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A STUDY ON PREVALENCE OF MEDICATION ERRORS IN A MULTISPECIALTY HOSPITAL

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Keywords:

Medication Errors, Drug-Drug interactions, Cognitive pharmaceutical care/service, Continuous quality improvement, Drug-related problem, Intensive care unit, Level of significance

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ABSTRACT: Background: Medication errors (MEs) are the potential to cause adverse clinical outcomes. The incidence of MEs is hopefully controlled with patient-centric pharmaceutical services. The present study evaluated the incidence of MEs in various departments in a multispecialty hospital in India. **Methods:** This prospective observational was analyzed 100 prescriptions included 749 drugs from general medicine, cardiology, renal, and endocrinology departments. The prescriptions were analyzed for medication errors as per NCCMERP criteria. The outcome was expressed as range additionally as percentages of variables. **Results:** A total of 217 MEs (n-105, 48.39%) were ruled out from out of these 100 cases. The applied NCCMERP criteria found 87 drug administration errors (40.09%) with higher categories A and B, but the distribution of category C (n-10) and D (n-10) was noted quite alarming. **Conclusion:** The study would suggest perpetual inculcation and training programs to be conducted to incorporate cognizance and practice inputs of medicos, nurses, and pharmacists.

INTRODUCTION: MEs are potential for consequentiality in the occurrence of morbidity and mortality in both hospitalized and non-hospitalized patients [1]. MEs are multifactorial, ranges from 4.4 to 59.1% [2] ecumenical, and the injury caused by MEs are explicated as 1 out of 25 hospitalized patients [3]. Albeit the incidence of MEs has been studied astronomically, the reporting is <5%; it could additionally associated with financial burden [4] to both healthcare as well as to patients. Pharmaceutical care (PC) involves a patient-centered, outcomes-oriented pharmacy practice accommodations achieved through the conjunction of work with patients and healthcare providers for the amelioration of clinical outcome [5].

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MEs often occur due to the tendency to get think in a particular mode of thinking by healthcare staff, called cognitive errors [6]. This could be even due to biases that cloud over the judgment under certain conditions of pressure. There are predisposing factors behind cognitive errors that give rise to principle biases like anchoring [7] where the person overvalues their thinking, availability [8] where recent drastic cases and situations come to mind and attribution [9] in which stereotypes make prejudgement, therefore, conclusions arise from preconceptions [10] on current situation. The present study evaluates the prevalence of MEs in major departments in a multi-specialty hospital in India.

METHODOLOGY: This prospective interven-tional study was carried out among the in-patients admitted in a tertiary care multispecialty hospital in Chennai, Tamil Nadu, for a duration of 2 years and 8 months (32 months). The research protocol was reviewed and approved by the Institutional Review Board (IRB) for clinical studies, Ratnam Institute

of Pharmacy, Anantapur, Andhra Pradesh (Protocol ID: Ratnam/Pharmacy/Res/ DPP/IRB/2016-17 dated 12.01.2016). A total of 749 drugs were accumulated from 100 in-patients enrolled from general medicine, cardiology, renal, and endocrinology departments. The inclusion criteria were adults male and female of age 20-60 years who admitted with an anticipated length of hospital >5 days. The omission criteria were all outpatients, renal and hepatic impairment, patients admitted for surgery and/or post-surgical evaluation, and chemotherapy received patients. The data sources were case report forms, mediation chart, laboratory reports, physical symptoms. The medication charts were reviewed for the potential MEs, analysed in to the categories of illegible handwriting, drugs written in generic name, wrong dose, wrong route of administration, wrong time of administration, drug omission, wrong drug dispensed etc. The MEs categorized according to the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) [11]. The outcome was counted as number and percentages of variables.

RESULTS:

Demographic Metaphors: This prospective observational study accumulated 100 cases from various inpatient departments. A total of 217 MEs were ruled out from out of these 100 cases. The demographic metaphors of the enrolled subjects were as showed in **Table 1**. The distribution of male was higher (n-79) than female (n-21) within the age group 40-49 (43.04%) and 50-60 (31.64%) whereas a number of females were higher in 30-39 age group (42.85%). The average length of patient stay at the hospital was calculated 7.12 ± 2.82, with an average number of drugs prescribed 7.49 (*i.e.*, poly prescribing).

