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Analysis of Distribution & Risk Factors Associated with Medication Errors in Delhi, India

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ABSTRACT: This study was aimed at finding out the occurrence of medication errors and the occurrence of risk factors for medication errors in the inpatient setting of the general hospitals in Delhi. 20 doctors, 30 nurses, 45 pharmacists, 500 patients charts were the population involved in the study. Over 70% of the health professionals work over 12 hours in a day. Apart from some nurses (23.3%) who attend to at most 100 patients in a day, the rest, doctors and pharmacists (84.8%) attend to more than 80 patients in a day. This number is far beyond the threshold of 40 patients. It is obvious that working in such a complex environment (clinical setting) demands rapt attention and concentration. Further research is recommended to be carried out into the feasibility and effectiveness of adopting the computerized order entry with clinical decision-support systems.

KEYWORDS: Medication Errors; Delhi; Medication Misadventure; Medical Errors.

INTRODUCTION

According to WHO, health is defined as state of complete physical, mental and social well being and not merely the absence of disease or infirmity. As with all human actions, the decision regarding health behavior are influenced in part by external stimuli e.g. a pharmacist advising a patient and also by internal states such as those thoughts, feelings and beliefs. Medication misadventure can occur anywhere in the health care system from prescriber to dispenser to administration and finally to patient use, the simple truth is that many errors are preventable. According to studies cited in the institute of Medicine report, “to Err is Human; Building a Safer Health System” 44,000 to 98,000 Americans die each year as a result of medical errors[1-5]. Medication errors or medical errors are preventable adverse effects of care, whether or not it is evident or harmful to patient, but this might include an inaccurate or

incomplete diagnosis or treatment of a disease, injury , syndrome, behavior, infection, or other ailment[6]. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing; order communication; product labeling, packaging , nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use[7, 8].

Medication errors directly impact the lives of the patients. It also leaves a lasting negative impression on the minds of the people about the hospital[8]. These can be broadly divided into four categories–

• Prescription error
• Administration error
• Transcription error
• Dispensing errors

Delhi, officially National Capital Territory(NCT) is a metropolis and capital of India. So medication errors would be minimally expected. Current research survey was to analyze the distribution & risk factors associated with medication errors in Delhi, India.

RESEARCH METHODOLOGY

Research Design

The research design is a prospective research design. The descriptive survey design was used because the purpose of the study was to provide Delhi hospitals and clinics with information on the extent to which medication errors occur and the presence of factors that generally increase the chance of medication errors[1].

Population Target

The study was performed in the Delhi. The targeted populations for this research are patients both in patients and OPD, doctors, nurses and pharmacists from the five main locations in Delhi covering East, West, North, South and Central Delhi. The researcher, is a citizen of India and native of Delhi. This way, the review of the patients' charts could be performed as confidential as possible[1].

Sample and Sampling Procedure

Research question: inpatients and out patients in June 2009- September 2010, 18-45 years, admission >= 1week or on medication more than 2 weeks in case OPD patient[1].

For research question (the occurrence of medication errors) the inclusion and exlusion criteria for the patients were:

Inclusion Criteria

- Admission for more than one week for in patient
- On treatment for more than two weeks for OPD
- Age between 18- 45 years
- Admission or on treatment between June 2009- September 2010

Number of patients included in the study for research question (occurrence of medication errors) by randomly picking patient charts[1]

Zone	Male (n)	Female (n)	Total (n)
East	60	50	110
West	50	50	100
North	70	60	130
South	30	30	60
Central	44	56	100
Total	254	246	500

Research Instruments

For research question (occurrence of medication errors), the instrument used is the review of inpatients charts by means of the Trigger Tool.

Concepts and indicators of risk factors for the occurrence of medication errors[1]

	INDICATORS	Indicators are translated into questions (appendix) for:
Overload of work	Hours of work, days of work, number of patients cared for, Complexity of work.	Doctors, nurses, pharmacists
Lack of expertise and training	Qualification, Experience, Upgrading of knowledge, opportunities for further training.	Doctors, nurses, pharmacists
Appropriate Technologies	Computer aided diagnosis, prescription and ordering.	Doctors, nurses, pharmacists
Labelling	Legibility of inscription, Content colour, shape, size etc.	Doctors, nurses, pharmacists
Prescription	Legibility of hand writing, typographical errors, duration of prescription, etc.	Doctors, nurses, pharmacists
Communication among health professionals	Healthy working relationship, emotional condition of colleagues, conflict resolution, staff/patient relation.	Doctors, nurses, pharmacists
Handing over	Number of shifts, Briefing on handover, hand-over notes, hand-over gaps	Doctors, nurses, pharmacists
Victimization	Free reporting, queries, fear of intimidation	Doctors, nurses, pharmacists
Patient,/relative Participation	Knowledge on diagnosis, dosage and dosage regimen of drugs etc.	Patients

Data Collection Procedure

The randomly selected number of inpatients charts and out patients prescriptions form three hospitals were put together in a located office at the regional hospital where the researcher used officially. The review process was carried out by the researcher with the aid of a general practitioner at the regional hospital with clarifications sought from the specialist Hospital who was the resource person for the researcher[1].

