International Journal of Pharmacy and Pharmaceutical Sciences

Print ISSN: 2656-0097 | Online ISSN: 0975-1491 Vol 13, Issue 3, 2021

Original Article

A PROSPECTIVE OBSERVATIONAL AND INTERVENTIONAL STUDY ON THE ROLE OF DOCTOR OF PHARMACY/CLINICAL PHARMACIST IN IDENTIFICATION, REPORTING AND MINIMIZATION OF DRUG-RELATED PROBLEMS IN PULMONARY AND CARDIOLOGY DEPARTMENTS OF ESI HOSPITAL

NASIBEH GHANBARLOU*, MEKKANTI MANASA REKHA, MAHSA NAZI

Department of Pharmacy Practice, Gautham College of Pharmacy Affiliated to Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India
Email: nasimghanbarlou@gmail.com

Received: 04 May 2020, Revised and Accepted: 11 Jan 2021

ABSTRACT

Objective: The present study aims at implementing the doctor of pharmacy services in the identification and reporting of drug-related problems in the in-patient units of cardiology and pulmonary medicine departments of ESI Hospital, Bangalore.

Methods: A prospective interventional study was conducted from September 2018 to March 2019. Determination and categorization of drug-related problems (DRPs) were performed by the pharmacist using the PCNE classification scheme for drug-related problems V5.01. The DRPs identified by the pharmacist were reported and interventions made were subsequently recorded.

Results: 180 drug-related problems were identified in the study, among which the major problems were drug-drug interactions (13.88%), followed by generic substitution (10%). The mean drug-related problem per patient was found to be 1.06. A total of 196 interventions were made by the clinical pharmacists among which, 109 (55.61%), 56 (28.57%), 17 (8.67%) interventions were at the prescriber, drug, patient levels, and 14 (7.14%) cases were the rest of interventions or activities. Distributions based on type and degree of acceptance of interventions showed that among 56 drug regimen change interventions proposed by the pharmacist, only 55.35% were accepted. The results further indicated that out of 68 monitoring required interventions made by the pharmacist, and among 17 cases that required counseling by the pharmacist in verbal, 77.94% and 88.36% of cases were accepted, respectively. Also, regarding the cases that required communication between the pharmacists and other healthcare professionals, 85.36% of a total of 41 samples and all of 14 adverse drug reporting cases made in a formal note form were accepted.

Conclusion: The clinical pharmacist's/doctor of pharmacy professional's timely interventions in the patient's drug therapy is required to prevent or minimize the occurrence and the risk of DRP. Rational drug therapy and optimal medication safety can be achieved by clinical pharmacy services.

Keywords: Doctor of pharmacy, Drug-related problems, Cardiology and pulmonary medicine department, Pharmaceutical care, Pharmacy practice

DOI: https://dx.doi.org/10.22159/ijpps.2021v13i3.38152. Journal homepage: https://innovareacademics.in/journals/index.php/ijpps.

INTRODUCTION

Drug therapy can improve the quality of life while treating and counteracting or mitigating side effects in various conditions. Drugs are, however, powerful and should be appropriately dealt with. A drug-related problem (DRP) has been defined as an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes [1]. Alternatively, a DRP is an undesirable patient experience that involves drug therapy and that actually or potentially interferes with a desired patient outcome [2]. To meet a DRP for an event, at least two conditions must be met: (1) a patient experiences, or must be likely to experience, disease or symptomatology; and (2) these conditions must have an identifiable or suspected relationship with drug therapy [3].

Drug-related problems are common among the wards of a hospital [4]. The patient, not the drug product, is the main focus of the pharmacist's decisions and actions. Creating practice standards for pharmacists reflecting the pharmacist's ability to detect, solve, and prevent patient-specific DRPs is straightforward. Pharmacist's functions would be arranged accordingly so that providing the essence around which to structure standards of practice. The patient itself and the patient's desired pharmacotherapeutic outcomes and the pharmacist's ability to reach these outcomes are associated with their focuses mentioned earlier [5]. Generally, DRP incorporates Adverse Drug Reactions (ADRs), Drug Errors (DE), and Drug Interactions (DI).