TABLE 1: DEMOGRAPHIC DETAILS OF THE STUDY POPULATION

Parameters	Total (n-100)		Male (n-79)		Female (n-21)	
	n	%	n	%	n	%
Age (Yrs.)						
18-29	8	8	8	10.12	0	0
30-39	21	21	12	15.19	9	42.85
40-49	42	42	34	43.04	5	23.81
50-59	29	29	25	31.64	7	33.33
BMI						
<18.5kg/cm^2	28	28	13	16.45	7	33.33
18.5 -24.9kg/cm^2	34	34	25	31.65	5	23.81
25-29kg/cm^2	21	21	26	32.91	5	23.81
>30kg/cm^2	17	17	15	18.99	4	19.05
Dietary pattern						
Predominantly Veg	89	89	54	68.35	18	85.71
Predominantly Non Veg	0	0	0	0	0	0
Pure Veg	11	11	25	31.65	3	14.28
Pure Non Veg	0	0	0	0	0	0
Social habits						
Smoke	30	30	28	35.44	2	9.52
Alcohol	24	24	24	30.37	0	0
Smoke & Alcohol	12	12	12	15.19	0	0
None	34	34	15	18.99	19	90.47

Types of MEs: Out of 217 MEs, prescription errors were found to be prevalent (n-105, 48.39%) and drug administration errors (n-87, 40.09%), as depicted in **Table 2, Fig. 1**. The index of MEs, according to NCCMERP, was used to assess the severity of MEs into categories A, B, C, and D in particular to the types of MEs. This was found that majority MEs have belonged to category A, then B, while C and D were limited. The general medicine department had the most number of MEs (36.41%) could be due to multiple diagnostic cases than other departments of specialty **Fig. 2**. The cardiology department had a quite higher number of cases (26.27%) due to vast usage of inter system drugs like diuretics, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, anti-arrhythmic drugs *etc*. the other types of MEs from NCCMERP categories were not included in this study.

TABLE 2: CONSOLIDATED DETAILS OF MEs

Type of ME	Distribution of ME		Category of ME			
	n	%	A	B	C	D
Prescription error	105	48.39	51	47	5	2
Transcription error	14	6.45	5	5	2	2
Dispensing error	11	5.07	9	2	0	0
Drug administration error	87	40.09	42	23	12	10

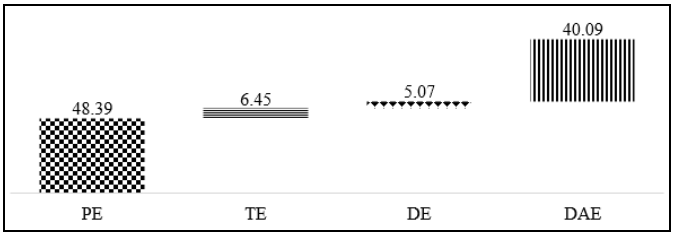

FIG. 1: TYPES OF MEs. Values expressed as % PE: Prescription error, TE: Transcription error, DE: Dispensing error, DAE: Drug Administration Error

