Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i2.4369

EVALUATION OF DRUG-RELATED PROBLEMS (DRPS) IN THERAPEUTIC REGIMENS AT DIFFERENT MEDICINE WARDS OF LIAQUAT UNIVERSITY HOSPITAL JAMSHORO

Sikander Munir Memon[1*], Bhawna Devi[2], Haris Samoo[3], Deepa hemnani[4], Syed Mubashir[5], Baby Bai[6], Maisam Ali[7]

[1*,6]Institute of Dentistry, Liaquat University of Medical & Health Sciences, LUMHS, Jamshoro, Pakistan
[2,3,5]College of Pharmacy, Liaquat University of Medical & Health Sciences, Jamshoro, Pakistan
[4,7]Liaquat University Hospital, Jamshoro, Pakistan

***Corresponding Author:** Sikander Munir Memon
*Assistant Professor, Department of community Dentistry, Liaquat University of Medical & Health Sciences, Jamshoro- Pakistan, drsikander.memon@lumhs.edu.pk

ABSTRACT

Introduction: Drug-related problems (DRPs) pose significant challenges in healthcare, often leading to ineffective medication use and adverse outcomes. This study aimed to assess the incidence and types of DRPs at a teaching hospital in Pakistan while evaluating the acceptance of pharmaceutical interventions by the medical team. Factors contributing to DRPs include polypharmacy, chronic diseases, and medication errors, with DRPs associated with increased morbidity, mortality, and healthcare costs.

Methodology: A cross-sectional study was conducted at Liaquat University Hospital, Jamshoro, Pakistan, between January and August 2023. Patients admitted for more than 24 hours were eligible, and DRPs were identified by trained clinical pharmacists using the PCNE V9.1 classification. Data sources included prescriptions, medical records, and lab tests. Pharmacist recommendations were documented, but due to limitations, interventions were not implemented.

Results: Out of 363 patients, 79.1% were found to have DRPs, with patient-related factors being the leading cause. Treatment effectiveness issues were the most common type of DRP, followed by safety concerns and other issues like unnecessary medication use. Causes of DRPs included inappropriate drug selection, dose selection, and dispensing errors. Medication reconciliation problems and lack of treatment outcome monitoring also contributed to DRPs.

Conclusion: Addressing systemic challenges is essential to enhance pharmacist roles in DRP management and ensure patient safety. Creating a supportive working environment for pharmacists is crucial for optimizing medication management and improving healthcare outcomes.

Keywords: Drug-Related Problems, Polypharmacy, Hospitalization, Clinical Pharmacy, Patient Safety, Medication Errors

INTRODUCTION

Drug-related problems (DRPs), defined as events that hinder desired treatment outcomes, are associated with ineffective medication use and can lead to serious consequences such as morbidity and mortality.[1] Various factors, including multiple chronic diseases, polypharmacy, allergies, and impaired kidney function, increase the risk of DRPs.[2] The prevalence of chronic diseases is on the rise, resulting in heightened medication utilization, particularly among hospitalized patients.[3] DRPs, encompassing medication errors and adverse drug events, are especially prevalent in this demographic, especially among older adults.[4]-[5]

DRPs are known to contribute to higher rates of morbidity, mortality, and healthcare costs by disrupting optimal treatment effects, including medication non-adherence.[6]-[7] Studies have shown that over 20% of emergency department visits involve medication-related issues[8], with DRPs contributing to hospital admissions at an average rate of 15.4%. Importantly, DRPs have been linked to death in up to 2.7% of hospitalized patients.[9]-[10]

This study aims to assess the incidence and types of DRPs at a general teaching hospital in Pakistan while also evaluating the acceptance of pharmaceutical interventions by the medical team. Building on previous research, we hypothesize that treatment ineffectiveness and cost will be the most common DRPs, with drug use processes and treatment duration being the primary contributing factors.[11] Additionally, we aim to measure the effectiveness of pharmaceutical interventions in addressing DRPs.

Prior studies have underscored the value of pharmacist collaboration in reducing DRPs through activities such as medication reconciliation and patient education.[12] Recognizing that pharmacist involvement is crucial for raising awareness of DRPs across diverse hospital settings, this study addresses limitations of prior research by employing a larger sample size and examining both DRPs and intervention acceptance. Furthermore, our findings will contribute to understanding the incidence, morbidity, and mortality associated with DRPs within the context of Pakistan.

