Original Research Article

Evaluation of Drug Related Problems in Patients with Chronic Disease at Tertiary Care Teaching Hospital

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ABSTRACT

Drug related problem is a broad term because it includes problems related to the drug at any level of use that is the prescribing level, dispensing level, administration level or at the patient or care taker level. In this study the case reports were analyzed using patient profile, patient medication chart, medication history interview and other information's were also analyzed. Out of the identified patients 54.1 % were male and 45.8% were female, the presence of DRPs is calculated according to the age, and it was found that patient present with an age of ≥60 years are more prone to have DRPs. 21% of this population was suffering from ADRs, and 37.91% ware with no optimal treatment. 16% of patient present with unnecessary treatment. Prescriber level intervention was more that only proposed. According to the study around 32% of the intervention proposed were implemented, almost 36% of total population were present with partially solved DRPs. Since the medicine can cure illness and at the same time can harm the patient if not appropriately used. Clinical pharmacist can play a key role in promoting better medication use, ensuring that patients receive appropriate pharmacotherapy thus helps in minimizing the risk of unfavorable outcomes of pharmacotherapy.

Keywords: Drug related problem, chronic disease, Problems, Interventions, Clinical pharmacist

INTRODUCTION

Drugs are important in prevention and treatment of diseases and health ailments. The increasing number of available drugs and drug users, as well as more complex drug regimens leads to more side effects, drug interaction, and complicates follow-up. Drug related problems (DRPs) leads to substantial morbidity and mortality as well as increasing health care expenditure, which in turn affect both patients and society. Pharmacokinetics is the study, what happens to drug once they enter the body[1].

Drugs not only have beneficial effect but also are associated with adverse reactions. Adverse drug reactions can be regarded as the top of a pyramid, which contains all problems associated with the drug therapy of the identified subject with drug related problems. Drug related problems include all problems, which can potentially affect the success of pharmacotherapy in patient, in particular medication errors, adverse drug event and adverse drug reactions. Drug related problem is a broad term because it includes problems related to the drug at any level of use that is the prescribing level, dispensing level, administration level or at the patient or care taker level[2]. Adverse reaction to a drug, allergic reactions, drug not prescribed appropriately, drug prescribed not appropriate for indication, indication for which drug is not prescribed, drug duplication, prescribed drug contraindicated, drug duplication, administration, and storage errors,

inappropriate laboratory and non-laboratory monitoring, drug interactions, medical chart errors, patient noncompliance and unawareness about the usage of drugs are some causes of DRPs[3].

Unrecognized or unresolved DRPs can potentially lead to significant drug related morbidity or mortality. There are a number of consequences associated with DRPs which include hospitalizations, long-term care admissions, emergency department visits, additional physician office visits, and additional prescriptions. In addition to these, substantial costs are also associated with DRPs. For example, the economic burden arising from drug related morbidity and mortality in United State of America (USA) was $177.4 billion annually[4]. Whereas, £100707 was reported in Australian study[5]. Therefore, DRPs are major area concern of the patient's physical, psychological and economic burden to the patients as well as to the whole society. Hence, improving drug therapy by preventing drug-related problems may have an important effect on the patient's health, treatment related costs and potentially save lives[6].

Drug related problem can be classified as per different classification systems. These include American Society of Hospital Pharmacists (ASHP) Systems, Cipolle *et al.,* Granada consensus, Helper/ Strand, Pharmaceutical Care Network Europe (PCNE) classification, Problem-Intervention Documentation (PI-oc) and Westerlund classification[7].

Clinical pharmacist can play a key role in promoting better medication use, ensuring that the patients receive appropriate pharmacotherapy thus helps in minimizing the risk of unfavorable outcomes of pharmacotherapy. Prevention of drug related problem include before starting a drug, after starting a drug and during ongoing of the drug. Before starting a drug the prevention should be done to reduce the risk of DRPs, health care providers should consider the proclamations before starting a new drug. It include considering of non-pharmacological therapy, discuss goals of care with the patients, document the indication for each new drug, choose the safest possible alternative, check for potential drug-disease and drug-drug interactions, start with accurate dose at appropriate time, explain the indications and contraindications and special precautions of each drug, note co-existing disorders and their likelihoods of contributing to adverse drug effects, anticipate confusion due to sound – alike drug names and pointing out any names that could be confused. After starting a therapy, assuming a new symptom may be drug-related until proved otherwise, document the response to therapy and maintain the doses as necessary to achieve the desired effects, monitor patients for signs of adverse drug effect, including measuring drug level and doing other laboratory tests as necessary, regularly monitoring the response the need to continue drug therapy and stop drugs that are no longer necessary. For the prevention of ongoing drug related problem, computerized physician ordering programs and medication reconciliation is given[8].