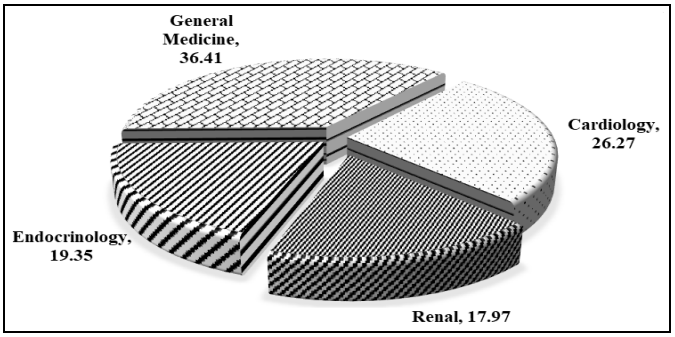

FIG. 2: DEPARTMENT WISE DISTRIBUTION OF MEs. Values expressed as %

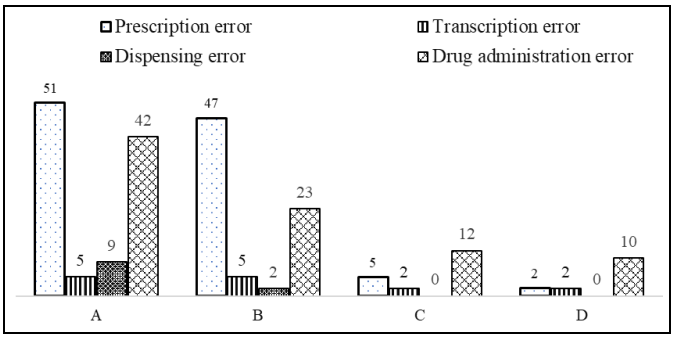

FIG. 3: THE TYPES OF MEs IN CATEGORIES. Values expressed as a number

Severity level and types of MEs: The severity level analysis, according to NCCMERP, showed more number of MEs belonged to category A and B presumably higher the prescription errors **Fig. 3**. Despite the number of categories C and D in the drug administration error section (12, 10, respectively) was quite alarming. **Table 2**; drug administration errors have reached the patients and caused harm.

These harms were hypoglycemia, hypotension, hypokalemia, rashes, peripheral numbness, incompatibility; the detailed analysis was not included. Correlation analysis performed between the length of hospital stay and incidence of MEs showed significance ($p<0.05$). Similarly, we performed a correlation between a number of drugs prescribed and the incidence of MEs; the significance was observed with $p<0.05$.

The sagacious content analysis of MEs showed a paramount number of drug administration errors in terms of the time of administration, **Fig. 4**. The MEs observed due to erroneous time of drug administration (40.9%) was the highest among all; could be potential because the drugs were not administered as per its optimum pharmacokinetic data. This drug administration time was calculated to omit of 30 min window given by certain guidelines.

The administration protocols did not found to follow the 6 rights of the patients; right drug, right dose, right route, right frequency at right time to right patients. The lack of adequate information about the available formulation (*i.e.*, dose, dosage forms, monograph, tardy receival of a drug from the pharmacy, unavailability of drug *etc*.) was additionally thought to contributed consequential numbers of MEs depicted in **Fig. 4**.

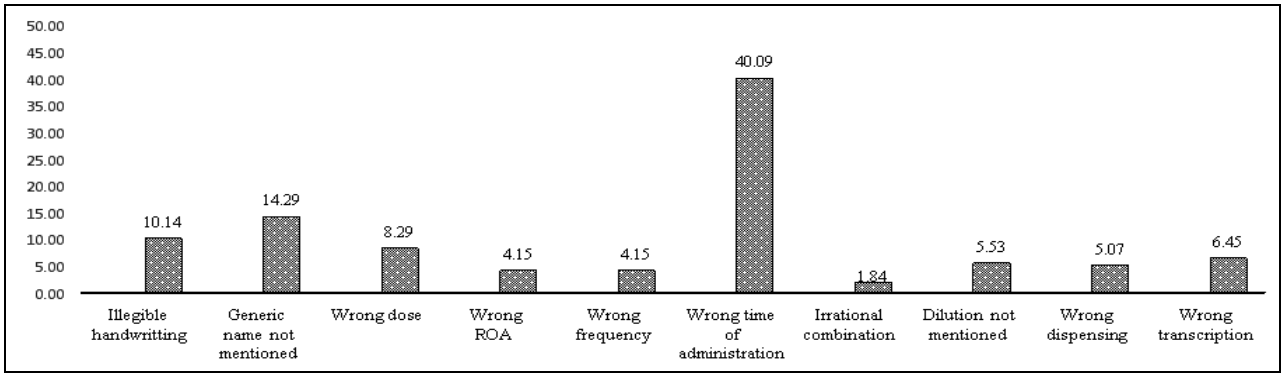

FIG. 4: THE CONTENT WISE ANALYSIS OF MEs. Values expressed as %

DISCUSSION: MEs thought to cause serious health-related problems in hospitalized patients, results in significant morbidity as well as mortality. The study demonstrated that more number of prescription errors (48.39%) and drug administration errors (40.09%) revealed the direct relationship between prescription errors were potential [11] to cause drug administration error. The different previous studies performed reported similar incidence, but this association was yet to be proved. The increased number of drugs was observed to be another risk for incidence of MEs; this risk stratification had 17 MEs [12] with increased length of hospital stay. The harm analyzed with NCCMERP indexed categories C and D were significantly caused by drug administration.