The questionnaires were self administered and collected within a ten days interval. This was to avoid forgetfulness and lost of instruments. The data collection period in Delhi lasted for twenty weeks.

Data Analysis Plan

Since the information retrieved from the patients charts and prescriptions were all open-ended and of varied characteristics, a statistical data processing package known as the "Epi-info" version 3.3.5 was used to captured the data and then transported to the Statistical Package for Social Sciences (SPSS version 12.0) for analysis. All the other data on doctors, nurses, pharmacists and patients were coded and put together as combination data for analysis. The combination data was created to give a general analysis of the items since the recommendation is to be used for a general policy strategy for the hospitals (and others which were not captured in the study)[1].

RESULTS & DISCUSSION

Table 1 Distribution of number of Medication Errors registered out of 500 patients charts and prescriptions

Disease Categories	Distribution by Disease Category	Number of ADE Cases (28)	Percentage of ADEs by Disease Category
Inflammatory (Arthritis, Cellulitis etc)	23	3	13.0
Infections/Parasitic (Enteric fever, Malaria, Typhoid etc)	112	22	19.6
Trauma (Cervical Fracture, Cerebral concussion etc)	8	0	0
Others (Hypertension, Jaundice, Anaemia etc)	17	3	17.7
Occurrence by age Category			
18-30	76	18	23.7
31-45	84	10	11.9
Occurrence by gender			
Male	80	14	17.5
Female	80	14	17.5
Occurrence by length of hospital days			
7-9	109	22	20.2
10-12	45	5	11.1
13 >	6	1	16.7

In **Table 1**, all the disease categories, except Tauma (0%) were high risk for ADE considering the sample size of 160. But the highest risk for ADE was Inflammation/ Parasitic (19.6%) The results indicate that the lower age category (18-30) were at high risk (23.7%) than the higher age category (31-45). Both males and females were seen to be at equal risk of experiencing medication errors. The patients with hospital stay less than 20 (10) day were at high risk, whereas the patients with the between 10 and 12 days of hospital stay were at the least (11.1%) risk

The Occurrence of risk factors of Medication Errors in Delhi hospitals & Clinics

Here investigators seeks to find out the risk factors of medication errors through the responses given by health professionals based on the indicators of medication errors found from literature.

Table 2: Risk factors for Medication Errors (Response by Profession; combination data). In this table, the respondents are 20 (20) doctors, thirty (30) nurses and 45 (45) pharmacists.

Risk Situation	Factor Description	Profession N=95							
		Dr. (20)	(%)	Nurses (30)	(%)	Pharmacist (45)	(%)	Total (95)	(%)
Demanding Nature of work	Less Demanding	2	10	9	30.0	7	15.6	12	12.6
	Very Demanding	18	90	21	70.0	38	83.3	44	46.3
Working Hours/day	12 hours	0	0	9	30.0	30	66.7	13	13.7
	>12 hours	20	100	21	70.0	15	33.3	43	45.3
Number of patients attended to in a day	80 patients	0	0	7	23.3	0	0.0	7	7.4
	>80 patients	20	100	23	76.7	45	100.0	49	51.6
Legibility of Handwriting	Not legible-quite legible	0	0	11	36.7	23	50.0	14	14.7
	Legible-very legible	0	0	19	63.3	22	48.9	22	23.2
Legibility of drug Labels	Not Legible-quite legible	0	0	3	10.0	0	0.0	3	3.2
	Legible-very legible	0	0	27	90.0	45	100.0	33	34.7
Suggestion of new ideas to management	Not Easy-quite easy	6	30	9	30.0	22	48.9	18	18.9
	Easy-Very easy	14	70	21	70.0	23	50.0	38	40.0
Discussions about working difficulties	Not easy-quite easy	6	30	6	20.0	15	33.3	14	14.7
	Easy-very easy	14	70	24	80.0	30	66.7	42	44.2
Responsibility for adverse drug event	Responsible	10	50	6	20.0	7	15.6	17	17.9
	Not Responsible	10	50	24	80.0	38	83.3	39	41.1
Adverse Drug Event reporting	Self reported	20	100	4	13.3	0	0.0	24	25.3
	Not self report	0	0	0	0.0	0	0.0	0	0.0
Opportunities for knowledge upgrading	Easy	20	100	23	76.7	45	100.0	49	51.6
	Not Easy	0	0	7	23.3	0	0.0	7	7.4
Accessibility of opportunity for upgrading	Easy	20	100	22	73.3	38	83.3	47	49.5
	Not Easy	0	0	6	20.0	0	0.0	6	6.3
Need for hands	extra Need	20	100	24	80.0	23	50.0	47	49.5
	No Need	0	0	6	20.0	0	0.0	6	6.3
Request for extra hands	1 to3	18	90	21	70.0	23	50.0	42	44.2
	4 to 6	2	10	9	30.0	0	0.0	11	11.6
Writing of Prescription	Computer aided	0	0	0	0.0	0	0.0	0	0.0
	Hand written	20	100	0	0.0	0	0.0	20	21.1
Susceptivity of manual	Not Susceptible	8	40	7	23.3	30	66.7	19	20.0

