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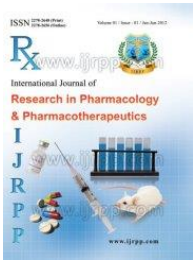

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Clinical pharmacists' role in identification of drug related problems in a teritiary care teaching hospital

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ABSTRACT

Objective

To evaluate the drug related problems in which it occurs mostly in both IP and OP. To examine the nature, frequency and to estimate the risks associated with drug related problems in a General Medicine Department.

Methodology

A prospective observational study was carried out at a 750 bedded teaching hospital for a period of 6 months. Patients were enrolled on the basis of inclusion and exclusion criteria. The inclusion criterion involves patients in multiple drug therapy with a minimum of two drugs and patients of both sexes.

Results

A total of 508 cases were collected during the study period. Among them 165 cases due to the infectious diseases. The most common DRP is possible drug-drug interaction in part of patients i.e.219.Based on severity level, moderate drug-drug interactions were found to be maximum (48.8%) followed by minor (28.4%) and major 22.8%. Adverse drug reactions (ADRs) are the second major DRP found in 34 cases. Poly pharmacy is found to be the most important cause of DRPs followed by in appropriate drug choices, poor medication adherence risk. Statistical analysis was performed using spearman's correlation test and it was found a significant difference (P=0.0001) between the drug related problems of inpatient and outpatient department.

Conclusion

Clinical pharmacist as a member of the health care team can contribute significantly to the improved patient outcomes by monitoring drug therapy and can also promote rational use of drugs.

Keywords: Drug related problems (DRP), adverse drug reactions (ADR), possible drug-drug interactions (pDDI), Polypharmacy.

DRUG RELEATED PROBLEMS

INTRODUCTION

A drug can be defined as any substance or product that is used or is intended to be used to modify or explore physiological systems or pathological states for the benefit of the recipient. [1]

But the shadow side is the improper use can be the cause of patient morbidity and even mortality. In general, problems related to the use of approved drugs can be summarized with the term "***Drug-Related Problems***". [2]

Definition

A Drug-Related Problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes. [3] When reviewing a patient's drug therapy, one of the main objectives is to identify and resolve any drug-related problems. [4]

A survey in Indonesia showed that 78 % of elderly suffered up to 4 medical illnesses, 38 % of them had more 6 diseases and 13 % suffered more than 8 diseases. [5]

Out of all the drug related problems

- 54.8% are due to Therapeutic failure
- 32.9% are due to Adverse reactions
- 12.3% are due to Overdose
- 49.3% are due to Avoidable [12]

Eight categories of drug-related problems (DRPs) were outlined by Charles Hepler and Linda Strand in their landmark paper in 1990.

Drug related problems

- Adverse drug reactions
- Drug interactions
- Untreated indication
- Improper drug selection
- Sub therapeutic dose
- Over dosage
- Failure to receive drugs
- Drug use without indication[4]

Although medications provide a beneficial effect in most patients, the elderly are at particular risk for drug-related problems, which have been defined as undesirable patient experiences related to drug therapy that actually or potentially interfere with desired patient outcomes. Specific medications that are potential risk factors include digoxin, warfarin, lithium, and chlorpropamide. Each of these medications is highly potent and requires careful dosing calculations based on the patient's status [11].

In addition to specific medications, several classes of therapeutic agents that may be prescribed for elderly patients have been reported as risk factors based on research of elderly nursing facility residents [13]. In fact, some research indicates that high-risk patient characteristics are more prevalent than medication risk factors as causes of drug-related problems."

