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Evaluation of Medication Errors in A South Indian Hospital

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ABSTRACT

Errors resulting in patient injury and death are occurring in hospitals at significantly high and unacceptable numbers. Evidence from a number of sources over several decades indicates that a substantial number of patients suffer iatrogenic injuries while in hospital. The main aims of this study was to detect, identify and document the onset, underlying cause, type of medication errors and assess the severity of medication errors in the outpatient departments of a south Indian hospital. A prospective observational study was conducted at outpatient departments of general medicine, surgery, pediatrics, obstetrics and gynecology, orthopedics in Rajiv Gandhi Institute of Medical Sciences, Kadapa for the period of 6 months. The study was approved by the Institutional Ethical Committee, RIMS, Kadapa. Approximately, a total of 1296 medications were prescribed in 390 cases, and the average number of medications prescribed per patient was found to be 3.37.The present study showed a high incidence of medication errors in females (73%) over males and (27.50%) of medication errors in patients between 13-30yrs.The present study showed that prescribing errors 347(96.38%) was the most common among the medication errorsMajority of errors encountered in Anti-microbial agents 84 (23.33%). Severity level assessment of medication errors revealed that majority of errors (84.99%) were fallen under the category-B, C&D (Error, No Harm). A clinical pharmacist can play a major role in this situation appears to be a strong intervention and early detection and prevention of medication errors and thus can improve the quality of care to the patients.

Key words: Clinical pharmacist, evaluation, medication errors

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INTRODUCTION

The objective of drug therapy is the attainment of definite therapeutic outcomes, which progress a patient's quality of life while minimizing patient risk.[1] Errors resulting in patient injury and death are occurring in hospitals at significantly high and unacceptable numbers.[2]A medication error was defined as any deviation from the prescribers order. This definition does not include the clinical outcome of the error.[3] One of the most important works was the Harvard Medical Practice study. In this study, it was shown that 3.7% of patients admitted to hospitals in the State of New York experienced injury resulting from care. It was also shown that 19% of these injuries were caused by the use of medications.[4]Evidence from a number of sources over several decades indicates that a substantial number of patients suffer iatrogenic injuries while in hospital.[5-10] Medication errors should be identified and documented in order to recognize recurring causes and therefore develop systems to minimize them. The difficulty, however, in detecting medication errors has been recognized for many years.It is accepted that most medication errors are probably undetected,and that of those that are detected only 5% are reported.The remainders are not reported for a variety of reasons including lack of awareness that an error has been made, lack of familiarity with reporting mechanisms, difficulty/time constraints in completing report forms, fear of possible legal ramifications for both the individual and the organization, and lack of feedback to staff causing a reduction in motivation to continue submitting reports.Direct comparison of error rates between studies becomes difficult when a variety of error definitions and data collection methods have been used. Ongoing monitoring programs for the detection and management of medication errors within a hospital are needed. According to the American Society of Health System Pharmacists guidelines on preventing medication errors in hospitals, medication errors should be identified and documented and their causes studied in order to develop systems that minimize recurrence.A first step toward improving the quality of a drug distribution system and reducing drug-related errors is to employ an effective mechanism for systematic collection and feedback on errors. The main aims of this study was to detect, identify and document the onset, underlying cause, incidence, and type of medication errors and assess the severity of medication errors in the outpatient departments of a south Indian hospital.

MATERIALS AND METHODS

Ethical Approval: Approved by Institutional Ethical Committee, RIMS, Kadapa

Study design: Prospective Observational Study

Study site: Outpatient departments of general medicine, surgery, pediatrics, obstetrics and

gynecology, orthopedics in Rajiv Gandhi Institute of Medical Sciences, Kadapa.

Study duration: 6- months

Sample size: 390 medication orders

Inclusion criteria: The patients having at least one medication error were included in this study.

Exclusion criteria: Prescription from Pulmonology

Study Materials: Medication error reporting and documentation form

RESULTS AND DISCUSSION

Out of 390 cases, 112 (28.77%) were males and 278 (71.28%) were females.A total of 1296 medications were prescribed in 390 cases, and the average number of medications prescribed per patient was found to be 3.37. Medication errors were identified in 200 cases out of these 54 (27%), 146 (73%) cases related males and females respectively.28 (14%) were below 12yrs age group, 55 (27.50%) were 13-30 yrs age group, 52 (26.00%) were 31-50yrs age group, 36 (18.00) were51-60 yrs age group and 29 (14.50%) were above 60 yrs age group. Medication errors from each department like General medicine was found to be 163(41.79%), followed by General Surgery 79 (20.26%), in Pediatrics 60 (15.38%), in Obstrectics & Gynecology 47 (12.05%), and in Orthopedic 41(10.58%). 320(88.89%) were Prescribing errors which includes Poor hand writing 12(3.33%), Wrong dosage form error 26(7.22%), Wrong drug error 6(1.67%), Wrong route error 12(3.33%), Wrong dose error 31(8.61%) and Wrong duration error 233(64.72%), 35(9.72%) were omission error and 5(1.39%) were compliance error, were expressed in table 1.

