Research Article

A Study to Evaluate the Impact of Clinical Pharmacist on Patient Care by Drug Therapy Assessment in Intensive Care Units

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ABSTRACT

Drug-related problems (DRPs) are common with hospitalized patients, polypharmacy and increase in age have been identified as the two major risk factors. The main objective of our study is to identify the occurrences DRP and classifying them on the basis of Drug therapy assessment (DTA) and to assess level of significance of clinical pharmacist intervention. Our study is prospective observational study involving all patients admitted in critical care units in the hospital. Out of 180 patients 91 patients were presented with DRPs and from this 91patients total of 237 DRPs were identified. Among 237 interventions major fraction is missing dose ie, 58(24.47) followed by 41(17.3) drug changed, 34(14.35) drug not changed, 22(9.29) new drug started, 20(8.43) dose changed, 17(7.17) dosing interval changed, 15(6.32) does not changed, 13(5.49) substitution of drug, 12(5.08) change in route of administration and 5 (2.1) fall in others category. And in these 237 interventions made 35.5(83) were considered as major interventions, 33.33 (79) considered as moderate and minor 31.65(75) were considered as minor. This indicates the importance of clinical pharmacist in health care settings. Our study shows that DRPs are significantly occurring in hospital causing the patient for comorbidity, prolonged hospitalization, and increased financial burden. The study suggests that the pharmacists and general practitioners (physicians) can work together to identify and resolve DRPs.

Keywords: Drug related problem, Polypharmacy, Drug therapy assessment, Interventions, Clinical Pharmacist.

INTRODUCTION

Pharmaceutical care is defined as direct, responsible provision of medication-related care with the aim of obtaining definite outcomes to improve a patient's quality of life. Drug Related Problems (DRP) is defined an event or circumstance which interferes with health outcomes and the term DRP embraces medication errors(ME), adverse drug events(ADE), adverse drug reactions(ADR) etc.[1]Patients admitted in the intensive care unit (ICU) are complex patients who require an extra amount of care and consideration as a consequence of complicated and extensive medicine regimes compounded by physical and mental limitations.[2]

Clinical pharmacy is the health specialty that describes the activities and services which promote rational and safe use of medicinal products and devices.[3]As time being pharmacy practice also continues to evolve with a greater focus on Medication Therapy Management (MTM), which becomes more important for patients in intensive care. In our we use a another complimentary term "drug therapy assessment" (DTA) instead of MTM.[4]According to American Society of Health System Pharmacist(ASHP) in accordance with Pharmaceutical Care Network Europe(PCNE) and Hepler and Strand Classification, a medication review is defined as an evaluation of patients medicines with the aim of optimizing the outcomes of medicine therapy.[3]Based on this, DTA categorized as drug use without indications, improper drug selection, drug interaction, adverse drug reaction, over dosage, needs additional drug therapy, sub therapeutic dosage, improper drug selection and untreated indications.[5]

The role of clinical pharmacist in interventional study is to identify and endorse safe and effective use of medications to resolve DRPs, by analysing the medication regimen to be rational, safe and effective. The rational utilization of medications be uplifted by acquiring detailed knowledge and information about DRPs with relation to the patients, doctors and pharmacists. Identification and assessment of DRPs with the aid of DTA may lessen the occurrences of DRPs, morbidity, mortality and improve personal satisfaction of patients.[6] This study aimed to provide information to quantify the burden of DRPs among patients with polypharmacy and contribute to the design and implementation of risk management plans.[7]

METHODOLOGY

Our study was a prospective interventional study. The study was carried out for a period of 3 months from March 2019 to May 2019 in a multidisciplinary ICU of JAYPEE hospital, Noida, Uttar Pradesh, India. The inclusion criteria were all patients get admitted in ICU and including all routes of administration such as topical, inhaled, intravenous, oral and over the counter drugs etc.

Patients admitted to wards or other units were excluded from the study. During the study period, the drug information liaisons participating in the ward rounds along with medical team reviewed the patient's case sheets and identified the problems in consultation with the staff. A self-designed patient data collection form has been used to collect the patient data. Various aspects were monitored according to American Society for Health-System Pharmacists DTA worksheet (for clinical skills competition) and categorized by utilizing both ASHP and Hepler and Strands classification and attention of the interventionist to the interventions was called for the problems identified. DRPs identified were recorded and discussed with the concerned health care team. The information obtained was analysed to identify DRPs and assessed by DTA.

RESULTS

In demographic details out of 180 cases collected 113 (62.78%) are males and 67(37.22%) are females.In our study the most frequently occurred age group is above 6o years ie,73 patients (40.55%) followed by 45-60 age group having 49 patients (27.22%) followed by 0-14 age group then 30-44 and finally least number falls in 15-29 age group.

