A PHARMACEUTICAL CARE PRACTICE – "DRUG RELATED PROBLEMS IN IN-PATIENTS OF A TERTIARY CARE TEACHING HOSPITAL

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2. ABSTRACT

Background: Drugs play a dual role in patients and they are intended to cure, prevent or diagnose signs or symptoms of a disease and on the same side its improper use cause drug related problems which leads to increased morbidity and mortality. A pharmacist in a hospital had a vital role to monitor prescriptions for drug related problems (DRP's). A prospective study is done here, pharmaceutical care services on drug related problems in a tertiary care teaching hospital. *Objectives:* To identify the drug related problems like adverse drug reactions ADR's, drug-drug interactions (DDI), low dose (LD), high dose (HD), To identify the patient demographics. *Materials and methods:* Present study is an prospective observational study conducted in a 600 bedded tertiary care hospital for a period of six months. Individual patient data with prescription content is collected every day in Peadiatric and Medicine departments in a suitable data collection form. Ethical clearance is obtained from the ethical committee before the study commence. *Results:* In the total data collection of 605 Prescriptions, 455 DRP's were found. In that 7.47% (n=34) ADR's, 71.64% (n=326) DDI, 11.86% (n=54) HD and 9.01% (n=41) LD were identified. Most of DRP's were identified in male gender and age group of 0-20 years patients. *Discussion and Conclusion:* Drug related problems are one of the major problems now a days seen in the hospital. The study suggests that pharmacists and general practitioners (physicians) can work together to identify and resolve DRPs. Additional controlled studies are required to measure the effect of this service on health outcomes.

3. KEYWORDS: DRP's, ADR's, Drug-Drug Interactions (DDI), High dose (HD), Low dose (LD), Pharmaceutical care services, Age group.

4. INTRODUCTION

Pharmaceutical care is a ground breaking concept in the practice of pharmacy. It stipulates that all practitioners should assume responsibility for the outcomes of drug therapy in their patients.[1] Pharmaceutical Care is a patient centered, outcome oriented pharmacy practice that requires the qualified pharmacist to work in concert with the patient and the patient's other healthcare providers to promote health, to prevent disease, and to assess, monitor, initiate, and modify medication use to assure that drug therapy regimens are safe and effective and also it is the responsible provision of drug therapy for the purpose of achieving definite outcomes.[2,3] It encompasses a variety of services and functions ,some new to pharmacy, others traditional which are determined and provided by the pharmacists serving individual patients.[1] The goal of pharmaceutical care is to improve an individual patient's quality of life through the achievement of definite (predefined), medication-related therapeutic outcomes.[4] Drugs are the absolute therapeutic tools used in diseased conditions in hospitalized individuals. They are intended to cure, prevent or diagnose diseases, signs or symptoms, but the shadow side is that improper use can be the cause of patient morbidity and even mortality.[5] The presence of any of these drug related problems will harm the patient. The doctors are experts in the diagnosis and treatment of diseases and their efforts need to be constantly supplemented by contributions from all the healthcare professionals. As drug use is increasing, there is increased risk of drug related morbidity and mortality.[6]

According to Pharmaceutical Care Network Europe Foundation (PCNE) Drug-Related Problems are defined as "A Drug-Related Problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes", and according National Coordination Councilfor Medication Error Reporting and Prevention (NCCMERP) medication errors are defined as:"Any preventable event thatmay cause or lead to inappropriate medication use or patient harm while the medication is inthe control of healthcare professional, patientor consumer".[5]

Classification of DRPs

For the purpose of this study, we used DRPs as a general term for

Actual or potential DRPs as follows.