MATERIALS AND METHODS
Study site: A prospective observational study was carried out in Srinivas Institute of Medical Science and Research Centre, Mukka, Mangalore

Study Design: Hospital based prospective observational study.

Study period: The study was conducted for duration of 6 months from October 2018to March 2019.

Ethical clearance: The study protocol was approved by the Institutional Ethics Committee (IEC) of in Srinivas Institute of Medical Science and Research Centre. Mukka, Mangalore

Study criteria

Inclusion criteria:-
- Patients of age above 18 years.
- Patients with either gender specifically with chronic disease.
- Patients who are willing to participate in the study.

- Patients who are admitted in ICU and MICU.

Exclusion criteria:-

- Patients of age less than 18 years.
- Pregnant women excluding from the study.
- Patient who are not willing to participate in the study.
- Patients with incomplete profile.

Source of data: The data for study was taken from the medical records of Srinivas Hospital, Mukka. Data collected included lab reports, treatment charts, past medical history and final diagnosis.

Sampling method: Medical records of patients (male & female) admitted to the hospital between October 2018 and March 2019 was obtained from the Medical Records from various Department of the hospital. A total of 316 patient case files met the selection criteria.

4.1.8 Study method: Medical records of patients filled by doctors, nurses and other health care professionals were used for the study. Data were collected using a structured data collection tool to document demographic details, presenting complaints, medical & medication history, biochemical investigations, diagnosis, treatment including dose, duration, frequency, route, time of administration and concomitant medication, No of co-morbidities present, length of stay in hospital (General Ward, ICU, MICU and all other special wards)and patient mortality status. Required pharmacist intervention was given to find out the improvement in the disease status, complications present with the patient is reported, all the data were kept confidential.

Data Analysis: Data were collected in Microsoft Excel and SPSS(Statistical package for the social science) version 18.0 statistical analysis involved collecting and scrutinizing every data sample in a set of items from which samples can be drawn and a suitable statistical test will be applied to analyze the data. The p value will be less than 0.05 will be considered as statistically significant.

OPERATION MODALITY
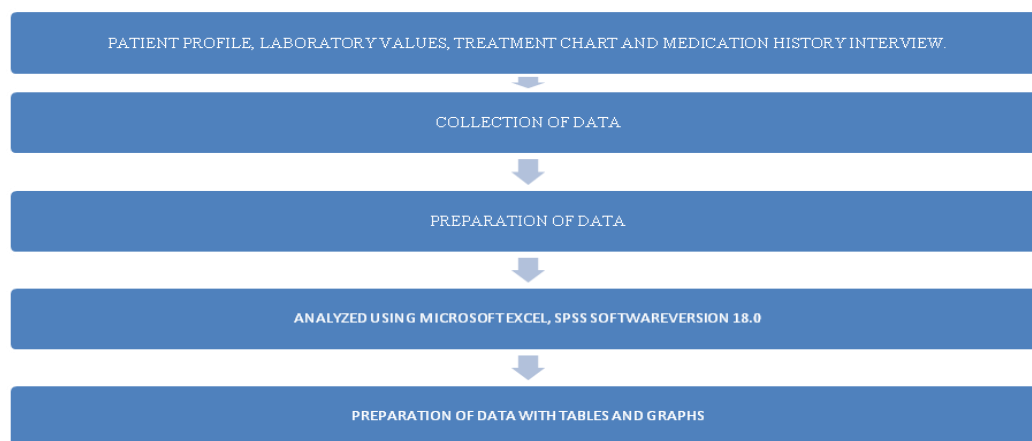
RESULTS
Demographic details of the study population:

The study was carried out in the total number of 316 Patients; the information available from each patient was recorded. Out of 316 patients, 171 were male and 145 were female. Among 316 patients enrolled in the study, 41 were smokers, 43 were Alcoholic, and 46 were both alcoholic and smoker. Out of 316 patients, number of drug prescribed greater than or equal to 10 was 241 and less than 10 was 76. Length of hospital stay of the patients with greater than or equal than 10 was 261 and less than 10 was 76. Here figure 1 and figure 2gives us a diagrammatic representation of distribution of the DRPs in the patient's different age group, gender, social habits. Out of 316, majority DRPs 134(63.5%) are

in age group of ≥ 60 and 77 (36.4%) in the age group of <60. In the case of gender DRPs are more in male 122(38%) compare to female 89(28%). The details of demographic features of the study population are given in the Table 1.

