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

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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 cardio 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 80.36% 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

INTRODUCTION

Drug therapy can improve the quality of life while treating and countering 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 experience, or must be likely to experience, disease or 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 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±11.65. 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          | 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              | 20 (32.3%)                   | 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)     |

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 y. These findings may suggest that older patients are more exposed to the risk of developing heart disease due to age progression and comorbidities.

Gender-wise classification of the study population in the cardiology department implied that out of 65 patients, 67.6% 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 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.

In the pulmonary department, 59.61% of patients were male while the remaining (40.39%) 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].

In the pulmonary department, 59.61% of patients were male while the remaining (40.39%) 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 5.1, while it was 3.5±1.1 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.
improving patient quality of life and applying appropriate
medication have almost been accepted among health care
professionals and patients.

The results suggest that the pharmacy practice and its role in
achieving by clinical pharmacy services.

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 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.

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

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AUTHORS CONTRIBUTIONS
All the authors have contributed equally.

CONFLICT OF INTERESTS
Declared none

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