1. An actual or potential adverse drug reaction

2. An actual or potential drug interaction

3. Potentially high dose

4. Potentially low dose

5. Potentially improper drug selection

6. Untreated indication

7. Drug use without indication

8. Failure to receive medication

9. Duplicate therapy.[7]

Identification of DRPs

A 4-step process was utilized to identify DRPs

1. Evaluation of computerized pharmacy-maintained patient profiles for medical diagnoses and comorbidities.

2. Analysis of clinical assessments documented in the pharmacy database,

3. Screening of past and present medication profiles,

4. Pharmacist review of prescribed drug therapy for appropriateness.[8]

Patients included in this investigation had several risk factors for polypharmacy, including older age, white race, and poorer health.[9] These squeal of multiple drug use also may increase the utilization of healthcare resources (including nursing home placement) and concomitant costs.[10] Medication error rates found in observational studies are reported to vary between 1.7% and 59%, but generally accepted rates are 15% for floor stock distribution systems and 2 to 5% for unit-dose distribution systems.[11] These rates do not include prescribing errors. The rates for prescribing errors are reported to be between 0.3 to 2.6%.[12]

Objectives of yhe study

➤ Determine demographic and clinical characteristics of inpatients.

➤ To identify the adverse drug reactions (ADR's).

➤ To identify the drug-drug interactions (DDI).

➤ To identify high dose (HD), low dose (LD).

➤ To investigate the appropriateness of drug use and the occurrence of drug related problems (DRP's) in hospitalised patients.

MATERIALS AND METHODS

5.1Study Site

The study conductedat Peadiatric, Medicine departments of Basaveshwara Medical College Hospital & Research Centre (BMCH & RC), Chitradurga.

5.2 Study Design

The study was designed primarily to investigate the occurrence or frequency of drug-related problems (DRP's) in patients admitting to the Paediatric and Medicine departments, and also cases were analysed for interventions which was related to the observed DRP's. Thus the study can be described as a prospective observational study.

5.3 Study Period

The study conducted over a period of six months (i.e. 1 Jan 2013- 30 June 2013).

5.4 Study Subjects

Patients who meets the following criteria were enrolled.

A. Inclusion criteria

- Patients aged $\leq$ 80 years of both genders were included.

- Patient's admission >2 days in Peadiatric and Medicine department.

- Admission or on treatment between Jan 2013 – June 2013.

B. Exclusion criteria

- Patient admission in other than Peadiatric & Medicine (Male & Female) department.

- Patients who are treated from the outpatient departments, and who do not require hospital stay were excluded from the study.

5.5 Sources of data

Participants at the morning meeting were physicians, nurses, interns and clinical pharmacists, and other health care professionals. Information was collected by interviewing with the patients/ care takers. A suitable standard data collection form was used for the collection of data, and then form had been designed, tested and found applicable to the participating departments. The following data were recorded for each patient: Name, Age, Sex, IP. No., Unit, DOA, DOD, History of Present Illness (HPI), Past Medical History(PH),Past Medication History (PMH), Allergies,Reason of Admission (ROA), Final diagnosis, Current

usage of drugs, Dose, Route, Frequency, relevant medical history, and results of routine laboratory tests. The data were collected from the medical charts, medical records and patient's prescriptions. Some specific factors that are assumed to increase the risk of DRP's arising were recorded.

5.6 Study Procedure

Study started with informed consent process, patients were explained about objectives, benefits and risks associated with this study. Patients who satisfied with the study criteria were included and collected their demographic details, clinical status,medical history, medication history and lab data were documented in a suitably designed data collection form. A validated questionnaire were administered to the patient at baseline to assess their current health related quality of life.The data was analyzed by using Microsoft Access in a computer. Data analysis has been presented in tabulated form and the collected data were also analyzed on basis of *online Medscape and CIMS India.*