The World Health Organization (WHO) defines an adverse drug reaction (ADR) as "a reaction which is noxious and unintended, and which occurs in doses normally used in human for prophylaxis, diagnosis, or therapy of disease, or modifying the physiological functions" [6]. The American Society of Health-Systems Pharmacists (ASHP) provides guidelines and emphasizes the role of pharmacists in comprehensive ADR management [7]. The corresponding tips include risk minimization technique, for example, grasping the patient's opinion about drug therapy, training with the patient to comprehend the treatment benefits, and recognition and detection techniques such as understanding known ADRs, examining the pre-existing symptoms of the patient, investigating new clinical presentations as conceivable ADRs, observing wellbeing conditions, labs, or other factors revealing the symptoms, applying probability tools, e. g., the Naranjo adverse drug reaction probability scale or 4Ts for heparin-induced thrombocytopenia, to name a few [8]. The pharmacist and prescriber have to make sure patients are informed about the side effects and the appropriate treatments applied. Pharmacists, thanks to detailed knowledge of medicine, can relate unexpected symptoms experienced by patients to possible adverse effects of their drug therapy. The practice in clinical pharmacy needs to make sure that ADRs are minimized by avoiding drugs with potential side effects in susceptible patients. Thus, a pharmacist has an important role in the prevention, detection, and reporting of ADRs [9]. There are various scales to assess ADRs and establish a causal relationship between the adverse event and medication. These scales include the Naranjo ADR probability scale, WHO-Uppsala monitoring center causality categories, the severity of reported ADRs by Modified Hartwig, and the Siegel scale.

A drug interaction is a situation in which a substance (usually another drug) affects the activity of the other drug when both are

administered together [10]. Drug interactions can be classified into three broad categories, including drug-drug interaction, drug-food interaction, and drug-condition interactions, and they could be a major source of drug-related problems. The practice in clinical pharmacy ensures that drug interactions are minimized by avoiding drugs with potential side effects in susceptible patients.

A medication error is a preventable event that may cause inappropriate medication prescription or harm to the patient while the medication is in the control of the healthcare professional, patient, or consumer [11]. The pharmacist can contribute to reducing such errors through applying various strategies such as educating health care providers and patients, implementing medication reviews and reconciliation, using computerized systems, and prioritizing areas for quick wins [12].

Studies have revealed that pharmaceutical care interventions have the potential for reducing hospitalization and drug therapy problems [13]. The goal of the pharmacist is to provide pharmaceutical care, which is the direct, responsible provision of medication-related care to achieve definite outcomes that improve a patient's quality of life. Cardiovascular and pulmonary diseases are often accompanied by comorbidities and complications, so multiple drugs are prescribed in this condition; thus, these diseases more liable to be exposed to DRPs. Therefore, pharmacist interventions in this area are of great importance. So, given that the patients are exposed to DRPs, which affect their quality of life, the present study is conducted to determine the impact of pharmacy services in the identification and reporting of DRPs in the in-patient units of cardiology and pulmonary departments of a primary care hospital.

MATERIALS AND METHODS

A prospective, observational, and interventional study was conducted for the identification of DRPs, underlying causes, viable interventions, and their outcomes in a primary care hospital. The duration of the study was a period of six months between September 2018 and March 2019. Only patients admitted to two departments (pulmonary and cardiology) were included. A sample size of 169 patients with pulmonary/cardiac diseases was randomly selected. The study protocol was approved by the Institutional Ethics Committee before the commencement of the study (Protocol No: GCP/IEC-09/2018-2019). The details of patients' medication therapy were collected from medication charts provided in the nursing station. The pharmacist determined and categorized DRPs using the PCNE classification scheme for Drug-Related Problems V5.01. The DRPs identified by the pharmacist were reported and interventions made were subsequently documented.

The following tools were used to collect the data:

1. Patient data collection form

2. Suspected ADR identification and reporting form

3. ADR notification form (adverse drug reaction form)

4. DI Form (drug interaction form)

5. Medication error reports form

Recording and calculation of enlisted subject's data were done using Microsoft Excel and Prism GraphPad Software.

RESULTS

Cardiology department

65 out of 169 cases were cardiac patients. The maximum percentage of patients (43.07%) was in the age group of 50–60 y, and the dominant gender (67.69%) was male. The mean age was found to be 49.30±11.63. Distribution of comorbidities among the study population in the cardiology department showed that the most prevalent type of comorbidity was hypertension (35.38%), followed by hyperlipidemia (32.3%). The mean presence of comorbidity was found to be 1.55 per patient (table 1).