prescription to medication errors	Highly Susceptible	12	60	23	76.7	15	33.3	37	38.9
By briefing	Handing over	14	70	20	66.7	30	66.7	38	40.0
	By leaving a note	6	30	10	33.3	15	33.3	18	18.9
The number of shifts	Once	5	25	15	50.0	15	33.3	22	23.2
	Twice	0	0	9	30.0	0	0.0	9	9.5
	Three times	0	0	6	20.0	0	0.0	6	6.3

Even though the numbers are very low, the percentages are given for easy comparison considering the concept of overload of work, **Table 2** indicates that over 70% of the health professional work well over the twelve hours per day and that their work is very demanding. 84.8% of them have indicated that they care for more than the 80 patients per day.

On expertise and training, the table indicates that over 80% have easy opportunities for training and can easily access the opportunities. On the use of modern technology to aid diagnosis and prescription, no health professional (doctor), and for that matter hospital uses any. 67.4% indicated that the manual diagnosis and prescription is highly susceptible to errors. 91.7& responded that the labels on the drugs are legible but on prescription errors, 38.9% indicated that the hand writing of the doctors is not legible. 32.6% of them left a note when colleagues were not present during hand over. 26.1% are involved and responsible for an ADE but only about 10% reported the incidence themselves.

In an attempt to find out the involvement of the patient in the care process as well as the link in the care process the questions bellow were designed as part of the effort to find out the risk factors of medication errors in the inpatient setting.

Table 3 Summary of response from questionnaire for patients

ITEM	YES	N (%)	NO	N (%)
1. Were you transferred from another hospital or switched doctor?	144	14.2	356.3	11.2
2 Do you know the types of medication/ drugs that are given to you in this hospital?	59	5.9	440.6	13.8
3 Were you on a previous prescription before admission?	203	20.1	293.8	9.2
4 If so, did you present the previous prescription to this hospital?	56	5.6	146.9	4.6
5 Do you know the diagnoses that were made on you?	200	19.7	300.0	9.4
6 Have you experience any reaction to any medication since you came on admission?	91	8.9	409.4	12.8
7 Do you know the number of times you should take your drugs?	144	14.2	356.3	11.2
8 Do you know the dosage that you should take?	113	11.1	387.5	12.2
9 Do you know about medication records?	3	0.3	496.9	15.6

The **Table 3** above indicates that 28% of the patients were transferred from one hospital to the hospitals under study. 88.1% of the admitted patients did not have any knowledge about the medications that were given to them. 40.9% of the patients were on previous drugs but only 27.7% presented their previous drugs to the hospital during admission. The results indicate that only 40% of the patients were aware of their diagnosis. 18.1% of the patients responded that they have experienced a drug reaction in one form or the

other since they came on admission. Asked as to whether they know their dosage regimen, 22.5 % indicated yes. Only one patient indicated that he/she has knowledge about medication records.

CONCLUSION

Over 70% of the health professionals work over 12 hours in a day. Apart from some nurses (23.3%) who attend to at most 100 patients in a day, the rest, doctors and pharmacists (84.8%) attend to more than 80 patients in a day. This number is far beyond the threshold of 40 patients. It is obvious that working in such a complex environment (clinical setting) demands rapt attention and concentration. Attention and high concentration could result into stress if one works for very long hours just as in the study where professionals attend to very high numbers of patients.

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