Table 1: Demographic details and characteristics of the patients

Details	Characteristics	Number
Gender	Male	171(54.1%)
	Female	145(45.8%)
Age	20-39	34(10.7%)
	40-60	89(28.16%)
	>60	193(61.07%)
Social habits	Alcoholism	43(13.60%)
	Smoking	41(12.97%)
	Both	46(14.55%)
Number of drug prescribed	≤10	241(76.265%)
	>10	76(24.05%)
Length of hospital stay	≤10	261(68.35%)
	>10	55(17.40%)

Disease distribution:

The chronic diseases with involved in this study was endocrine diseases, respiratory diseases, cardiac disease, neurological disease, neurological disease, nephrological diseases etc. and among that cardiac diseases and its co-morbidities are more in number 156 (49.36%) followed by endocrine diseases and its co-morbidities 58(18.35%), respiratory 34(10.74%), nephrological 12(3.79), neurological 10(3.16%). And it is shown in Table 2.

Table 2: Diseases included in the study

DISEASE	MULTIPLE DISEASE	NO.OF PATIENTS	PERCENTAGE
Endocrine	Endocrine	34	10.7%
	Endocrine + Nephrology	7	2.21%
	Endocrine+ respiratory	16	5.06%
	Endocrine +others	1	0.31%
Respiratory	Respiratory	34	10.7%
cardiac disease	Cardiac	63	19.93%
	Cardiac +nephrology	7	2.21%
	Cardiac +respiratory	18	5.69%
	Cardiac +endocrine	65	20.56%
	Cardiac+ endocrine +nephrology	1	0.31%
	Cardiac +endocrine + respiratory	2	0.63%
neurological disease	Neurological	8	2.53%
	Neurological +cardiac	2	0.63%
Nephrological	Nephrological	9	2.53%
	Nephrological +neurological	1	0.31%
	Nephrological +respiratory	1	0.31%
	Nephrological +cardiac+ endocrine	1	0.31%
Others	Others	48	15.18%

Incidence of DRPs

In this study, Total of 316 patients was analyzed and 211 patients were having drug related problem. Among 211 patients a total of 216 drug related problems were identified. Patients with DRP found to be 211(66.77%) and without DRPs were 105(33.22%). The identified drug related problems classified according to the PCNE Classification version V8.01. In this study the incidence of drug related problems was more in male patients 123(38%) as compare to female patients 89(28%) it may due to the risk factors such as alcoholism, smoking, and life style, or disease co morbidities.

And in the case of age group, patients with age group of ≥ 60 have more

(63.5%) incidence of drug related problems than patients with age group of < 60 (20.56%). Total DRPs identified were shown in Figure 1, incidence of DRPs according to the gender and age shown in figure 2 and 3 respectively.
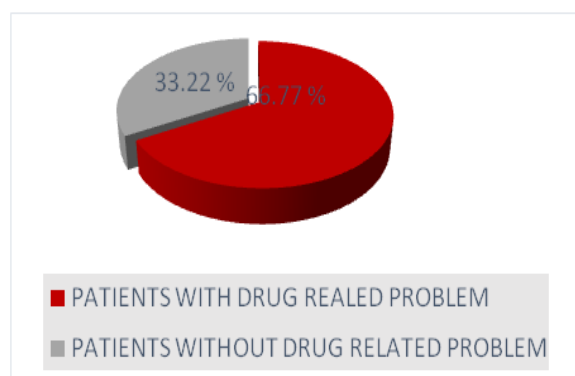

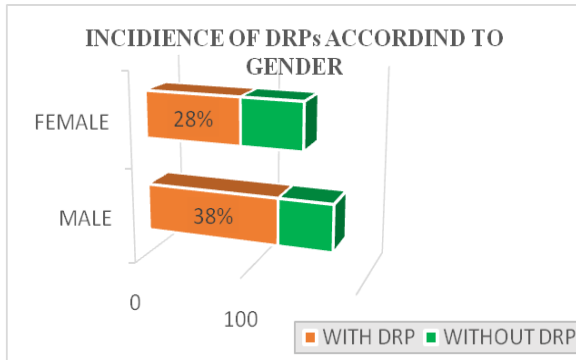**Figure 1: Total DRPs identified in study population**

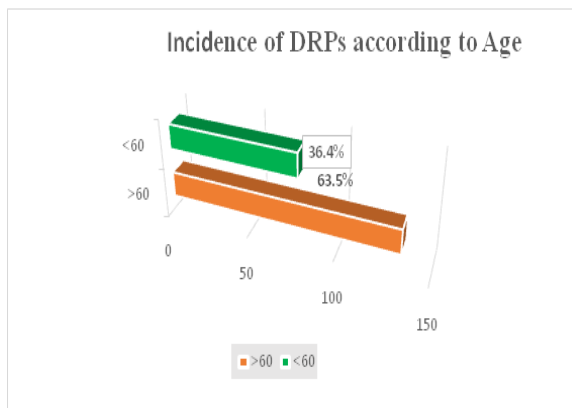**Figure 2: Incidence of DRPs according to gender**

Figure 3: Incidence of DRPs according to age

Level of significance

In this study levelof significance of the drug related problem can be divided in to minor, moderate and major.