Methodology

Setting and Participants: A cross-sectional study was conducted in Medicine Units I-IV at Liaquat University Hospital, Jamshoro, Pakistan, between January and August 2023. Ethical approval was obtained on December 28th, 2022. Patients admitted for more than 24 hours were eligible, excluding those with incomplete records, surgical/transplant/cancer treatment, or post-marketing surveillance drugs.

Data Collection: After obtaining informed consent, trained clinical pharmacists identified DRPs within patients' therapeutic regimens. Data sources included prescriptions, over-the-counter medications, supplements, administration sheets, lab tests, and medical records. The standardized PCNE V9.1 classification categorized DRPs based on potential issues in treatment effectiveness, safety, and other aspects. DRP causes were assessed for factors like drug selection, dose, form, duration, dispensing, use process, patient factors, and transfers. Evaluations were conducted using the BNF 84 and Micromedex references.

Intervention and Implementation: The research team documented DRP findings, including categorization, severity, and patient impact, and communicated them to the healthcare team. However, due to limitations in the healthcare system, pharmacist recommendations and interventions were not implemented. Consequently, the study could not assess intervention rates, types (no intervention, prescriber/patient/drug level), acceptance rates, or DRP resolution status.

RESULTS

Out of 363 patients admitted to the medicine wards with an average age of 45.92, a staggering 79.1% (287 patients) were found to have drug-related problems (DRPs), compared to only 20.9% (76 patients) without DRPs.

The study investigated various categories of potential or manifest problems related to treatment effectiveness, treatment safety, and other issues, with the results summarized in Table 1. Concerning treatment effectiveness, approximately 7.7% of cases reported no positive impact of drug treatment despite correct usage (P1.1), while 27.5% indicated that the effect of drug treatment was suboptimal (P1.2), and almost 29.8% highlighted untreated symptoms or indications despite ongoing treatment (P1.3). Regarding treatment safety, about 19% of cases reported adverse drug events, including possible occurrences of drug-drug interactions (P2.1). In terms of other issues, in 9.4% of cases, drug treatment was deemed unnecessary (P3.1), suggesting potential over-prescription or inappropriate use, while approximately 6.6% of cases presented with an unclear problem or complaint (P3.2), posing challenges in diagnosis or understanding the patient's condition. These findings underscore the importance of evaluating treatment effectiveness, safety, and potential issues to optimize patient care. Addressing these issues could lead to improved therapeutic outcomes and patient well-being, providing valuable insights for healthcare professionals to refine treatment strategies and enhance overall healthcare quality.

The table 2 illustrates various causes of Drug-Related Problems (DRPs) and their corresponding percentages within the examined population. Concerning drug selection, issues such as inappropriate drug choices according to guidelines/formulary (C1.1) were observed in 9.4% of cases, while 8.3% lacked indications for prescribed drugs (C1.2). Additionally, inappropriate combinations of drugs and other substances (C1.3) accounted for 13.5% of cases, with 3% showing inappropriate duplication of therapeutic groups or active ingredients (C1.4). Notably, instances of no or incomplete drug treatment despite existing indications (C1.5) were found in 11.6% of cases, and 14% of cases involved the prescription of too many different drugs or active ingredients (C1.6).

Regarding drug form, issues such as inappropriate drug formulations (C2.1) were noted in 3.3% of cases. Concerning dose selection, various problems were identified, including drug doses of single active ingredients being too high (C3.2) at 1.7%, dosage regimens not being frequent enough (C3.3) or being too frequent (C3.4) at 1.7% and 4.1% respectively, and dose timing instructions being wrong, unclear, or missing (C3.5) at 8.8%. Issues related to treatment duration were observed, with durations deemed too short (C4.1) noted in 8% of cases, durations deemed too long (C4.2) in 1.1% of cases, and durations being unclear in 0.6% of cases. These findings underscore the complexity of factors contributing to DRPs, ranging from issues with drug selection, formulation, and dosing to problems related to treatment duration. Addressing these issues is crucial for optimizing medication management and improving patient outcomes.

The table 03 delineates various causes of Drug-Related Problems (DRPs) and their corresponding percentages within the analyzed dataset. Under the category of dispensing, notable issues included prescribed medicines not being available (C5.1) at a rate of 19.8%, alongside instances of necessary information not being provided or incomplete advice being dispensed (C5.2) at 2.5%. Furthermore, occurrences of wrong drug, strength, or dosage being advised (C5.3) accounted for 1.4% of cases, with wrong drugs or strengths being dispensed (C5.4) noted in 0.6% of cases.