6. RESULTS & DISCUSSION

6.1 Total number of Prescriptions collected in different departments

In the present study, 605 prescriptions were enrolled of both genders. Among them 64.95% (393) were from medicine and 35.04%(212) prescriptions from peaditric department. Figure No.1 shows the prescriptions collected from each department.
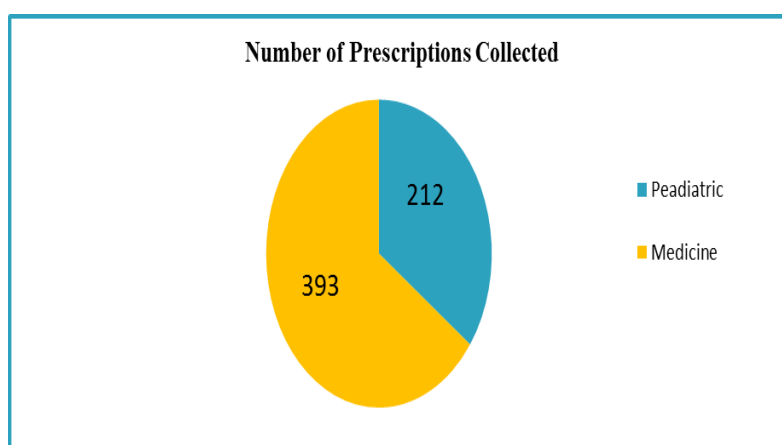
Figure No. 1: Number of Prescriptions collected (N=605) in each department

6.2 Gender wise distribution of data

On comparing gender wise distribution of data showed that Males were admitted more i.e., 55.37%(335) compared to females 44.62%(270). Table no. 1 represents the gender wise distribution of data.

Table No.1: Gender wise distribution of data

Department	Male	Percentage (%)	Female	Percentage (%)
Peadiatric	133	39.70	79	29.25
Medicine	202	60.29	191	70.74
Total	335	100	270	100

6.3 Monthly wise distribution of data

When coming to monthly wise, there where more number of prescriptions were collected and analysed in the month of february 27.76%(168) as patient inflow was more followed by january 22.47%(136). Based on department and month wise distribution of data as presented in table no. 2.

Table No. 2:Department and the Number of Prescriptions collected per Month

Month	Peadiatric	Percentage (%)	Meedicine	Percentage (%)
January	24	11.32	112	28.49
February	57	26.88	111	28.24
March	8	3.77	36	9.16
April	61	28.77	68	17.30
May	51	24.05	37	9.41
June	11	5.18	29	7.37
Total	212	100	393	100

6.4 Age V/S Number of Prescriptions collected in each department:

In this study, we have categorized the age group and analysed. There where more number of prescriptions were collected in the age group between 0-20 years i.e., 37.02%(224) and least were found in the age group of 61-80 years i.e., 15.20%(92). The age wise distribution of data based on the department as showed in table no.3.

Table No. 3: Age V/S Number of Prescriptions collected in particular department

| Age grup	Peadiatric	Percentage (%)	Medicine	Percentage (%)
0-20 years	212	100	12	3.05
21-40 years	00	00	144	36.64
41-60 years	00	00	145	36.89
61-80 years	00	00	92	23.41
Total	212	100	393	100

6.5 DRP's in various departments

During the study period, around 455 DRPs were identified in 605 prescriptions. Among them 69.01%(314) in medicine department and 30.98%(141) were from peadiatrics. The out of 455 DRPs , DDIs were found to be more followed by HD 54, LD 41and ADRs 34.coming to the department wise, highest number of ADRs, DDIs and LD were found in medicine and lowest

in peadiatrics as well as the HD was found more in the department of pediatric. The department wise analysis of DRPs with the prevalance were represented in table no.4 and categorization of DRPs as shon in figure no.2.