Minor: problems requiring smalll adjistments and alteration in therapy, which are not expected to significally alter hospital stay, resource utilization or clinical outcomes.

Moderate: problems which needs adjustments, which are expected to enchance effectivience of drug producing minor reduction inpatient morbidity or trearments costs.

Major: problems requiring intervention, expected to prevent or address very serious durg related problems, with a minimum effecft on decreasing hospital stay by no lessthan 24hrs.

Here the minor problems are more in number 20(7%) followed by moderate 69(22%) and minor 125(39.5%) .It is mention in the figure 4.
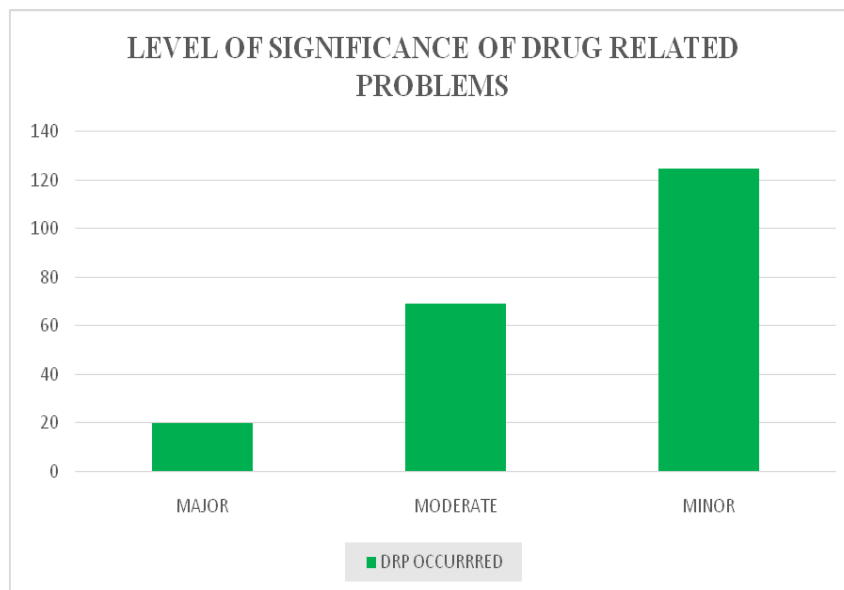

Figure 4: Level of significance of drug related problems

Risk factors and their association with DRPs:

Various factors and their association with DRP were identified. The factors taken in to consideration were age, gender, length of hospital stay, number of drug prescribed and social habits. Among which length of hospital stay, numbers of drug prescribed were found to have a statistically significant association with DRPs.

The factors found to be significantly associated with DRPs, along with their 'p' values are shown in the Table 3.

The incidence of DRPs was high (63.5%) in patients of age group of greater than or equal to 60 than patients age group of less than 60(36.4%). Out of 316 patients, 38% of DRPs were found in males and 28% in females. The increased drug related problem in males might be due escalated medication use because of their multiple comorbid conditions and due to different risk factors like smoking, alcoholism and life condition compared with female population. Pearson correlation test using SPS software system was used to analyze the degree of association between number of drug prescribed and length of hospital stay with DRPs. For the length of hospital stay and drug related problems get p value as 0.001, seen as statically significant with each other. So we can say that increase in the length of stay in the hospital can increases the number of drug related problems. Similarly in the case of number of drug prescribed and DRPs are statically significant at the p value 0.045. So increase in number of drug prescription can increase the incidence of the drug related problems.

Table 3: Factors significantly associate with DRP

FACTORS	WITH DRP	WITHOUT DRP	P VALUE
Length of hospital stay			
≥10	41	17	
<10	4	33	0.001
Number of drug prescribed			
≥10	69	33	
<10	15	17	0.045

Distribution of DRPs in the study population

Out of 316 patients, 211 patients were found to have DRP. Among these 211 patients, a total of 216 DRPs were identified. The identified DRPs were classified based on PCNE V8.01 criteria and is shown in the Table 4.

The major DRP was found to be in this study was problem with treatment effectiveness 125(39.5%) followed by adverse drug reaction 44(13.92%).

Table 4: Classification of DRPs as per PCNE

	CODE	PROBLEMS	NUMBER	PERCENTAGE
1.Treatment effectiveness There is a (potential)problem with the (lack of) effect of the pharmacotherapy	P1.1	No effect of drug treatment/therapy failure.	20	9.47%
	P1.2	Effect of drug treatment not optimal.	80	37.91%
	P1.3	Untreated symptoms.	25	11.84%
2. Treatment safetyPatientsuffers, or could suffer, from an adverse drug event.	P2.1	Adverse drug event (possibly) occurring.	44	20.85%
3.Others	P3.1	Problem with cost-effectiveness of the treatment.	8	3.79%
	P3.2	Unnecessary drug- treatment.	33	15.63%
	P3.3	Unclear Problem/complaint. Further clarification necessary.	4	1.89%

Causes for each DRPs were also found with the aid of PCNE V8.01 criteria. Causality assessment revealed that improper drug selection was the major cause of DRPs 192 (90.99%) followed by drug selection 34(16.12%). The observations corresponding to causality assessment is tabulated in table 5.