Table 1: Demographic Details of the Study Population (N=180)

Demograpic Details	Characteristics	Number (%)
GENDER	MALE	113(62.78)
	FEMALE	67(37.22)
AGE GROUP	0-14	25(13.89)
	15-29	12(6.67)
	30-44	21(11.67)
	45-60	49(27.22)
	>60	73(40.55)

In table 2, out of 180 ICU patients majority of patients fall in the category of pulmonary and critical care ie, 47(26.11) followed by 31(17.22) patients in neurology, 29(16.11) in cardiology, 26(14.45) in pediatrics, 16(8.89) in nephrology, 9(5) in ortho, 8(4.44) in surgical, 6(3.33) in gastro, 4(2.22) in oncology, 2(1.11) in GI-hepato and 1(0.56) for both OBG and rheumatology.

Among 180 cases collected the no.of drug prescribed is categorixed into 4 categories. According to this more number of drugs prescribed in 10-20 category ie, 91(50.56) patients followed by 70(38.89) in 5-10, 11(6.11) in 1-5 and finally 8(4.44) in >20 group.

Table 2: Clinical Characteristics of Study Population (N=180)

DETAILS	CHARACTERISTICS	NUMBER(%)
DEPARTMENT WISE	PULMONARY AND CRITICAL CARE MRDICINE	47(26.11)
	NEUROLOGY	31(17.22)
	CARDIOLOGY	29(16.11)
	PEDIATRIC	26(14.45)
	NEPHROLOGY	16(8.890
	ORTHO	9(5)
	SURGICAL	8(4.44)
	GASTRO	6(3.33)
	ONCOLOGY	4(2.22)
	GI- HEPATO	2(1.11)
	OBG	1(0.56)
	RHEUMATOLOGY	1(0.56)
NO.OF DRUGS	1-5	11(6.11)
	5-10	70(38.89)
	10-20	91(50.56)
	>20	8(4.44)

Out of 180 cases collected total number of drugs given is 1028 and among that mostly prescibed is antibiotics 218(21.21) followed by PPIs 100 and so on as illustrated in figure 1. The least prescribed drug is Midazolam.

Table 3: Drug Utilization Pattern in ICU

Drugs Prescribed	No.of Drugs	% of Drugs Prescribed
Antibiotics	218	21.21
PPIs	100	9.73
Anti platelets	92	8.95
Anti hypertensives	84	8.17
Anticoagulants	81	7.88
Diabetics	76	7.39
NSAIDS	75	7.3
Statins	68	6.61
Anti epileptics	53	5.16
Steroids	45	4.38
NEB IPRA	38	3.4
DOPA and DOBU	24	2.33
NORAD	21	2.04
NEB SAL	16	1.56
Digitalis Prep	15	1.46
H2RA	15	1.46
Midazolam	7	0.7
Total	**1028**	**100**

Among 180 cases collected 142 patients ie in majority of 78.89% of patients are prescribed with antibiotics and only 38 ie,21.1% patients are not prescribed with any antibiotics. And of all this patients total of 1028 drugs are prescribed among that 218 drugs are antibiotics. In 218 antibiotics the more commonly used antibitoic is Piperacillin-tazobactam 42(19.27) then meropenam 29(13.3) and the less commonly prescribed is linezolid and polymixin B ie, 1(0.46).

Out of 180 cases 91cases are having drug related problems and 89cases without any drug related problems. Among these 91 cases total of 237 DRPs are identified. In this 237 DRPs the most frequently occurring DRP is drug choice problems which contribute about 68 (28.69) followed by 66 (27.85) drug interactions, 58(24.48) medication errors, 26(10.97) drug dose problems, 9(3.8) drug allergy, 2(0.84) for both drug use problems and failure to receive therapy and only 1(0.42) ADR. This is depicted in Figure 1. And a detailed description of individual DRPs of each category is illustrated in Table 4.