Pulmonary department

104 out of 169 cases were pulmonary patients. The maximum percentage of patients (31.73%) was in the age group of 50–60 y, and similar to the Cardiology department, the majority (59.61%) were male. The mean age was found to be 45.9±12.34. Distribution of comorbidities among the study population in the pulmonary department showed that the most prevalent type of comorbidity was hypertension (19.77%), followed by a viral infection (19.20%). The mean presence of comorbidity was found to be 1.70 per patient (table 1).

Table 1: Baseline characteristics

Parameter	Frequency (%)	
	Cardiology department (n=65)	Pulmonary department (n=104)
Age (years)		
10–20	2 (3.07)	3 (2.88)
20–30	3 (4.61)	9 (8.65)
30–40	6 (9.23)	18 (17.30)
40–50	17(26.1)	29 (27.88)
50–60	28 (43.07)	33(31.73)
60–70	9 (13.84)	11 (10.57)
Gender		
Male	44 (67.69)	62 (59.61)
Female	21 (32.30**)**	42 (40.38)
Comorbidity		
Hypertension (HTN)	23 (35.38)	28 (15.81)
Diabetes mellitus (DM)	15 (23.07)	33 (12.99)
Hyperlipidemia	21 (32.30)	35 (19.77)
Viral Infection	8 (12.53)	34 (19.20)
Bacterial Infection	14(21.53)	33 (18.64)
Other Comorbidities	17 (26.15)	24 (13.55)

A total of 169 prescriptions were collected from both cardiology and pulmonary departments among which 133 (79%) prescriptions were involved in DRPs (table 2).

Among drugs involved in drug-related problems, the most frequently involved drug was theophylline (21.95%), followed by antacids (19.51%) (table 3).

According to table 4, 180 drug-related problems were identified in the study. The major problems were drug-drug interactions (13.88%), followed by generic substitution (10%). The mean drug-related problem per patient was found to be 1.06.

A total of 196 interventions were made by the clinical pharmacists among which, 109 (55.61%) interventions were at the prescriber level, 56 (28.57%) interventions were at the drug level, 17 (8.67%) were at the patient level, and 14 (7.14%) were other interventions or activities (table 5).

Distribution based on the type and degree of acceptance of interventions showed that among 56 drug regimen change interventions proposed by the pharmacist, only 55.35% were accepted, while most of them 41 (73.21%) were in the formal note form. Out of 68 monitoring required interventions made by

the pharmacist, about 77.94% were accepted, whereas the majority of them were in the formal note form (83.82%). Among 17 cases that required counseling by the pharmacist in verbal, about 88.36% were accepted. Out of 41 cases that required communication between the pharmacists and other healthcare professionals, 85.36% of cases were accepted, and all 14 adverse drug reporting cases made in a formal note form, were accepted (table 6).

Table 2: Distribution of the number of prescriptions involved in DRP (n=169)

Prescriptions involved in DRP	Number of prescriptions (%)
Prescriptions with DRP	133 (79%)
Prescriptions without DRP	36 (21%)

Table 3: Distribution of most common drugs involved in drug-related problems (n=41)

Drugs	Frequency (%)
Antacids	8 (19.51)
Aspirin	4 (9.75)
Corticoids	7 (17.07)
Digoxin	4 (9.75)
Rifampin	3 (7.31)
Theophylline	9 (21.95)
Warfarin	6 (14.63)

Table 4: Distribution of drug-related problems that are identified and reported by the doctor of pharmacy in in-patient units of cardiology and pulmonary departments (n=180)

Types of drug-related problems	The total frequency of drug-related problems that are identified and reported by clinical pharmacist (%)
Adverse drug reaction	14 (7.77)
Drug-allergy interactions	14 (7.77)
Drug-disease contraindications	16 (8.88)
Drug-drug interactions	25 (13.88)
Generic substitution	18 (10.00)
Inappropriate duration of drug treatment	17 (9.44)
Incorrect drug dosage	12 (6.66)
Laboratory test omitted	12 (6.66)
Over and underutilization	17 (9.44)
Therapeutic duplication	10 (5.55)
Therapeutic inappropriateness	10 (5.55)
Untreated indication	15 (8.33)

Table 5: Distribution of level of interventions made by the pharmacist (n=196)

Intervention level	Frequency of activities (%)
At prescriber level	109 (55.61)
At patient level	17 (8.67)
At drug level	56 (28.57)
Other interventions or activity	14 (7.14)

Table 6: Distribution of types of pharmacist's clinical interventions and degree of acceptance