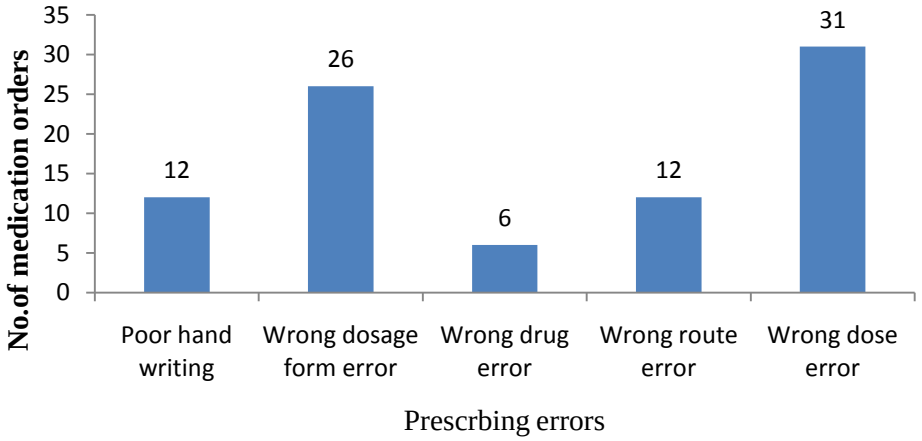

Figure-1- It displays the prescribing occurs

Table 1-It displays type of medication errors

Sl.No.	Types of medication errors	No. of medication errors (%)
1.	**Prescribing errors:**	320(88.89%)
a)	Poor hand writing	12(3.33%)
b)	Wrong dosage form error	26(7.22%)

c)	Wrong drug error	6(1.67%)
d)	Wrong route error	12(3.33%)
e)	Wrong dose error	31(8.61%)
f)	Wrong duration error	233(64.72%)
2.	Omission error	35(9.72%)
3.	Compliance error	5 (1.39%)

360 medication errors were categorized according to the physiological systems, shown in the table 2.

Table 2- It displays Physiological system-wide distribution of medication errors

Physiological systems	No. of MEs (%)
CVS	12(3.33%)
RS	24(6.67%)
CNS	10(2.78%)
GIT	46(12.78%)
Endocrine & Metabolism	20(5.56%)
Musculoskeletal & Joint	58(16.11%)
Nutrition & Blood	36(10%)
Infectious	73(20.27%)
Obstetrics&Reproductive	31(8.61%)
Poison	26(7.22%)
Others	24(6.67%)

The majority of the medication errors were observed in Antimicrobial agents 84(23.33%) fallowed by GI agents 60(16.67%), RS agents 40(11.11%), Anti-diabetic agents 10(2.78%), NSAIDS 76(21.11%), CVS agents 10(2.78%), Diuretics 8(2.22%), Miscellaneous 16(4.44%), CNS agents 16(4.44%), Vitamins36(10%), Anti-coagulants 4(1.11%), Anti –allergic 3(0.83%) and Corticosteroids 6(1.67%), were expressed in table 3.

Table 3- It shows medication class-wise distribution of medication errors

Medication class	No. of MEs (%)
Anti-microbial agents	84(23.33%)
GI agents	60(16.67%)
RS agents	40(11.11%)
Anti-diabetic agents	10(2.78%)
NSAIDS	76(21.11%)
CVS agents	10(2.78%)
Diuretics	8(2.22%)
CNS agents	7(1.94%)
Miscellaneous agents	16(4.44%)
Vitamins	36(10%)
Anti-coagulants	4(1.11%)
Anti-allergic agents	3(0.83%)
Corticosteroids	6(1.67%)

