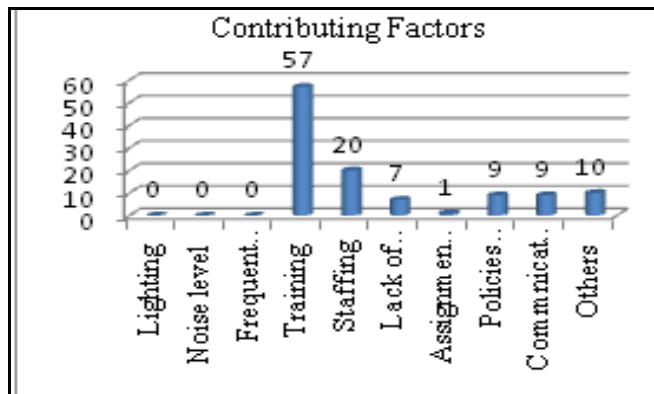


FIGURE 3: CONTRIBUTING FACTORS

The contribution of each personnel to medication errors is depicted in the **Figure 4**.

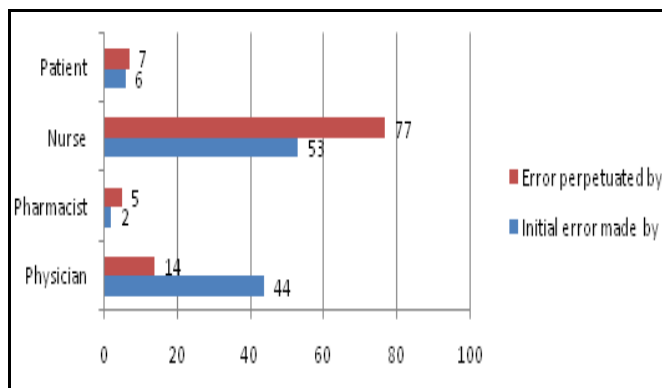


FIGURE 4: PERSONNEL INVOLVED

The predictors of medication errors were determined by taking into consideration the variables like gender, age, length of hospital stay and number of medications received. Of all these variables, male gender [(Odds ratio {OR}: 1.9375, p=0.0405)] and more than 6 medications [(Odds ratio {OR} :0.0667, p=0.007)] were identified as predictors of medication errors.

DISCUSSIONS: Given that very few studies were conducted on medication errors in psychiatry practice in India, our prospective observational study was intended to assess the medication errors in psychiatry practice in a tertiary care hospital. Majority of medication errors were observed in males, perhaps due to the fact that, males are more in number among the study population. It was observed in our study that, increased length of

hospital stay and polypharmacy are the causes of increased medication errors. As the numbers of days of hospital stay increased, more number of medications were prescribed which led to more number of medication errors.

The concurrent use of multiple psychoactive medications in a single patient, i.e. polypharmacy was clearly evident in most of the prescriptions analyzed. It is considered to be an increasingly common and debatable contemporary practice in clinical psychiatry.⁹ This concomitant use of psychiatric drugs is based more probably upon experience than evidence.¹⁰ Concerns with polypharmacy include adherence issues which emerge with increasing regimen complexity.¹¹ There is a need to develop evidence-based strategies for polypharmacy to avoid most of medication errors.¹²

Among all the error types, administration error was most frequently observed error of which omission of a prescribed dose of drug was highly encountered. This finding of our study was found to be similar to medication incidents observed using medication error reporting scheme (safemed), wherein, majority of medication errors were administration errors, of which dose omission errors were predominant.¹³

The administration errors observed in our study were attributed to the performance deficit of nursing staff. The reason being, lack of availability of the nurse in the ward at required times, to administer medications to the patients as the nursing station is not located within the ward. The most commonly observed prescribing error was an order to break a delivery system that should not be broken as in case of enteric coated tablets and controlled-release tablets. Breaking of enteric coated tablets and controlled-release tablets may result in significant fluctuations in the administered dose.¹⁴

The tablet dissolution rate and absorption characteristics may also be affected when tablets are split.¹⁵ This finding of our study was found to be similar to an audit of prescribing errors in psychiatry department, wherein, prescribing an order to break a delivery system that should not be broken is the most commonly observed prescribing

error.¹⁶ However, findings contrast to this finding of our study were observed in a prospective observational study of medication safety in psychiatry practice, where in the most common type of medication errors were found to be due to prescribing wrong dose of drugs.¹⁷

The dispensing errors observed in our study which were very few were all confined to inpatients. Dispensing errors were not studied in outpatients as outpatients do not return to the OPD with the dispensed medications. Dispensing a drug of a brand other than that prescribed is the most commonly found dispensing error in inpatients. The administration errors in outpatients were not assessed in our study as their adherence to medications could not be monitored accurately.

However, medication adherence measures were also not followed. Majority of errors observed in our study were grouped under category C. Such errors reached the patient but did not cause any harm to the patient, as in case of dose omission, administration of drug at wrong time and splitting enteric coated tablets, combination drug products and controlled release tablets. For instance, nurse failed to administer escitalopram 10mg (Dose Omission) and administered risperidone 3mg at wrong time. Such errors reached patient but no patient suffered observable harm as a result of these errors as the nurse was immediately advised regarding the missed dose and administration of the drug at the right time by the pharmacist posted in the respective ward.

This finding of our study was found to be similar to an observational study of medication administration errors, wherein most of the errors were not serious and did not cause patient harm.⁷ However, their study employed five-point scale to rate the severity of errors in contrast to our study, wherein medication error severity was categorized according to NCCMERP.

Performance deficit of nursing staff was associated with medication errors at the level of drug administration. This finding of our study was found to be similar to a study of medication safety in a psychiatric hospital, wherein, performance deficit was found to be the most common human factor leading to medication error.¹⁷ Lack of proper

training was predominant among the system related factors leading to Medication Errors. Reason being, student nurses who were still in the training phase were assigned with the duty of administering drugs to the patients. Lack of sufficient nursing staff was the next system related factors that lead to medication error. Only single nurse is assigned with the duty of administering drugs to every 10 patients. Moreover, the nurse is also not available to the patients at all the times as the nursing station is not located within the ward.

The contribution of nursing staff to medication error was predominant over other personnel. Clinician involved in the error by prescribing an order to break delivery system that should not be broken (enteric coated and combinational drug products). However, many a times such an order was prescribed if the required strength of medication is not available. Patient contributed to the error by not adhering to the medication.

Many of the psychiatric patients are violent and aggressive and resist to take medications leading to medication errors. This finding of our study was found to be similar to a comprehensive review of medication errors conducted to examine patient, provider and system related factors that contributed to medication errors.

The patient related factors that resulted in medication errors include non-adherence to the medication and provider related factors contributing to medication errors were identified to be clinical practices associated with prescribing, dispensing and administration. The incidence of medication errors increased with an increase in age till 50 years, upon which medication errors decreased due to less number of patients beyond age group 50 years. Male gender and receiving more than 6 medications were identified as predictors of medication errors.

The limitations of the study include an underestimated medication error rate due to lack of ME reporting system at study site, shorter duration and smaller sample size of the study, only randomly selected out-patients being reviewed and dispensing and administration errors associated with out-patients not being detected.

CONCLUSIONS: Majority of errors identified in the study reached the patients but did not cause any harm. So as to minimize the medication errors, it is necessary to conduct awareness and education programs for all health care providers especially nursing staff regarding detection and reporting of medication errors. As polypharmacy is identified as one of the major risk factor for medication errors, it is necessary to establish a proper system for constant monitoring and reporting of medication error for all the patients receiving multiple drug therapy.

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