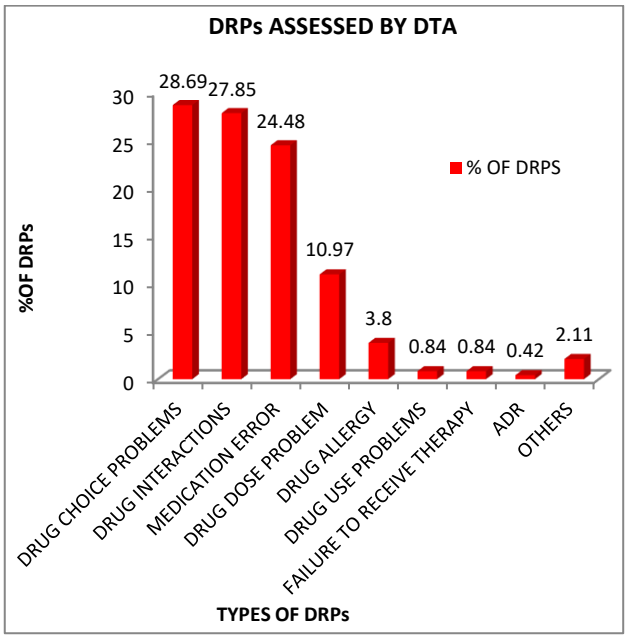

Figure 1: DRPs assessed by DTA

Table 4: Types DRPs Assessed by DTA (N=237)

DTA Assessment OF DRPs	No. of DRPs	% of DRPs
Drug Choice Problems		
Inappropriate Drug	27	11.39
Drug Duplication	4	1.69
No clear drug indication for drug use	10	4.22
No drugs for clear indication	27	0.39
DRUG INTERACTIONS		
Major	9	3.8
Moderate	40	16.88
Minor	17	7.17
MEDICATION ERROR		
Prescription error	49	20.68
Transcripttion error	9	3.8
Dispensing error	0	0
Administration error	0	0
Documentation error	0	0
Drug Dosing Problems		
Drug dose too low	20	8.44
Drug dose too high	4	1.69
Short duration	2	0.84
Drug allergy		
Penicillin	3	1.27
Vancomycin	4	1.69
Pregabalin	2	0.84
Drug use problems		
Drug not taken	1	0.42
Wrong drug	1	0.42
ADR	1	0.42
Failure to receive therapy	2	0.84
Others	5	2.11
Total	237	100

Among identified 237 DRPs from 91 cases, the most commonly causing DRP is due to antibiotics. It ranges about 26.72% DRPs due to antibiotics followed by 12.93% for anti-hypertensives, 11.21% for anti-epileptics. The least cause of DRP is Steroids and antihistamines which contribute about 0.86%.

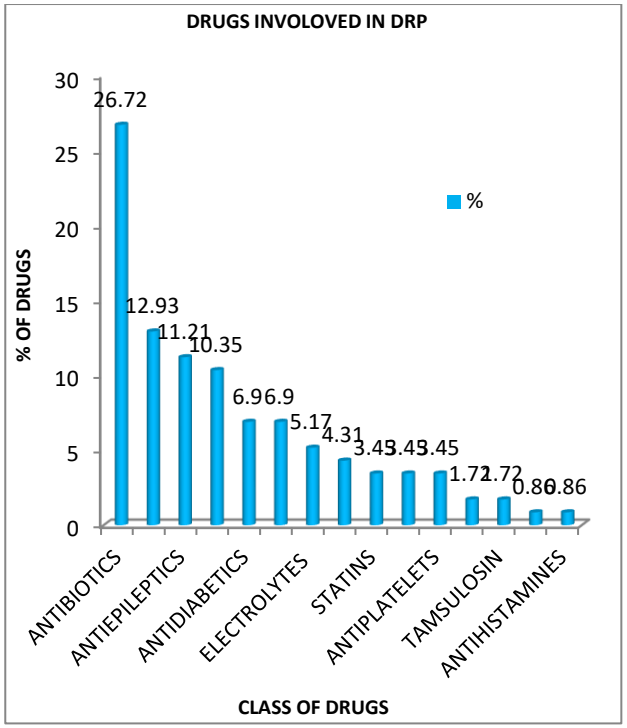

Figure 2: Class of drugs involved in DRPs

Out of 180, 91 cases with 237 DRPs and the number of interventions made is also 237. Among these the majority falls under the category of missing dose i.e 58(24.47) followed by 41(17.3) drug changed, 34(14.35) drug not changed, 22(9.29) new drug started, 20(8.43) dose changed, 17(7.17) dosing interval changed, 15(6.32) dose not changed, 13(5.49) substitution of drug, 12(5.08) change in ROA and 5 (2.1) fall in others category (Table 5).

Among 237 interventions 35.5(83) are considered as major interventions, 33.33 (79) considered as moderate and minor 31.65(75) are considered as minor.

Table 5: Level of Interventions Made By Clinical Pharmacist (N=237)

Level of Intervention Made	No. of Interventions	Percentage
Missing dose	58	24.47
Drug changed	41	17.3
Drug not changed	34	14.35
New drug started	22	9.29
Dose changed	20	8.43
Dosing interval changed	17	7.17
Dose not changed	15	6.32
Substitution of drug	13	5.49
Change in ROA	12	5.08
Others	5	2.1
Total	**237**	**100**

And of all these 237 interventions 139 (58.65) interventions are accepted 23(9.7) are not accepted and for 75(31.65) no changes are made.