Intervention type	Method	Number of reports (%)	Acceptance	
			Yes (%)	No (%)
Drug regimen change (n=56)	Verbal	15 (26.78)	31 (55.35)	25 (44.64)
	Write a formal note	41 (73.21)		
Monitoring required (n=68)	Verbal	11 (16.17)	53 (77.94)	15 (22.38)
	Write a formal note	57 (83.82)		
Counseling required (n=17)	Verbal	17 (100)	15 (88.23)	2 (11.76)
Communication (n=41)	Verbal	41 (100)	35 (85.36)	6 (14.63)
Adverse drug reporting (n=14)	Write formal note	14 (100)	6 (100)	0 (0)

DISCUSSION

In the present study, 65 patients were admitted to the cardiology department, out of which the majority of patients (43.07%) were in the age group of 50–60 and, the mean age was found to be 49.30±11.63. The results are comparable to the observations from the study conducted by Javedh Shareef (2014) [14], which demonstrated that most of the study population was in the age group of 41–60 y. These findings may suggest that older patients are more exposed to the risk of developing cardiac diseases due to age progression and comorbidities.

Gender-wise classification of the study population in the cardiology department implied that out of 65 patients, 67.69% of cases were male, and the rest (32.30%) were female. In contrast, Ousman Abubeker Abdela *et al.* (2016) [15], showed that the majority of the study population were female (63%). This difference suggests that the risk of developing heart disease is not affected by gender and is more influenced by other risk factors.

Distribution of comorbidities among the study population in the cardiology department showed that the most prevalent type of comorbidity was hypertension (35.38%), and the mean presence of comorbidity was found to be 1.55 per patient. In a similar study conducted by Ousman Abubeker Abdela *et al.* (2016) [15], about (43.1%) patients were over five comorbidities (mean value 5.8±0.8). On the other hand, the mean value for the number of drugs per patient was found to be 5.1, while it was 3.5±1.5 in the study conducted by Ousman Abubeker Abdela *et al.* (2016) [15]. Hence, it can be inferred that the presence of comorbidities, the number of drugs prescribed per patient, and the development of drug-related problems among patients with cardiac diseases are correlated.

In the pulmonary department, 59.61% of patients were male while the remaining (40.38%) were female. Shreds of evidence from different studies indicate that gender influences the incidence, susceptibility, and severity of several lung diseases. Data from both human and animal studies suggest that sex hormones may contribute to disease pathogenesis or serve as protective factors, depending on the disease involved. Also, it is observed that men are more vulnerable to most lung diseases stemming from higher smoking rates in men [16].

Consideration of patients based on the reason for admission showed that most of the patients (31.73%) suffered from Chronic Obstructive Pulmonary Disease (COPD). Moreover, the mean age was found to be 45.9±12.34. Similar results were reported by Madhuragauri Shevade *et al.* (2015) [17]; indicating that the most common respiratory disease was COPD (29.6%), among patients with a mean age of 43.6±18.5 y. Accordingly, the prevalence of COPD disease among this age group is more than other ages, which can be due to the habits of smoking and tobacco chewing. The observations found from the present study indicate that the habit of smoking was more prevalent among 40-to 50-year-old patients (12.50%), so higher risk of COPD is expected among older patients.

A total of 169 prescriptions were collected from both cardiology and pulmonary departments among which, 133 (79%) prescriptions were involved in DRPs, and the mean drug-related problem per patient was found to be 1.06. Likewise, a mean number of 1.17±1.1 DRP per patient [15] and 2.6±1.8 DRPs per patient [18] were reported elsewhere. In both studies, the underlying risk factor was found to be polypharmacy. Similarly, the present study found polypharmacy, with a mean number of more than 5 drugs in each

department, which was the result of the presence of comorbid conditions.

Based on the distribution of drug-related problems that are identified and reported by the doctor of pharmacy in in-patient units of cardiology and pulmonary departments, the most prevalent DRPs found in respective departments are drug-drug interaction (13.88%), followed by generic substitution (10%), which is comparable to the results reported by Cecilia Peterson *et al.* (2017) [19], which shows that the most common DRPs were interactions. This is justified because multiple drug regimens (polypharmacy) were applied to patients because of suffering from multiple diseases.

Distribution based on type and degree of acceptance of interventions in the present study showed that most of the interventions made by the pharmacist at different levels were accepted. This is comparable to the findings in Qatar, which indicated that most of the interventions (53%) were accepted [20]. The results suggest that the pharmacy practice and its role in improving patient quality of life and applying appropriate medication have almost been accepted among health care professionals and patients.