Typical elderly patient characteristics that have been associated with drug-related problems include patients who:

- Receiving nine or more different medications and two or more doses of medication per day
- Having six or more active chronic medical diagnoses and previous adverse drug reactions
- Having low body weight
- Having decreased renal function. [6]

CONSEQUENCES OF DRUG RELATED PROBLEMS

Drug related problem occur mainly due to multiple drug therapy, drug or dose selection, drug misuse process information regarding patient care. It also include in appropriate drug prescribing, failure to receive drug, over dosage, drug- drug interaction [10], adverse drug events, poor monitoring by health care professionals. The administration of drug may result in the development of side effects, unwanted effects, and toxic effects, allergic and idiosyncratic effects. Drug interaction are said to occur when the pharmacological activity of a drug is altered by the concomitant use of another drug or by presence of food [9], drink or environmental chemicals. Medication error as any preventable event that may cause or lead an inappropriate medication use or patient harm while the medication is in control of the health care professional, patient or consumer. Miscommunication of drug orders, which can involves poor hand writing, confusion between drugs and similar names, misuse of zeros and decimal point .[7]

The purpose of the study was to evaluate the nature, frequency and risk of the drug related problems in a General Medicine department [8].

MATERIALS AND METHODS

The present study was a prospective, observational study, conducted at the RAJIVGANDHI INSTITUTE OF MEDICAL SCIENCES (RIMS) a tertiary care teaching hospital, Kadapa Andhra Pradesh. All patients who presented to the general medicine department during six months period from September2012-March2013 were eligible for enrollment. Ethics approval was obtained from the Institutional Review Board ethical committee (Rc.No.413/Acad.2012-13).

Patient enrollment

Patients are randomly enrolled in the study based on inclusion & exclusion criteria. Patients on multiple drug therapy: with a minimum of two drugs and patients of both genders in General Medicine department were included in this study. Patients with intentional or accidental poisoning with the drug and pregnant and lactating women were excluded from this study.

Study materials

A specially designed

- Patient standard data collection form(I.P/O.P)
- ADR Form
- Naranjo's scale
- Pharmacist Intervention Forms are used in this study.

During these six months period each patient was interviewed to determine the chief complaints, history of present illness, past medical history, medication history and allergy status in patients in pre-ward rounds. Information from the physical examination conducted by the treating physician or resident. Drug releated problems were noted according to the Hepler and Linda Strand classification of drug releated problems. [4]

Data collection

The information which is necessary to this study was collected from the patient case sheets. Direct enquires was done with the patients and their attenders regarding patient condition and disease progress. The collected data were analyzed by using Microsoft Excel in a computer. Analyzed data has been presented in tabulated form.

Statistical analysis

Spearman Correlation method was used to analyze the collected data. Test was performed to calculate p value for the purpose of comparison of result by using software namely "Graph Pad Prism".

RESULTS

Patient distribution based on gender

In our study we screened 508 cases for drug related problems based up on Charles Hepler and Linda Strand classification. Out of 508 patients 255(50.2%) were male and 253(49.8%) were female.

Distribution of diseases among the study population

Out of 508 patients, infectious diseases cases have been found to be highest in number, 165 (32.48%) followed by cardiovascular diseases 67 (13.4%), respiratory diseases 63(12.4%), neurological disease 54(10.6%), and co. morbidity conditions 47 (9.4%), etc and results were shown in table 1.

Table: 1. Distribution of diseases among the study population

SYSTEM AFFECTED	NO.OF CASES	PERCENTAGE (%)
Infectious diseases	165	32.4%
Cardiovascular diseases	67	13.4%
Respiratory diseases	63	12.4%
Neurological diseases	54	10.6%
Co Morbidity conditions	47	9.4%
Gastrointestinal diseases	40	7.8%
Hepatic disease	22	4.4%
Endocrine disorders	20	3.9%

Hematopoietic disorders	13	2.5%
Renal disorders	03	0.5%
Other	14	2.7%
Total	**508**	**100%**

Adverse drug reactions

Patient distribution based on gender

In total 508 Patients 42 adverse drug reactions were developed. In this male patients who developed ADR was 16 (38.1%) and then female patients 26 (61.9%), results were shown in table 2.

Table: 2. Patient distribution based on gender

Gender	No. of reactions	Percentage (%)
Male	16	38.1%
Female	26	61.9%
Total	**42**	**100**

Naranjo's causality assessment for the adverse drug reactions reported

The suspected adverse drug reactions were assessed to establish the extent of relationship between the suspected drugs and adverse drug reactions manifested by using Naranjo's Causality Assessment scale. According to the Naranjo's algorithm majority of the reported adverse drug reactions were rated as possible 33 (78.5%), followed by probable 9 (21.5%). And results were given in table 3.