Interventions were also made in regard to each to DRP. Interventions were put forward at various levels, namely patient level, drug level and others. Intervention put forward at prescriber level were higher 164(77.7%). Followed by patient level (26.54%) and drug level 26 (12.32%). The result are shown in the tabulated from in Table 6

Table 5: Causes of DRPs as per PCNE:

The table below describes causes of drug related problems according to PCNE guidelines

PRIMARY DOMAIN	CODE	CAUSES	NUMBER	PERCENTAGE
1.Drug Selection The cause of the (potential) DRP is related to the selection of the drug.	C1.1	Inappropriate drug according to guidelines/formulary.	35	16.58%
	C1.2	Inappropriate drug (within guidelines but otherwise contra-indicated)	29	13.74%
	C1.3	No indication for drug.	12	5.68%
	C1.4	Inappropriate combination of drugs or drugs and herbal medication.	30	14.21%
	C1.5	Inappropriate duplication of therapeutic group or active ingredient.	23	10.90%
	C1.6	No drug treatment in spite of existing indication.	46	21.80%
	C1.7	Too many drugs prescribe for indication.	17	8.05%
2. Drug Form	C2.1	Inappropriate drug form	13	6.16%
3. Dose Selection The cause of the DRP is related to the selection of the dose or dosage.	C3.1	Drug dose too low	7	3.31%
	C3.2	Drug dose too high	17	8.05%
	C3.3	Dosage regimen not frequent enough	7	3.31%
	C3.4	Dosage regimen too frequent	0	0%
	C3.5	Dose timing instructions wrong , unclear or missing	3	1.42%
4. Treatment Duration The cause of the DRP is related to the duration of treatment.	C4.1	Duration of treatment too short	26	12.32%
	C4.2	Duration of treatment too long	3	1.42%
5. Dispensing The cause of the DRP is related to the logistics of the prescribing and dispensing process	C5.1	Prescribed drug not available	1	0.47%
	C5.2	Necessary information not provided	0	0%
	C5.3	Wrong drug strength or dosage advised (OTC)	1	0.47%
	C5.4	Wrong drug or strength dispensed	2	0.94%
6. Drug Use Process The cause of the DRP is related to the way the patient gets the drug administered by a health professional or career ,despite proper dosage instructions (on the label)	C6.1	Inappropriate timing of administration and/ or dosing interval	4	1.89%
	C6.2	Drug under administered	0	0%
	C6.3	Drug over – administered	7	3.31%
	C6.4	Drug not administered at all	3	1.42%
	C6.5	Wrong drug administered	7	3.31%
7. Patient Related The cause of the DRP is related to the patient and his behavior (international or non-intentional)	C7.1	Patient uses/takes less drug than prescribed or does not take the drug at all.	3	1.42%
	C7.2	Patient uses/takes more drug than prescribed	0	0%
	C7.3	Patient abuses drug (unregulated overuse)	0	0%
	C7.4	Patient uses unnecessary drug	6	2.84%
	C7.5	Patient takes food that interacts	1	0.47%
	C7.6	Patient stores drug inappropriately	1	0.47%
	C7.7	Inappropriate timing or dosing intervals	3	1.42%
	C7.8	Patient administers/ uses the drug in a wrong way	2	0.94%
	C7.9	Patient unable to use drug/form as directed	7	3.31%
8. Others	C8.1	No or inappropriate outcome monitoring (incl.TDM).	2	0.94%
	C8.2	Other cause :specify	2	0.94%
	C8.3	No obvious cause	1	0.47%

Table 6: Intervention as per PCNE

	CODE	INTERVENTION	NUMBER	PERCENTAGE
No intervention	I0.1	No Intervention	8	3.79%
1. At prescriber level	11.1	Prescriber informed only	34	16.11%
	11.2	Prescriber asked for information	33	15.63%
	11.3	Intervention proposed to prescriber	61	28.90%
	11.4	Intervention discussed with prescriber	36	17.06%
2. At patient level	12.1	Patient (drug) counselling	40	18.95%
	12.2	Written information provided	3	1.42%
	12.3	Patient referred to prescriber	2	0.94%
	12.4	Spoken to family member/caregiver	11	5.21%
3. At Drug Level	13.1	Drug changed to ….	4	1.89%
	13.2	Dosage changed to ….	1	0.47%
	13.3	Formulation changed to …..	0	0%
	13.4	Instructions for use changed	4	1.89%
	13.5	Drug stopped	8	3.79%
	13.6	New drug started	9	4.26%
4. Other intervention	14.	Other intervention	1	0.47%
	14.2	Side effect reported to authorities	0	0%

The acceptance of intervention was evaluated and it was found that 79.14% intervention accepted by physician or patient and 14% intervention not accepted by physician or patient. This is shown in Table 7.