It was found that 47(13.05%) were belonged to the severity level of No Error which comes under the Category-A followed by 306(84.99%) were belonged to the severity level of Error, No harm which comes under the Category-B 98(28.12%), Category-C 160(48.82%), Category-D 48(14.84%) and 7(1.94%) were belonged to the severity level of Error, Harm which comes under the Category-E.Out of 390 cases, 311(79.74%) were due to cases prescribed with rational drugs and 79(20.26%) were due to cases prescribed with irrational drugs.Medication errors are serious problems in health care and can be a source of significant morbidity and mortality in the health care settings. A report from the Institute of Medicine (2001)[11] suggested that medical errors account for 44,000-98,000 deaths per year and is recognized as the 8th leading cause of death. A report from the IJCP'S MEDINEWS (2008)[12]said that the medication errors are responsible for almost 1, 00,000 wrongful deaths each year. Dr. Barbara Starfield study reported that 2, 50,000[13] deaths per year from iatrogenic causes which is the third leading cause of deaths in the U.S. in our study no such cases were found. A medication error is an episode associated with the use of medication that should be preventable through effective control systems. The factors that increase the chance of a medication error are attributes of the complex mechanisms involved in the prescribing, dispensing and administration of drugs. Many authors have reported mechanisms for reducing the opportunity for errors in medicine; they include reduced reliance on memory, improved access to information, simplification, standardization and training.[14] Problems of medication safety are now the grave concern of many persons involved with patient care. The multiplicity of drugs, increased number and kinds of medications prescribed per patient, the increased number of patients being treated and ever changing concepts of medical care make it mandatory that a system of safe medication practices be developed and maintained to insure that the patient receives the best possible care and protection.[15]

In the recent years, the rapid obsolescence of drugs, the availability of more specific drugs per disease entity, and the general increase in the prescribing of medication have placed a greater responsibility on healthcare professionals. To keep a record to report an error is a good practice, any action taken subsequently to prevent such error in future and its recurrence. It is ideal to have a protocol in place for dealing with complaints. "Substantial evidence suggests that pharmacists in decentralized patient care settings can reduce the frequency of medication errors".[16] The demographic reports of epidemiological studies conducted by Jerry Philips *et al* (2001)[17]in the analysis of mortalities associated with medication errors and the study conducted by the Massachusetts Board of Registration in Pharmacy (2004)[18] cited a predominance of males over females. The present study showed a high incidence of medication errors in females (73%) over

males. The study conducted by Jerry Philips *et al* (2001)[19]showed that the mortality rate associated with medication errors is higher in patients over 60yrs of age. The present study showed a higher incidence (27.50%) of medication errors in patients between 13-30yrs. This can be attributed to the fact that more number of patients (28.46%), who visited the hospital during the study period, was 13-30yrs of age.

The studies conducted by the Almut G. winter stein *et al* (2004)[20], Alison Dale *et al* (2003)[21] and S. Nadeem H. Shan*et al* (2001)[22]showed that prescription errors are the most common among the types of errors. The present study showed that prescribing errors 347(96.38%) was the most common among the types of errors, in this particularly inappropriate duration errors were most common 230(63.89%). In present study majority of errors encountered in Anti-microbial agents 84(23.33%) followed by NSAIDS 76(21.11%), GI agents 60(16.67%)and Respiratory agents 40(11.11%). Very fewer errors were encountered in Anti-allergic agents 3(0.83%).

Majority of errors encountered in Anti-microbial agents 84(23.33%) this may be because of their frequent usage. Severity level assessment of medication errors revealed that majority of errors (84.99%) were fallen under the category-B, C&D (Error, No Harm). 13.05% were in the category-A (No Error) and 1.94% in the category-E, (Error, Harm). This finding is consistent with the study carried out by Rodney W. Diane *et al* (2004)[23]on analyzing the recorded medication errors for error category Index, which showed that 35% of the recorded errors did not reach the patients, 49% of the recorded errors reached the patients.

The prescriptions were also evaluated for their rationality & irrationality. Of 1296 drugs 1211 (93.44%) drugs were prescribed rationally, the remaining of 85 (6.56%) prescriptions were found to be irrational. Only 6.56% of prescriptions were irrationally prescribed, this indicates that prescribers good at prescribing rational prescriptions. Majority of errors were found in General Medicine departments (38.89%) this may be due to vast usage of medicines in this department and least was found in orthopedic department (9.72%).

CONCLUSION

This study concludes that overall incidence of medication error cases was around 50%but there were no life threatening events was observed.A clinical pharmacist can play a major role in this situation appears to be a strong intervention and early detection and prevention of medication errors and thus can improve the quality of care to the patients.Educating the patients about the drugs and their importance of right use, literacy can be helpful in minimizing errors.“This helps to ensure that the **‘right’** patient is receiving the **‘right’** drug in the **‘right’** dose by the authorized clinician”.

