Identification of drug-related problems and pharmacist's interventions in asthmatic patients at a private tertiary care facility-Pakistan

Aziz Ullah Khan, Iftikhar Ali, Roheena Zafar, Abdul Khalil[1]

Departments of Pharmacy Services, [1]Medicines and Allied, Northwest General Hospital and Research Center, Peshawar, Pakistan

Address for correspondence:
Dr. Aziz Ullah Khan,
Department of Pharmacy Services,
Northwest General Hospital and Research
Center, Sector A3, Phase V, Hayatabad,
Peshawar, Pakistan.
E-mail: azizkhanrph@gmail.com

ABSTRACT

Background: Drug-related problems (DRPs) potentially contribute to morbidity, mortality and financial indicators. There is increasing evidence that participation and interventions of clinical pharmacists in health care have a positive influence on clinical practice. **Objectives:** The main focus of this study was to identify DRPs, evaluate clinical pharmacy services and document pharmacist's interventions. **Materials and Methods:** A 3 months prospective observational study from October, 2014 to January, 2015 was carried out on 80 asthmatic patients admitted to pulmonology unit at Northwest general hospital and research center, Peshawar, Pakistan. The drug therapy details of the patients were collected from inpatient treatment charts using a predesigned questionnaire. The DRPs were identified, and clinical interventions made by pharmacists were documented. **Results:** A total of 37 patients (61.25%) presenting 91 DRPs were identified, including potential drug-drug interactions 39 (48.75%), drug selection 27 (33.75%), drug use process 12 (15%), drug monitoring 5 (6.25%), adverse drug reactions 5 (6.25%) and dosing 3 (3.75%). Clinical interventions documented by pharmacist were drug information response 21 (26.25%), patient education and counseling 14 (17.5%), change/clarify medication order 11 (13.5%), proper storage and cost effectiveness 10 (12.5%), medication error/brand duplication 7 (8.75%), change of drug/dosage 3 (3.75%), dose calculation in special population 3 (3.75%) and discharge plan 2 (2.5%). Of 91 interventions, the pharmacists contacted the consultants for 24 (30%) interventions, postgraduate medical officers/registrars 34 (42.5%), nursing staff 21 (26.25%) and the patients/attendant 12 (15%). 15 (18.75%) interventions were approved by concerned prescribers. **Conclusion:** To minimize the risks of DRPs and prevent their occurrence, drug therapy requires pharmacist's timely and effective interventions at all levels.

INTRODUCTION

Clinical pharmacy is an area of pharmacy concerned with the science and practice of rational medication use.

It is a health science discipline in which pharmacists provide patient care optimizing medication therapy and promoting health and disease prevention.[1] A drug-related problem (DRP) is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes.[2] DRPs include medication errors (involving an error in the process of prescribing, dispensing, or administering a drug, whether there are adverse consequences or not) and adverse drug reactions (any response to a drug which is noxious and unintended, and which occurs at doses normally used in humans for prophylaxis,

diagnosis or therapy of disease, or for the modification of physiological function).[3]

Drug-related problems are common in hospitalized patients and can interfere with the achievements of desired therapeutic outcomes.[4] These problems can potentially have an impact on desired health outcomes.[5] There is increasing evidence that participation and interventions of clinical pharmacists in health care have a positive influence on clinical practice.[6] In a number of studies, clinical pharmacists have shown to reduce DRPs in the inpatient settings. In one study, 277 clinical interventions were reported by pharmacists, with 332 DRPs identified and 91.8% recommendations made.[7] Another study reported that the incidence of DRPs was found to be much higher than quoted as an average in developed countries.[8] Some publications have evaluated the impact of drug errors identified or intercepted by emergency department pharmacist.[9-11] and inpatient medical and surgical ward.[12,13]

Over the last decades, pharmacists have seen their potential competencies broadened beyond the traditional dispensing role.[14] An intervention is defined as any action taken into account by a clinical pharmacist resulting in a change in patient's therapeutic management.[15] The effect of pharmacist-delivered services has been reported for asthma management previously.[16] The aim of this study is, therefore, to highlight the role of clinical pharmacy services on DRPs and assess drug therapy interventions by pharmacist in patients with asthma in a tertiary care facility.