CONCLUSION

The present study concludes that the clinical pharmacist's/doctor of pharmacy professional's timely interventions in the patient's drug therapy is required to prevent or minimize the occurrence and risk of DRP. Rational drug therapy and optimal medication safety can be achieved by clinical pharmacy services.

ACKNOWLEDGMENT

Nil

LIMITATIONS OF THE STUDY

The study period and sample size were limited. Also, results cannot be generalized as the study was single centered.

FUNDING

Nil

AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

REFERENCES

1. Ernst FR, Grizzle AJ. Drug-related morbidity and mortality: updating the cost-of-illness model. J Am Pharm Assoc 2001;41:192-9.
2. Molino Cde G, Carnevale RC, Rodrigues AT, Visacri MB, Moriel P, Mazzola PG. Impact of pharmacist interventions on drug-related problems and laboratory markers in outpatients with human immunodeficiency virus infection. Ther Clin Risk Manag 2014;10:631-9.
3. Marc A, Adrian M. Adverse drug reactions: types and treatment options. Am Fam Physician 2003;68:1781-91.
4. Sarfaraz Mohammed, Poudel S, Fernance Laloo, Arjun Madhur, Rinson Robert, Mathew B. Assessment of drug-related problems in a tertiary care teaching hospital, India. Asian J Pharm Clin Res 2020;10:310-3.
5. Strand LM, Morley PC, Cipolle RJ, Ramsey R, Lamsam GD. Drug-related problems: their structure and function. Drug Intell Clin Pharm 1990;24:1093-7.
6. Malahat AR, Latha CD, KS Baloju D, Vijayalakshmi G. Study to evaluate severe ADRs in a tertiary care teaching hospital. Int J Curr Pharm Sci 2017;9:55-8.
7. ASHP guidelines on adverse drug reaction monitoring and reporting. American Society of Hospital Pharmacy. Am J Health Syst Pharm 1995;52:417-9.
8. Karch FE, Lasagna L. Toward the operational identification of adverse drug reactions. Clin Pharmacol Ther 1977;21:247-54.
9. Ansari J. Drug interaction and pharmacist. J Young Pharm 2010;2:326-31.
10. Jith A, Kumar CT, Joy JS, P KS, R SK. A prospective study of drug-drug interactions and adverse drug reactions among stroke patients in a tertiary care hospital. Asian J Pharm Clin Res 2016;9:100-4.
11. Nikhithasri P, Ramya M, Kishore P. Assessment of medication errors in pediatric in-patient department of a private hospital. Int J Curr Pharm Sci 2017;9:70-5.
12. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. Am J Hosp Pharm 1990;47:533-43.
13. Akonoghrere Rita O, Arute John E, Akparobore Akpevwe. Impact of pharmaceutical care interventions on the quality of life of a group of hypertensive patients. UK J Pharm Biosci 2016;4:19-28.
14. Shareef J, Sandeep B, Shastry CS. Assessment of drug-related problems in patients with cardiovascular diseases in a tertiary care teaching hospital. J Pharm Care 2014;2:70-6.
15. Abdela OA, Bhagavathula AS, Getachew H, Kelifa Y. Risk factors for developing drug-related problems in patients with cardiovascular diseases attending Gondar University Hospital, Ethiopia. J Pharm Bioallied Sci 2016;8:289-95.
16. Carey MA, Card JW, Voltz JW. It's all about sex: gender, lung development, and lung disease. Trends Endocrinol Metab 2007;18:308-13.
17. Shevade Madhuragauri, Apte Komalkirti, Jadhav Sushma, Madas Sapna, Salvi Sundeep. What are the most common respiratory diseases encountered in clinical practice? Results of a pilot study in 737 Indian patients. Eur Respir J 2015;46:3864.
18. Niriayo Y, Kumela K, Kassa T, Angamo M. Drug therapy problems and contributing factors in the management of heart failure patients in Jimma University Specialized Hospital, Southwest Ethiopia. Plos One 2018;13:101-8.
19. Peterson C, Gustafsson M. Characterisation of drug-related problems and associated factors at a clinical pharmacist service-naïve hospital in Northern sweden. Drugs Real World Outcomes 2017;4:97-105.
20. Hooper R, Adam A, Kheir N. Pharmacist-documented interventions during the dispensing process in a primary health care facility in Qatar. Drug Healthc Patient Saf 2009;1:73-80.