Table 7: Acceptance of intervention as per PCNE

	CODE	IMPLEMENTATION	NUMBER	PERCENTAGE
1. Intervention accepted (by prescriber or patient)	A1.1	Intervention accepted and fully implemented	51	24.17%
	A1.2	Intervention accepted, partially implemented	66	31.27%
	A1.3	Intervention accepted but not implemented	40	18.95%
	A1.4	Intervention accepted, implementation unknown	10	4.73%
2. Intervention not accepted (by prescriber or patient)	A2.1	Intervention not accepted: not feasible	9	4.26%
	A2.2	Intervention not accepted: no agreement	12	5.68%
	A2.3	intervention not accepted: other reason (specify)	5	2.36%
	A2.4	Intervention not accepted: unknown reason	5	2.36%

Final outcomes of the proposed intervention were also evaluated and it was found to that 20.37% of drug related problems was completely solved and 36.37% of drug related problems was partially solved. Showed in the Table 8.

Table 8: Outcome of proposed intervention

	CODE	OUTCOME OF INTERVENTION	NUMBER	PERCENTAGE
0. Not Known	00.1	Problem status unknown	56	26.54%
1. Solved	01.1	Problem totally solved	43	20.37%
2. Partially Soved	02.1	Problem partially solved	77	36.49%

Intervention Given and Acceptance of Intervention Compared With Outcomes

The intervention given and Acceptance of the intervention were compared with P value by using statistical test as ANOVA by Microsoft excel. And found p value as statistically significant with each other (0.028 & 0.021). So given interventions are implemented and got proper outcomes. Most the identified DRPs are completely or partially solved. This is mentioned in Table 9.

Table: 9 Comparison of intervention and acceptance of intervention with status of DRPs.

COMPARISON	p VALUE
Planned intervention with status of DRPs.	0.028
Acceptance of the interaction with status of DRPs.	0.021

DISCUSSION

DRPs are common in hospitalized patients and can result in patient morbidity and mortality and increased treatment coast. More the number of drugs and polypharmacy, more will be the number of clinical or pharmacological risk factors significantly contribute to the risk for DRPs. In India, the role of clinical pharmacist is an

emerging discipline. With the view of expanded roles of clinical pharmacist in providing improved patients care in hospital and to assess the clinical pharmacist-initiated changes in patient's drug therapy and prevention of drug related and prevention of drug related problems in medicine inpatient of tertiary care teaching hospital.

In the present study 316 patients were evaluated for DRPs, and 211 patients were found to have drug related problem and a total of 214 DRPs were found.

Out of 211 patients identified with drug related problem, majority of DRPs were found in 122(57.81%) males and in females 89(42.18%) were identified with drug related problems which is in consistent with the earlier study conducted by Wincent MM *et al.,*[9] and Ramanath KV *et al.,*[10] showed predominance of drug related problem in male patients. The result was similar to the study carried out by the Alagiriswami *et al.,*[11] and Satishkumar *et al.,*[12] were increase in male patients with drug related problem was seen as compared with female patient. The increased drug related problem might be due escalated medication use because of their multiple comorbid conditions and due to different risk factors like smoking, alcoholism and life condition compared with female population.

The incidence of DRPs was high (63.5%) in patient aged above 60 years as compared to age group between 18-60 years(34.5%) which is analogous to the study conducted by Greeshma *et al.,* where DRPs was high in patients aged above 60 years(57.7%) as compared to the aged group between 18-60 years(42.3%)[13].

Out of total 211 DRPs the level of significance minor (58.41%) was found to be high, moderate (32.24%) and major (9.34%) was found to be low. This was found to be contrast with the study carried out by Shareef J *et al.,*[14] where moderate (58.5%) was found to be high and followed by minor (41.50%) and no major. DRPs according to the level of significance were

identified. And also contrast with the study carried out by Satishkumar BP *et al.,*[12]. In this study adverse drug reaction was found to be 20.5% which is similar to the study conducted by Shareef J *et al.,* in which the adverse drug reaction was found to be 18.86%[14].