Table No.4: DRP's identified in various departments

Department	No. of Prescriptions	DRPs Identified	ADR	DDI	HD	LD
Peadiatric	212	141 (100%)	4 (2.83%)	87 (61.70%)	**34** (24.11%)	16 (11.34%)
Medicine	393	314 (100%)	30 (9.55%)	239 (76.11%)	20 (6.36%)	**25** (7.96%)
Total	605	455 (100%)	34 (7.47%)	326 (71.64%)	54 (11.86%)	41 (9.01%)
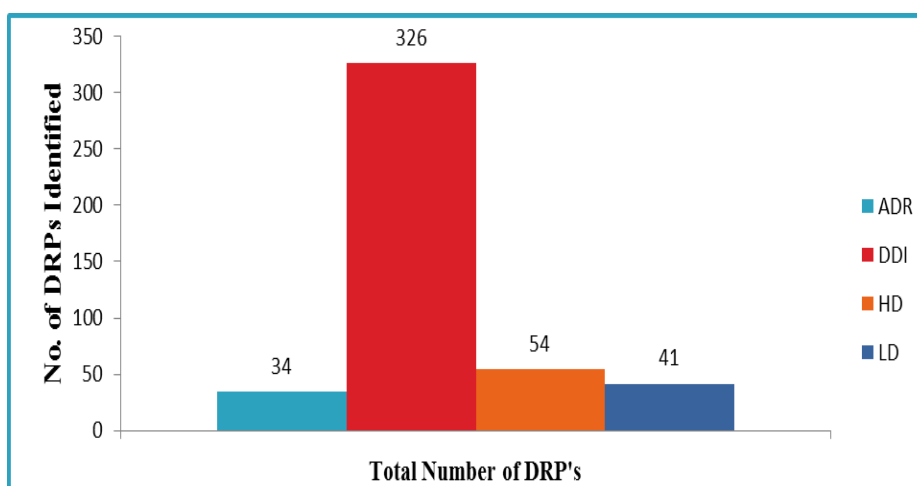
Figure No. 2: Categorization of DRPs

6.6 DRP's in relation to age groups

As discussed above that the 455 DRPs were identified in 605 prescriptions, among them 32.30%(147) were identified in age group of 0-20 years followed by 27.69%(126) in 41-60 years, 25.93%(118) in 21-40 years and 14.06%(64) in 61-80 years of age group.

The below mentioned table and figure shows a clear picture regardingprevalence of drug related problems in different age groups. The prevalance of different DRPs were represented in table no.5 based on age age groups.

Table No. 5: Prevalance of Different DRP's in relation to different age groups

Age grup	Total Prescriptions	Identified DRPs	ADR	DDI	HD	LD
0-20 years	224	147	5 (14.70%)	95 (29.14%)	**29** (53.70%)	18 (43.90%)
21-40 years	144	118	**14** (41.17%)	78 (23.92%)	13 (24.07%)	13 (31.70%)
41-60 years	145	106	9 (26.47%)	**105** (32.20%)	8 (14.81%)	4 (9.75%)
61-80 years	92	64	6 (17.64%)	48 (14.72%)	4 (7.40%)	6 (14.63%)
Total	605	455	34 (100%)	326 (100%)	54 (100%)	41 (100%)

6.7 Prescriptions with DRP's and without DRP's in various departments

Among 605 presriptions, 455 DRP's were observed during the study. The average DRP's per prescription was found to be 0.75. Prescriptions with DRP's were identified more in the department of Medicine i.e. 257, followed by Peadiatric i.e. 108 respectively. Whereas in the prescriptions without DRP's were identified more in the Medicine department 136 followed by Peadiatric 104. The following table no.6 represents the DRP's in respective departments based on the presriptions.

Table No. 6: Prescriptions with and without DRP's in various departments

Departments	Prescriptions with DRPs	Percentage (%)	Prescriptions without DRPs	Percentage (%)
Peadiatric	108	29.58	104	43.30
Medicine	257	70.41	136	56.66
Total	365	100	240	100

In recent years patient safety has become a major concern for health providers, and medication management is one of its more relevant aspects. Pharmacy has witnessed a gradual significant change over the past years worldwide. The traditional role of the pharmacist that involving the preparation, dispensing and selling medications is no longer adequate for the pharmacy profession to survive.[13] In our present study 605 presriptions were analysed among them 55.37%(335) were males and 44.62% (270) were females. A study conducted by **Kevin *et al***[14] on the prevalence and predictors of medication related problems,the total patients are 142, in that males are 34 (23.9%) and females are 108(76.1%). During the study highest number of patients were seen in the age group 0-20 years. **Yvonne Koh*et al***[8] shown that polypharmacy is one of the cause for drug-related problems on admission or during hospitalization among inpatients.In the geriatric patients it is commonly