Table: 3. Naranjo's causality assessment for the adverse drug reactions reported

Causality	No. of ADRs	Percentage
Probable	9	21.5%
Possible	33	78.5%
Definite	0	0%
Unlikely	0	0%
Total	**42**	**100%**

Number of adverse drug reactions reported among the drug classes

Therapeutic group of the drugs associated with the adverse drug reactions is shown in. The results shows that antibiotics, 15 (35.7%) were the drug class mostly reported for adverse drug reactions followed by anti-hypertensive, (23.8 %), results were shown in table 4.

Table: 4. Number of adverse drug reactions reported among the drug classes

Class Of Drug	No. Of Adrs (%)
Anti-biotics	15(35.7%)
Anti-hypertensives	10(23.8%)
Anti-platelet	7(16.6%)
Anti-viral	5(11.9%)
Anti-consultants	3(7.1%)
Anti- angina	5(11.9%)
Anti-emetics	3(7.1%)
Anti-histamines	2(4.7%)

Ant-tubercular	3(7.1%)
Anti-ulceratives	15(35.7%)
Lipid lowering agents	3(7.1%)
Diuretics	1(2.3%)
Bronchodilators	1(2.3%)

Possible drug- drug interactions

A total of 508 patients were included in this study. Out of this 219 cases were screened out. In 219 cases 503 possible drug - drug interactions (PDDIs) are found. Among them female occupied maximum 126(57.5%) and followed by male 93 (42.5%).

Distribution of patients based on age

Among the 219 studied cases, 54(24.6%) patients were in the age group of 50-60 followed by 53(24.2%) were in age group of 60-70 respectively, results were shown in table 5.

Table: 5. Age categorization

Age in groups	Male	Female	Total	Percentage%
20-30	6	13	19	8.7%
30-40	10	25	35	15.9%
40-50	19	19	38	17.4%
50-60	29	25	54	24.6%
60-70	23	30	53	24.2%
70-80	6	11	17	7.8%
80-90	0	3	3	1.4%
Total	**93**	**126**	**219**	**100%**

Based on severity scale

According to the severity scale, among possible drug-drug interactions identified moderate interactions were found to be maximum 245(48.8%), followed by minor 143(28.4%), major115 (22.8%), results were given in table 6.

Table: 6. Based on severity scale

Severity of Interaction	No. of Interactions identified	Percentage (%)
Minor	143	28.4%
Moderate	245	48.8%
Major	115	22.8%
Total	**503**	**100%**

Based on nature and frquency of drug releated problpatient (ip) and out patint (OP)

Adverse drug reactions had been manifested in 34 patients in I.P and 8 patients in O.P. Possible drug-drug interactions were found 415 in inpatient department and 88 in outpatient department. These are the maximum drug related problems were identified during the study period. The results were shown in table 7.

Problems in in patient (ip) and outpatient (OP)

Table: 7. Based on nature and frquency of drug releated

	No. of problems identified		
Drug related problems	**I.P**	**O.P**	**Total**
Adverse drug reactions	34	8	42(6.4%)

Possible drug-drug interactions	415	88	503(76.7%)
Untreated indications	35	9	44(6.7%)
Improper drug selections	15	5	20(3.1%)
Sub therapeutic dose	0	0	0(0%)
Over dose	4	0	4(0.6%)
Failure to receive therapy	28	5	33(5.1%)
Drug use without indication	7	2	9(1.4%)
Total	**538(82.13%)**	**117(17.87%)**	**655(100%)**

DISCUSSION

Over the past 40 years, advances in drug therapies have both improved patient care and led to an apparent increase in the incidence of drug related problems being reported. Drug related problems (DRPs) like adverse drug reactions (ADRs), unnecessary drug therapy, and inappropriate choice of drugs have shown to prevail in hospitalized patients. Drugs are usually prescribed with the objective of achieving an optimal therapeutic outcome. Studies in developed countries showed that approximately 5% hospital admissions were drug related and 50% of those were amendable. [8]