Concerning the drug use process, discrepancies were observed, such as inappropriate timing of administration or dosing intervals by healthcare professionals (C6.1) at 1.7%, and instances of drugs being under-administered (C6.2) or over-administered (C6.3) by healthcare professionals at rates of 3.3% and 2.5% respectively. Additionally, instances where drugs were not administered at all by healthcare professionals (C6.4) were observed in 8.8% of cases, with wrong drugs being administered

(C6.5) noted in 0.3% of cases. Patient-related factors also contributed significantly to DRPs, with occurrences such as patients intentionally using or taking less medication than prescribed, or not taking medication at all (C7.1) observed in 6.3% of cases. Moreover, patients deciding to take unnecessary medication (C7.4) accounted for 1.4% of cases, while instances of patients unintentionally administering or using drugs incorrectly (C7.8) were noted in 0.3% of cases. Physical inability to use medication as directed (C7.9) was observed in 0.6% of cases, and difficulties in understanding medication instructions (C7.10) were reported in 6.3% of cases. Patient transfer-related issues were also identified, with medication reconciliation problems (C8.1) observed in 1.7% of cases. Miscellaneous causes not fitting into predefined categories (C9.1) were noted in 4.7% of cases, with other specified causes (C9.2) reported in 0.6% of cases. These findings underscore the multifaceted nature of DRPs, encompassing issues related to dispensing, the drug use process, patient-related factors, patient transfers, and other miscellaneous causes. Addressing these issues is crucial for optimizing medication management and enhancing patient outcomes.

Table 1: Categories of Potential or Manifest Problems Related to Treatment Effectiveness, Treatment Safety, and Other Issues

Code	Category of potential or manifest problem	n (%)
TREATMENT EFFECTIVENESS		
P1.1	No effect of drug treatment despite correct use	28(7.7%)
P1.2	Effect of drug treatment not optimal	100(27.5%)
P1.3	Untreated Symptoms or Indication	108(29.8%)
TREATMENT SAFETY		
P2.1	Adverse drug event (Possibly) occurring (drug-drug interaction0	69(19%)
OTHER		
P3.1	Unnecessary drug-treatment	34(9.4%)
P3.2	Unclear Problem/complaint	24(6.6%)

Table 02: The causes of drug-related problems (DRPS) including drug selection, drug form, dose selection and treatment duration

Code	DRP CAUSES	n (%)
DRUG SELECTION		
C1.1	Inappropriate drug according to guidelines/formulary	34(9.4%)
C1.2	No indication for drug	30(8.3%)
C1.3	Inappropriate combination of drugs and drugs or herbal medications or drugs and dietary supplements	49(13.5%)
C1.4	Inappropriate duplication of therapeutic group or active ingredients	11(3%)
C1.5	No or incomplete drug treatment in spite of existing indication	42(11.6%)
C1.6	Too many different drug/active ingredients prescribed for indication	51(14%)
DRUG FORM		
C2.1	Inappropriate drug form/formulation (for this patient)	12(3.3%)
DOSE SELECTION		
C3.2	Drug dose of single active ingredient too high	6(1.7%)
C3.3	Dosage regimen not too frequent enough	6(1.7%)
C3.4	Dosage regimen too frequent enough	15(4.1%)
C3.5	Dose timing instructions wrong, unclear, or missing	32(8.8%)
TREATMENT DURATION		
C4.1	Duration of treatment too short	29(8%)
C4.2	Duration of treatment too long	4(1.1%)
	Duration unclear	2(0.6%)

Table 03: the causes of drug-related problems (DRPS) including dispensing, drug use process, patient related, and patient transfer related and other.

Code	DRP CAUSES	n (%)
DISPENSING		
C5.1	Prescribed medicines not available	72(19.8%)
C5.2	Necessary information not provided or incomplete advice provided	9(2.5%)
C5.3	Wrong drug, Strength or dosage advised	5(1.4%)
C5.4	Wrong drug or strength dispensed	2(0.6%)
DRUG USE PROCESS		
C6.1	Inappropriate timing of administration or dosing interval by a health professional	6(1.7%)
C6.2	Drug under-administrated by a health professional	12(3.3%)
C6.3	Drug over-administrated by a health professional	9(2.5%)
C6.4	Drug not administrated at all by health professional	32(8.8%)
C6.5	Wrong drug administrated by a health professional	1(0.3%)
PATIENT RELATED		
C7.1	Patient intentionally use/takes less drug than prescribed or does not take the drug at all for whatever reason.	23(6.3%)
C7.4	Patient decides to take unnecessary drug	5(1.4%)
C7.8	Patient unintentionally administer/uses the drug in a wrong way	1(0.3%)
C7.9	Patient physically unable to use drug/form as directed	2(0.6%)
C7.10	Patient unable to understand instructions properly	23(6.3%)
PATIENT TRANSFER RELATED		
C8.1	Medication reconciliation problem	6(1.7%)
OTHER		
C9.1	No or inappropriate outcome monitoring	17(4.7%)
C9.2	Other cause- specify	2(0.6%)