seen, especially with the multiple diseased condition. It leads to ADR's, drug-drug interaction and in another study conducted by **Harminder Singh *et al***[15] on the incidence and nature of drug related problems on hospital admission in a tertiary health care hospital. In this 3560 patients' records was analyzed and out of them 118 patients hospitalization was due to DRPs. During the study period the total drug related problems (DRP's) was found to be 455 out of 605 prescriptions which includes ADR's (Adverse drug reactions), DDI (Drug-drug interactions), HD (High dose), LD (Low dose). ADR's are more prevalent found in the Medicine department followed by Peadiatric department. **Anne J. Leenertse*et al***[16] conducted a study on frequency and risk factors for preventable medication-related hospital admissions. All 17059 cases were screened of which 714 were medication related hospital admission in which 332 were potentially preventable admitted, which is 2.6% of all unplanned admissions, 52 were the ADR's, 49.4% was females.In our study 455 DRPs in which 391 potentially preventable, 34 were the ADRs. A study by **Rainu Kaushal MD *et al***[17] done on adverse drug events, he reviewed 10,778 medication orders and found 616 medication errors (5.7%), 115 potential ADEs (1.1%), and 26 ADEs (0.24%). Of the 26 ADEs, 5 (19%) were preventable. In this 34 ADRs were found in that 30(88.23%)found in Medicine 4(11.76%) in Paediatric department. Out of 34 ADRs highest were seen with Beta – lactam antibiotics 6 (17.64%) followed by NSAIDs 5 (14.70%) , anti - TB agents 5 (14.70%) and least were found in anti - malarials 1 (2.94%), anti - retroviral drugs 1 (2.94%) , anti - cancer drugs 1 (2.94%) respectively. Of the 34 ADRs 3 were serious, 14 were probable, 12 were possible and 5 were unlikely. Assessment of potential drug-drug interactions at hospital discharge by ***Bertoli R, Bissig M.***[18] In total, 373 potential drug-drug interactions were identified: 223 (60%) of minor severity, 143 (38%) of moderate severity and 7 (2%) of major severity. On marking the present study 393 drug-drug interactions found in Medicine and Peadiatric departments. DDIs was categorized into Major, Moderate and Minor measures. 239(73.31%) drug interactions were seen in Medicine, 87(26.68%) in Paediatric departments.Out of 393 DDIs the most common drug-drug interaction found to be between Ceftriaxone + Diclofenac 64 (16.28%) followed by Metronidazole + Diclofenac 22 (5.59%). Low dose and high dose are not intentional but sometimes intentional on the way to support the individual or the patient diseased condition. In case of severe condition of the disease the physician himself prescribes the drugs which are suitable to the patient for the cure. It may be a high dose or low dose, in that case unknowingly or knowingly the patient may be affected by the drug. It may lead to an ADR or interaction or subtherapeutic activity. Prescribing errors in hospital inpatients, their incidence and clinical significance done by ***B Dean, M***

Schachter, C Vincent, N Barber.[19]About 36,200 medication orders were written during the study period, and a prescribing error was identified in 1.5% .A potentially serious error occurred in 0.4% . Most of the errors (54%) were associated with choice of dose, Making light on the present study the high dose 54 (11.86%) and low dose 41(9.01%) was found in Peadiatric and Medicine (Male & Female) departments.

7. CONCLUSION

In the study, we identified a high incidence of DRP's among people receiving treatment. We evaluated a DRP's like Adverse Drug Reactions, drug-drug interactions, high dose and low dose well in our study. Among 605 patient prescriptions, 455 dug related problems have been found out and most of the ADR's and drug-drug interactions had seen in medicine department, prescription errors like like high dose weigh more in peadiatrics and low dose in Medicine department respectively. Like these for every problem which arised during therapy for an individual depends (or) relies on one perfect reason behind.By solving (or) preventing the reason behind the problem the drug related problems(DRP's) will sure face reduction in the hospitals. The role of an pharmacist in an hospital is a very crucial one which depends on the pharmaceutical services provided by them. Regular monitoring of the prescriptions prescribed by the physicians will sure support in the reduction of drug related problems. The study suggests that pharmacists and general practicioners (physicians) can work together to identify and resolve drug-related problems and it will help to the patient for better health care, reduction of cost of therapy, rationality of prescriptions and morbidity. Additional controlled studies are required to measure the effect of this service on health outcomes.

8. ACKNOWLEDGEMEMNTS

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