In our study we have recruited 508 subjects of which males constitute 255 (50.2%) and females 253 (49.8%). Of the drug related problems identified in our study, 42 persons had experienced adverse drug reactions (6.4%). Females were mostly affected by the adverse drug reactions (26 in number and 61.9%). Our study had been supported by "JHA.N. et al. ADVERSE DRUG REACTION REPORTING IN A PHARMACOVIGILENCE CENTER OF NEPAL (2012)"Where they have reported that 55.35% of the ADRs had occurred in female patients. [9]

Based on the Naranjo's causality assessment of the Adverse Reaction reported, 33 (78.5%) ADRs were coming in the category of possible. Our study also provides a contrast view as proposed by "SINGHAL ROHIT et al in their REPORTING AND MONITORING OF ADVERSE DRUG RECTIONS WITH CARDIAC DRUGS (2011)" where they have reported that 64.5% ADRs were probable and 32.4% ADRs were possible.[10]ADRs reported among drug classes includes Antibiotics which were found to be highest 15 (35.7%) followed by Anti-hypertensives 10 (23.8%).Our study was supported by "JHA.N. et al. ADVERSE DRUG REACTION REPORTING IN A PHARMACOVIGILANCE CENTRE OF NEPAL (2012)" where they reported antimicrobials was the classes of drugs causing highest number of ADRS followed by anti-hypertensives.[9] The incidence rate of adverse drug reaction was estimated to be 0.082. Among the possible drug-drug interactions female patients were found to be the highest (126, 57.5%). In this category our study is in contrast of "NIMMY.N.JOHN et al. INCIDENCE OF POLYPHRMACY INDUCED DRUG INTERCTION IN A TERTIARY CARE HOSPITAL (MAY 2012)" Gender wise category where 66.6% of drug-drug interactions were male and 33.3% were female. [11]

A total of 503 drug-drug interactions were identified. Among those moderate drug-drug interactions was found to be maximum (245, 48.8%) followed by minor (143, 28.4%) and major (115, 22.8%). In this category our study was found to be in agreement with "VIRENDRA K. PATEL et al. POTENTIAL DRUG INTERACTIONS IN PATIENTS ADMITTED TO CARDIOLOGY WARDS OF A SOUTH INDIAN TEACHING HOSPITAL (2011)" where they have reported a similar findings of which comparing the nature and frequency of DRPs. [12] Most of the DRPs occurred in the IP compared to OP Department. Of the DRPs to be prominent are ADR (6.4%), possible drug-drug interactions (76.7%), untreated indication (6.7%) and failure to receive therapy (5.1%). In this category our study is in contrast of the findings of "HARMINDER SINGH et al. THE INCIDENCE AND NATURE OF DRUG RELATED HOSPITAL ADMISSION: A 6 MONTH OBSERVATIONAL STUDY IN A TERTIARY HEALTH CARE HOSPITAL (2012)"in many aspects. [13] Polypharmacy was found to be the most important cause of DRPs such as adverse drug events, drug-drug interactions, inappropriate drug choices, poor medication adherence risks.

Generally during the period of our study there were no risks associated with the drug related problems. But in two cases of patients undergoing immunosuppressive treatment there were risks associated with the adverse drug reactions manifested namely zidovudine induced hyperpigmentation and

also there occurred another case of risk of the patient undergoing hepatospleenomegaly for immunosuppressive treatment with a combination therapy of stavudine and lamivudine. Statistical analysis was performed by using spearman's correlation test and it was found a significant difference (P<0.0001) between the Drug Related Problems of Inpatient and Outpatient of General Medicine Department.

CONCLUSION

Clinical pharmacists are the upcoming breed of pharmacists in our country. Clinical pharmacists can contribute improved patient outcomes by monitoring the drug therapy and can also promote rational use of drugs. Clinical pharmacists can provide reactive intervention involving in the patient care and also can offer services like drug information to the other members of the health care team so that effective therapeutic decision can be made.

In this scenario we want to make a suggestion that the nursery of clinical pharmacists, the Pharm.D programme which had been introduced in our country has to be properly groomed. These budding pharmacists could offer effective patient care by means of their intervention in pharmaceutical care and hence improved therapeutic outcome could be reached.

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