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REFERENCES

1. Leelavathi D. Acharya, Javed Shareef, Padma G. M. Rao., Study and Evaluation of Medication Errors in a multi disciplinary tertiary Care South Indian Teaching Hospital, Indian Journal of Hospital Pharmacy; 2008, 45: 54-58.
2. Mukesh Chandra Joshi & Vijay Roy, Medication Errors: Identification, Prevention and Implementation of safe medication practice, Indian Journal of Hospital Pharmacy; 2005, 42(2): 62-65.
3. Allen EA and KN Barker, Fundamentals of medication error research, American Journal of Hospital Pharmacy; 1990(47): 555-71.
4. Barker KN, McConnell WE. The problems of detecting medication errors in hospitals American Journal of Hospital Pharmacy, 1962; 19: 360-9.
5. Schimmel EM. The hazards of hospitalization, Annals of Internal Medicine, 1964; 60: 100-10.
6. Steel K, Gertman PM, Crescenzi C et al, Iatrogenic illness on a general medical service at a university hospital, New England Journal of Medicine, 1981; 304: 638-42.
7. Bedell SE, Deitz DC, Leeman D, Delanco TL, Incidence and characteristics of preventable iatrogenic cardiac arrests, Journal of the American Medical Association; 1991, 265: 2815-20.
8. Brennan TA, Leape LL, Laird NM et al, Incidence of adverse events and negligence in hospitalized patients, New England Journal of Medicine; 1991, 324: 370-6.
9. Leape LL, Brennan TA, Laird N et al. The nature of adverse events in hospitalized patients: results of the Harvard Medical Practice Study II,New England Journal of Medicine; 1991, 324: 377-84.
10. National Coordinating Council for Medication Error Reporting and Prevention and Medication Error Index. Available from Website:www.nccmerp.org.

11. Institute of Medicine. Crossing the quality chasm: a new health system for the twenty-first century, Washington, DC: National Academy Press; 2001.
12. Voice of the Indian Doctors, IJCP'S MEDINEWS, Available from www.ijcpgroup.com March 2008, Vol.8, No.3, Page No.16.
13. Leelavathi D. Acharya, Javed Shareef, Padma G. M. Rao., Study and Evaluation of Medication Errors in a multi disciplinary tertiary Care South Indian Teaching Hospital, Indian Journal of Hospital Pharmacy; 2008, 45: 54-58.
14. P.M.K. Reddy, Steven A. Dkhar, G. Nartunai, D. G. Shewade, Prescription Handling Errors, Indian Journal of Hospital Pharmacy; 2001, 38 (1): 27-31.
15. Leelavathi D. Acharya, Javed Shareef, Padma G. M. Rao., Study and Evaluation of Medication Errors in a multi disciplinary tertiary Care South Indian Teaching Hospital, Indian Journal of Hospital Pharmacy; 2008, 45: 54-58.
16. Dr. Barbara Starfield. Doctors Are the Third Leading Cause of Death in the US, Causing 250,000 Deaths Every Year. Journal of the American Medical Association. Available from: http://temcat.com/07-Health-Secrets-Sem/Hazards/Doctors-Death.pdf.
17. Jerry Philips, Sammie beam, Allen Brinker, Carol Holquist, Peter Honig, Laureen Y. Lee et al. Retrospective analysis of mortalities associated with medication errors, American Journal of Health- System Pharmacists; 2001, 58: 1835-41.
18. Dr. Barbara Starfield. Doctors Are the Third Leading Cause of Death in the US, Causing 250,000 Deaths Every Year. Journal of the American Medical Association. Available from: http://temcat.com/07-Health-Secrets-Sem/Hazards/Doctors-Death.pdf
19. Jerry Philips, Sammie beam, Allen Brinker, Carol Holquist, Peter Honig, Laureen Y. Lee et al. Retrospective analysis of mortalities associated with medication errors, American Journal of Health- System Pharmacists; 2001, 58: 1835-41.
20. Medication Error Study found on the internet at: www.mass.gov/dpl/boards/ph/phstudy/04phers.htm.
21. Almut G. Winter Stein, Thomas E. Johns, Eric I. Rosenberg, Hatton RC, Gonzalez-Rothi R and Kanjanarat P. Nature and causes of clinically significant medication errors in a tertiary care hospital, American Journal of Health-system Pharmacists; 2004, 61:1908-16.
22. Alison Dale, Richard Copeland and Roger Barton, Prescribing errors on medical wards and the impact of clinical pharmacists; IJPP 2003, 11:19-24.
23. S. Nadeem H. Shah, Mohamed Aslam and Anthony F. Avery, A survey of prescription errors in general practice, The Pharmaceutical Journal; 2001, 267: 860-62.

24. Rodney W. Hicks, Diane D. Cousins and Roger L. Williams, Selected medication error data from USP'S MEDMARX program for 2002, American Journal of Health-System Pharmacists; 2004, 61:993-99.