The length of hospitalized patients with DRPs in the present study was 41 patients with a hospital stay of less than or equal to ten days and 43 patients with greater than ten days. Association between the lengths of hospital is compared with that of DRPs. A statistical significant result was obtained in the test for association with a p value of 0.001 at 95% confidence interval. This study was in accordance with the study conducted by Alagiriswami B *et al.,*[11] which showed that polypharmacy has a statistically significant association at the p<0.005. National survey conducted in 2002 indicates that 50% of the population taking 5 or more drugs developed.

A total of 69 patients who are prescribed with less than or equal to ten drugs were identified with DRPs and also 15 patients with more than ten drugs were having DRPs. This is similar to the study carried out by Iyer *et al.,*[15] were 60% patients were prescribed between 5-10 drugs, 26% between the range of 11-15 drugs and above 14% was 15 drugs. The statistical association between the drug related problem and number of drug prescribed was found to be significant with a p value of 0.045.

The patients number of drugs prescribed and length of hospital stays significance was found along with drug related problem and was found to be statistically significant from this it was concluded that as the number of drug increases drug related problem also increases and also increase in the hospital stay also increase the incidence of drug related problem.

The present study showed that 20.85% patients were identified with adverse drug reactions and the two most common type of adverse drug reactions

occurred with the administration of antibiotic which showed headache, thrombocytopenia and diarrhea and the other was with antihypertensive drugs which showed hypokalemia, breathlessness and fatigue which is analogues to the study conducted by Celin AT *et al.,*[16] where 15% ADRs were identified, and also in Wincent MM *et al.,* study[9].

The study showed that the drug related problem is more common in patients suffering with cardiac disease (49.36%) followed with endocrine disease (18.35%) which is contrast to the study conducted by Ramanath KV *et al.,* the most commonly observed disease were diabetes followed by HTN and followed by general problems.

Here the equal results were observed in the distribution of drug related problem in diabetes (11.7%) and HTN (11.7%).

The present study was done to identify the drug related problem in chronic disease patients and the data was classified according to the PCNE Classification system. The PCNE basic classification now has 3 primary domains for problems, 8 primary domains for causes, 5 primary domains for intervention, 3 primary domains for intervention acceptance and 4 primary domains for status of DRPs. Moreover there are 7 sub domains for problems, 36 primary domains for causes, 17 sub domains for planned intervention, 10 sub domains for intervention acceptance and 7 sub domains for status of DRPs.

The present study highlights that the primary domain Treatment effectiveness (58.2%) which includes no effect of drug treatment, effect of drug treatment not optimal and untreated symptoms is the major problem and effect of drug treatment not optimal(37.91%) was the major problem in sub domain which is followed by other primary domains that is treatment safety (adverse drug reaction) and others (problem with cost effectiveness of the treatment (3.79%), unnecessary drug treatment (33%) and unclear problem/ complaint(1.98%). This domain of the PCNE was newly added.

The various causes were analyzed according to the guidelines. The major cause of drug related problem was found to be drug selection (90.9%) and the next major cause identified was dose selection (16.11%) and followed by treatment duration (13.7%). This is analogues to the study conducted by Wincent MM *et al.,* were dose selection (33.34%) followed by improper information gathering from the patient (24.44%)[9].

And also in accordance with the study conducted by Maheshkumar VP *et al.,* in which drug/dose selection was found to be the major cause for DRP at the rate of 48.8%, followed by patient-related causes. Lack of time of physician, physician and language barriers and lack of communication between the patient and physician were found to be the major contributing factors for it.

The planned intervention is mainly given at prescriber level, patient level, at drug level and others. In which the planned intervention at the patient level (77.7%), was widely given followed by intervention given to the patient (26.5%) and which was followed by the intervention at the patient level (12.3%). This was contrast to the study conducted by the Wincent MM *et al.,*[9] out of which most of the interventions were proposed at the prescriber level (54.72%), followed by drug level (20.75%). And also contrast with the study conducted with the Maheshkumar VP *et al.,* in which the interventions at the patient level were highest followed by the prescriber level and then drug level.

For the proposed interventions it was classified as the intervention acceptance and intervention not acceptance. 79.14% of the intervention proposed was accepted and 17.5% intervention proposed was not accepted. According to the study conducted by Satishkumar BP *et al.,* 70.59% of the 89.71% acceptance of suggestions was identified. 10.29% the suggestions was not accepted[12].

The status of DRPs was identified to analyze the outcome of the patient. In which

the 36.49% of the drug related problem was partially solved. 26.54% problem status was unknown and 16.58% problem was not solved. According to the study conducted by Wincent MM *et al.,*[9] 64.28% problems were totally solved, 19.05% problems were partially solved and 16.67% problems were not solved. A wide difference in the real time clinical practice setting, when compared to the theoretical knowledge was the main challenge faced while doing the study. This study shows that the clinical pharmacist can helps in reducing DRPs in hospitalized patients.