There could be effective ME reporting systems, but further steps to sort out the incidence were not carried out. The portions of category A in the present study were high enough to cause harm (Category C and D) has been reported by previous studies [13]. The establishment of computer-based prescription [14] would reduce this incidence in future practices. Medication reconciliation systems required [15] effectively to reduce further incidence instantly more number generic formulation into hospital pharmacy to be restricted as well. The anticipated benefits would be achieved in the overall percentage of MEs without cause of harm. Another risk could be poly-prescribing [16], found in our study was 7.49 was found to be potential for fatal outcome [17] respective to age group distribution.

CONCLUSION: The study still more comments on occurrences of category D MEs due to drug administration errors. This higher incidence relates more antecedent failed recommendations fixated on published surveys. We withal would suggest perpetual inculcation and training programs to be conducted, which is often called integrated Continuous Quality Improvement (CQI)-Cognitive Pharmaceutical Services (CPS). This should be conducted in conventional substructure, incorporate cognizance and practice inputs of medicos, nurses, and pharmacists.

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CONFLICTS OF INTEREST: None declared

REFERENCES:

1. Abdullah DC, Ibrahim NS and Ibrahim MI: Medication errors among geriatrics at the outpatient pharmacy in a teaching hospital in Kelantan. MJMS 2004; 11(2): 52.
2. Patel N, Desai M, Shah S and Patel P: A study of medication errors in a tertiary care hospital. Perspectives in Clinical Research 2016; 7(4): 168.
3. Walker EE: Medication Errors. Imperial Journal of Interdisciplinary Research 2016; 2(5).
4. Sinha G, Acharya LD and Thunga G: Study of medication errors in general medicine wards of the south Indian tertiary care hospital. Asian Journal of Pharmaceutical and Clinical Research 2016; 9(4): 196-200.
5. Wilson RM, Harrison BT and Gibberd RW: An analysis of the causes of adverse events from the Quality in Australian Health Care Study. Med J Aust 1999; 170: 411-5.
6. Paton C and Benham SG: Prescribing errors in psychiatry. Psychiatr Bull 2003; 27: 208-10.
7. Dean B, Schachter M and Vincent C: Causes of prescribing errors in hospital inpatients: A prospective study. Lancet 2002, 359: 1373-8.
8. Solanki ND and Shah C: Root cause analysis of medication errors at a multispecialty hospital in Western India. 2013; 2(6): 819-23.
9. Ross LM, Wallace J and Paton JY: Medication errors in a paediatric teaching hospital in the UK: five years operational experience. Archives of Disease in Childhood 2000; 83(6): 492-7.
10. Kumar KSA, Venkateswarlu K and Ramesh A: A study of medication administration errors in a tertiary care hospital. Indian Journal of Pharmacy Practice 2011; 4(2): 37.
11. Karna KH, Sharma SA and Inamdar SH: Study and evaluation of medication errors in a tertiary care teaching hospital- A baseline study. Int J Pharm Sci 2012; 4(5): 58.
12. McDowell SE, Ferner HS and Ferner RE: The pathophysiology of medication errors, how and where they arise. Br J Clin Pharmacol 2009; 67: 605-13.
13. Meadows M: Strategies to reduce medication errors, Proquest Health Med Compl 2003; 37: 1e8.
14. Babar HS, Hussain S and Maqsood Z: Adherence to prescription format and compliance with who core prescribing indicators. J Phar Sci Res 2014; 6(4): 195-99.
15. Roy V, Gupta P and Srivastava S: Medication errors: causes and prevention, Health Adm. 2005; 29: 60-64.
16. Karthikeyan M and Lalitha D: A prospective observational study of medication errors in general medicine department in a tertiary care hospital. Dru Met Dru Int 2013; 19: 1e9.
17. Reddy P and Mandha M: Medication errors: identification, prevention and implementation of safe medication practice in a tertiary care teaching hospital. World J Pharm Pharm Sci 2015; 4: 1249-56.

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