MATERIALS AND METHODS

A prospective observational study was conducted for over a period of 3 months from October, 2014 to January, 2015 in medicines and allied ward (pulmonology unit) of Northwest General Hospital and research Centre Peshawar, Pakistan. Ethical clearance of the study was obtained from hospital's ethics committee so as to allow data collection. Patients of all ages with or without co-morbidities, admitted to the medical ward for asthma and ready to give consent were included only while those from Intensive care units and oncology were excluded. Identification of DRPs was assessed by reviewing and analyzing all medication orders, administration sheets, laboratory and diagnostic test results and pathophysiological status. The registration numbers of patients were noted in order to review the computerized file through the hospital management

information system software, interview the patients and retrieve the necessary information for the study.

A standard questionnaire was used in this study which constituted of:
- Patient's demographic characteristics, including age, sex, and medical history
- The drugs administered to the patient during the hospitalization period: Drug name, indication, dose, schedule, duration, and monitoring
- The type of DRPs and pharmacist's interventions; revived using Pharmaceutical Care Network Europe classification (DRP registration form V.6.2).

The patient's drug therapy was routinely monitored. The DRPs were identified, discussed, intervened and documented.

RESULTS

During the period of 3 months, a total of 80 cases of asthma patients were followed and assessed for DRPs. Of which 37 patients (46.5%) had DRPs. Total number of drugs received by patients was 513. Majority of the patients were seen with the age between 65 and 82 years (61.25%), out of which 52 (65%) were male and 28 (35%) female. The number of drugs in the prescriptions ranged from 3 to 9 with the mean value of 6.41. The demographic and clinical features of patients with asthma are vivid from Table 1.

In 80 cases, 91 DRPs were identified, including potential drug-drug interactions 39 (48.75%), followed by drug selection 27 (33.75%), drug use process 12 (15%), drug monitoring 5 (6.25%), adverse drug reaction 6 (6.25%) and dosing 3 (3.75%), as summarized in Table 2.

A total of 91 clinical interventions were documented by pharmacist; drug information response 21 (26.25%), patient education and counseling 14 (17.5%), clarify medication order 11 (13.75%), proper storage and cost-effectiveness 10 (12.5%), medication error/brand duplication 7 (8.75%), need for drug monitoring 5 (6.25%), change of drug/dosage 3 (3.75%), dose calculation in special population 3 (3.75%), discharge plan 2 (2.5%) and interventions approved by prescriber 15 (18.75%) as shown in table 3.

Of 91 interventions, the pharmacist contacted the prescribers for 24 (30%) interventions, postgraduate medical officers/registrars 34 (42.5%), nursing staff 21 (26.25%) and the patients/attendants 12 (15%).

Table 1: Demographic and clinical features of asthmatic patients (*n*=80)

Parameters	n (%)
Gender	
Male	52 (65)
Female	28 (35)
Age group (years)	
37-65	31 (38.75)
65-82	49 (61.25)
Number of drugs in prescription	
3 drugs	03 (3.75)
4 drugs	05 (6.25)
5 drugs	11 (13.75)
6 drugs	13 (16.25)
7 drugs	12 (15)
8 drugs	16 (20)
9 drugs	20 (25)
Total number of drugs prescribed	513 (mean 6.41)
Total number of patients with DRPs	37 (46.5)
Co-morbidities	
Hypertension	22 (27.5)
Diabetes	17 (21.25)
Chronic obstructive-pulmonary disease	13 (16.25)
Tuberculosis	07 (8.75)

DRPs= Drug-related problems

Table 2: DRPs identified in asthmatic patients (*n*=80)

Types and causes of DRPs	Frequency (*n*)	Percentage
Interactions		
Drug-drug interactions	39	48.75
Adverse drug reactions		
Allergic	1	6.25
Side effects	4	
Drug selection		
Inappropriate drug	7	33.75
No indication for drug	2	
Too many drugs for indication	4	
More cost effective drug available	14	
Drug use process		
Patients takes drug on wrong time	04	15
Wrong route of administration	08	
Dosing		
Over dosage	01	3.75
Sub-therapeutic dosage	02	
Monitoring		
Therapeutic drug monitoring	05	6.25
Total DRPs	91	