CONCLUSION

Clinical pharmacist can play a key role in promoting better medication use, ensuring that patients receive appropriate pharmacotherapy thus helps in minimizing the risk of unfavorable outcomes of pharmacotherapy. The review of patient's drug therapy can help in increasing of outcome.

Based on the study criteria all DRPs are identified and classified. All the factors which is significantly associated with DRPs were found out. Reason behind occurrence of DRPs (causes) also classified as per PCNE guidelines. Based on the DRPs, clinical pharmacist study was carried out and required intervention is proposed. Whether the intervention was accepted by the physician or not was also reported. According to the study there is a good response from the health sector towards finding out the DRPs. Most of the intervention was accepted, among this couple of intervention was placed. The suggestions provided by the clinical pharmacist during intervention were well accepted by the physician thus the collaborative approach of physician and pharmacist can provide better patient care outcomes.

The present studies highlighted that the clinical pharmacist can helpful in the identification of the problems and causes of the drug related problem and thus provide intervention.

Thereby, the study concludes that involvement of clinical pharmacist services in patient care can significantly help to identify, resolve, and prevent the DRPs in the hospital and enhance the patient compliance.

REFERENCES

1. Ruths S, Viktil K, Blix HS. Classification of drug related problems. Tidsskr Nor Laegeforen. 2007 Nov 29;127(23):3073-6.
2. Van den Bemt PM, Egberts TC, de Jong-van den Berg LT, Brouwers JR. Drug-related problems in hospitalized patients. Drug saf. 2000;22(4):321-333.
3. Assiri GA *et al.,* What is the epidemiology of medication errors, error-related adverse events and risk factors for errors in adults managed in community care contexts? A systematic review of the international literature. BMJ Open. 2018;8(5):e019101.
4. Adusumilli PK, Adepu R. Drug related problems: An over view of various classification systems. Asian journal of pharmaceutical and clinical research. 2014;7(4).
5. Ruscin JM, Linnebu SA. Drug related problems in older adults. 2015
6. VinksTH, deKoning FH, de Lange TM, Egberts TC. Identification of potential drug-related problems in the elderly: the role of the community pharmacist. Pharm World Sci. 2006;28:33–38.
7. Willeboordse F *et al.,* Medication use and drug related problems in elderly: self-reported questionnaire. Published online. 2016;38:380–387.
8. FilipaAlves da Cost, Silvestre L, Periquito C *et al.,*Drug-Related Problems Identified in a Sample of Portuguese Institutionalized Elderly Patients and Pharmacists Interventions to Improve Safety and Effectiveness of Medicines. 2016;3(1):89–97.
9. Wincent MM, Potrilingam D, Anagha V, Jacob SC, Andhuvan G. Assessment of drug related problems in paients with chronic disease in the general medicine units of a tertiary care hospital. International Journal of Pharmacy and Pharmaceutical Science. 2017;9(12):194-200.
10. Ramnath KV, Nedumballi S. Assessment of medication related problems in geriatric patients of a rural tertiary care hospital.

Journal of Young Pharmacist. 2014;4(4): 273-278.

11. Alagiriswami B, Ramesh M, Parthasarathi G, Basavanagowdapa H. A Study of Clinical Pharmacist Initiated Changes in Drug Therapy in a Teaching Hospital. Indian J pharm Pract. 2009;2(1):36-45.

12. Satishkumar BP, Dahal P, Venkatraman R, Fuloria PC. Assessment of clinical pharmacist intervention in tertiary care teaching hospital of southern India. Asian journal of pharmaceutical and clinical research. 2013;6(2):258-261.

13. Greeshma M, Lincy S, Maheswari E, Tharanath S, Viswam S. Identification of Drug Related Problems by Clinical Pharmacist in Prescriptions with Polypharmacy: A Prospective Interventional Study. Journal of Young Pharmacists. 2018; 10(4):460-465.

14. Shareef J, Shastry C. Assessment of Drug Related Problems in Patients with Cardiovascular Diseases in a Tertiary Care Teaching Hospital. J Pharm Care. 2015; 2(2):70-76.

15. Iyer K, Dilipkumar N, Vasay S, Pawar S, Diwan A. Comparison of drug related problems associated with use of narrow therapeutic index drugs and other drugs in hospitalized patients. J Young Pharm. 2018;10(3):318-321.

16. Celin A T, Seuma J, Ramesh A. Assessment of Drug Related Problems in Stroke Patients Admitted to a South Indian Tertiary Care Teaching Hospital, Indian Journal of Pharmacy Practice. 2012;5(4):28-33.

How to cite this article: Anshila MK, Nambiar DP, Augustine DV et.al. Evaluation of drug related problems in patients with chronic disease at tertiary care teaching hospital. Int J Health Sci Res. 2020; 10(9):144-155.

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