Table 6: Outcome of Clinical Pharmacist Intervention (N=237)

Outcome of CP Intervention	Number	Percentage
Approved	139	58.65
Unapproved	23	9.7
No Changes Made	75	31.65
Total	**237**	**100**

DISCUSSION

In our study out of all patients admitted to the various intensive care units, we have randomly enrolled 180 patients and were reviewed. Out of 180 patients 91 patients were presented with DRPs and from this 91patients total of 237 DRPs were identified. The DRPs were assessed by DTA and then categorizing them which helps in designing proper intervention based on the problems. The patient's data were collected as per standard data entry form and initially demographic analysis of the patients was done.

In demographic analysis out of 180 patients reviewed 113 were males and 67 were females. The most number of patients fall under the age category of above 60 i.e, 73 patients followed by 45-60 and least number fall in 15-29 age group. It suggests that aged group falls sick commonly. Pichal *et al.* conducted a similar study on DRP assessment and concludes the same. In our study we enrolled patients from various intensive care units and the most number of patients ie. 47(26.11) from pulmonary and critical care medicine followed by neurology 31(17.22), 29(16.11) in cardiology and so on. Also most the proportion of number of drugs prescribed is more under 10-20, its constitutes 91 (50.56) patients. Ahmad *et al.,* in his study categorized the patients on department wise and based on the number of drugs prescribed. It's a clear evident of the patient condition and the influence of polypharmacy.

Antibiotics are the mostly prescribed drugs in ICU followed by PPIs. All bout 1028 drugs were prescribed for 180 patients and in that 218 were antibiotics and 100 were PPIs. Among these 218 antibiotics 42 for piperacillin tazobactam,29 foe meropenam, 27 for colistin, 26 for teicoplanin and least that 1 for polymixin B and linezolid. Most of the patients were admitted in ICUs were prescribed with antibitotics. Sarfaraz Mohammed *et al.,* categorized the drug utilization pattern in ICU and the proportion of antibiotic usage in patients.

DRPs are assessed by DTA with the help of standard data entry form and then classifying them for proper management of interventions. Drug choice problems seemed to be highly identified intervention ie,68(28.69) followed by by 66 (27.85) drug interactions, 58(24.48) medication errors, 26(10.97) drug dose problems, 9(3.8) drug allergy, 2(0.84) for both drug use problems and failure to receive therapy and only 1(0.42) ADR. Antibiotics constitute for about greater number of DRPs ie 26.72%. Also previously, its evident that highest number of drugs prescribed were antibiotics and highest number of DRPs also occur for antibiotics. Greeshma *et al.* and Lucca *et al.,* highlighted different DRPs by DTA assessment and the various interventions made by clinical pharmacist. Among 237 interventions major fraction is missing dose ie 58(24.47) followed by 41(17.3) drug changed, 34(14.35) drug not changed, 22(9.29) new drug started, 20(8.43) dose changed, 17(7.17) dosing interval changed, 15(6.32) dose not changed, 13(5.49) substitution of drug, 12(5.08) change in ROA and 5 (2.1) fall in others category. And in these 237 interventions made 35.5(83) were considered as major interventions, 33.33 (79) considered as moderate and minor 31.65(75) were considered as minor. This indicates the importance of clinical pharmacist in health care settings. From all those 237 interventions made by CP 139 (58.65) interventions were accepted 23(9.7) were not accepted and for 75(31.65) no changes were made. However, our study points out that there is a significant number of drug-related problems occurring

in the ICUs and the presence of clinical pharmacist in the healthcare team in hospitals can make a vital contribution, in terms of increasing safety and efficacy and decreasing adverse events and other drug-related problems.

CONCLUSION

Drugs are the useful tools in the prevention and treatment of symptoms and diseases, but if not used properly, they may be harmful and cause new symptoms or produce sub-optimal effects which are termed as DRPs. Polypharmacy, comorbidities, lack of awareness has been found as the reason for DRPs. Our study presents the pattern of finding DRPs by DTA in a private tertiary care hospital in India. The present results point to the establishment of a DRPs reporting system at hospitals and the role of a clinical pharmacist in this situation appears to be a strong intervention and very crucial one which depends on the pharmaceutical services provided by them and, the clinical pharmacist, initially, could only confine to identification of the DRPs, later bring those problems to the notice of physician and other health-care professional and take precaution and measures to avoid them. Our study shows that DRPs are significantly occurring in hospital causing the patient for comorbidity, prolonged hospitalization, and increased financial burden. The study suggests that the pharmacists and general practitioners (physicians) can work together to identify and resolve DRPs.

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