DRPs= Drug-related problems

DISCUSSIONS

Among 80 patients followed during the study period, 37 patients required pharmacist's interventions in their drug therapy. The remaining 43 patients had no DRPs. The incidence of DRPs was higher in patients aged between 65 and 82 years (61.25%). A high number of DRPs resulted from potential drug interactions (48.75%). A study conducted by Ismail *et al.* showed (45%) potential drug-drug interactions (pDDIs) at pulmonology ward in a tertiary care hospital at Peshawar, Pakistan.[17] This study showed that drug-drug interaction is a common drug therapy problem in both government and private hospitals. Micromedex® Drug interaction V. 1.52.3 by Truven Health Analytics Inc., 2012 was used for detecting pDDIs.

The second documented DRP after pDDIs was drug selection (33.75%), which comprised of cost effective alternative (17.5%), inappropriate drug selection (8.75%), too many drugs for an indication (5%) and no indication for drugs (2.5%). This was observed previously in a study in which drug use without indication accounted for highest.[18]

Avoidable adverse drug reactions are the serious consequences of inappropriate drug selection. In present study, adverse drug reactions accounted for (6.25%) DRPs accounted for drug use process was (15%), which included drug administered at inappropriate time and wrong rout of administration; that is, in current study, some patients took (Budesonide/Formoterol) Rota caps (special capsules that contain the medication in a very fine powder form that is effectively delivered into the lungs when inhaled through a special device named revolizer.) with water instead of using it with revolizer. This was due to lack of patient education and training of nursing staff.

Drug related problems accounted for drug monitoring was (6.25%), out of which narrow therapeutic drug 5 while 3.75% for dosing (over dosage 1, sub-therapeutic dosage 2). Drug information response accounted for 26.25%. The information was both telephonic and face to face. The percentage of intervention approved by prescriber and patient education and counseling was 17.5 each. 13.75% patients received clarification regarding medication order. The clarification or advice was regarding confusion about prescription reading, adequate time and rout of administration. The percentage of medication errors and the brand duplication was 8.75%. Either two drugs with same generic with or without same route of administration were prescribed.

Other recommendations made in present study were proper storage and cost-effectiveness (12.5%), drug monitoring (6.25%), change of drug/dosage and dose calculation in special population (3.75%) each and discharge plan (2.5%).

Table 3: Types of clinical interventions documented by a pharmacist (*n*=80)

Types of interventions	Frequency (*n*)	Percentage
Drug information response	21	26.25
Intervention approved by prescriber	15	18.75
Patient education and counseling	14	17.5
Clarify medication order	11	13.75
Proper storage and cost effectiveness	10	12.5
Medication error/brand duplication	7	8.75
Need for drug monitoring	5	6.25
Change of drug/dosage	3	3.75
Dose calculation in special population	3	3.75
Discharge plan	2	2.5

For interventions, the pharmacists mostly contacted the postgraduate medical officers/registrars (42.5%). The reason behind the pharmacists contacting the postgraduate trainees frequently was because of their availability at ward for most of the time. The percentage of the concerned prescribers being contacted for interventions was (30%). This may be due to their busy schedule in an outpatient department. This was, followed by nursing staff (26.25%). The patients/attendants being contacted for interventions were (15%). This data are almost consistent with the study carried out by Ganachari *et al.*[19]

The major findings in this study indicate the need of clinical pharmacy services to be implemented in wards so as to prevent DRPs, improve treatment outcomes and enhance patient's quality of life.

CONCLUSION

In conclusion, procedures for identification of, and intervention on, actual and potential DRPs, may contribute to diminishing drug-related morbidity and mortality. To avoid negative effects of drug treatment and need for additional medical care, drug treatment must be individualized with implementation of clinical pharmacy services in wards. This study suggests that clinical pharmacists can effectively identify and prevent clinically significant DRPs.

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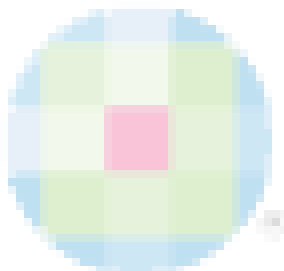
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