DISCUSSION

The findings of this study highlight the prevalence of Drug-Related Problems (DRPs) within the Medicine wards at Liaquat University Hospital, Jamshoro, with clinical pharmacists detecting DRPs in 79.1% of patients' medication profiles. These findings provide significant insights into the occurrence of DRPs and their underlying causes. The Pharmaceutical Care Network Europe (PCNE) characterizes DRPs as situations or occurrences related to medication therapy that hinder or have the potential to hinder desired health outcomes.[13]

The average treatment effectiveness score for patients is 2.92, indicating a moderate level of therapeutic regimen effectiveness. Similarly, the mean score for treatment safety is 2.57, suggesting the presence of significant but not major safety issues. In the context of unnecessary drug treatment and unclear diagnoses, the mean score is 2.7, implying that some patients may receive medications they do not require, and there may be challenges in comprehending or precisely identifying their health issues. Comparable findings were reported in a study conducted in Ankara, Turkey, which identified non-optimal effects of drug treatment (44.8%) and untreated indications (32.8%) as the most common problems in therapeutic regimens.[14]

Several factors contribute to these DRPs. Patient-related problems have the highest average score at 10.02, followed by wrong drug processes at 6.36, dose selection at 5.68, and drug selection at 4.82. A survey conducted at the Teaching Hospital of Zaria identified drug selection (28.1%) and dose selection (29%) as major causes of DRPs.[15] This study adhered to the PCNE classification version 9.1 and identified prescribing too many different drugs or active ingredients for a single indication (14%) and inappropriate combinations of drugs and supplements (13.5%) as major factors contributing to drug selection-related DRPs. Additionally, wrong, unclear, or missing dose timing instructions (8.8%) were identified as a major contributor to dose selection-related DRPs.

Dispensing emerged as a significant factor, with the unavailability of prescribed medicines (19.8%) being a notable issue contributing to DRPs. The recent study also investigated the drug use process,

highlighting two key elements contributing to this issue: no drug administration (8.8%) and under-drug administration by healthcare professionals (3.3%). Medication reconciliation problems were identified as a cause of DRPs in 1.7% of patients. Additionally, 4.7% of patients encountered DRPs due to the absence or inappropriate monitoring of treatment outcomes. A distinct group of patients, constituting 0.6% of the total sample, experienced DRPs unrelated to those previously mentioned, underscoring the complexity of healthcare problems contributing to DRPs.

These findings offer valuable insights into the evaluation of DRPs and their root causes within the healthcare setting. The study was meticulously designed with a considerable sample size, demonstrating a strong commitment to thoroughly evaluating this crucial element of pharmaceutical care. Although the research aimed to determine the acceptance rate of interventions to tackle these problems, it encountered limitations in measuring intervention acceptance rates due to unfavorable working conditions for pharmacists in the healthcare setting. This limitation underscores systematic challenges within the healthcare system that hinder the effective implementation of pharmacist interventions. Addressing these challenges is essential to ensure patient care and safety, emphasizing the importance of creating a supportive working atmosphere for pharmacists in healthcare settings.

CONCLUSION

Although our study aimed to evaluate both Drug-Related Problems (DRPs) and intervention acceptance rates, the inability to measure the latter due to insufficient working conditions for pharmacists underscores the urgent need for systematic improvements in healthcare settings. The absence of a conducive environment not only hampers pharmacists' ability to identify and address DRPs effectively but also limits their capacity to communicate efficiently with other healthcare professionals. Recognizing and addressing these challenges are essential steps toward enhancing the roles of pharmacists in patient care and ensuring the effective use of medications.

Acknowledgment: The authors wish to acknowledge Dr. Taufique, Clinical Pharmacist, for his valuable assistance in collecting data from the medicine wards at Liaquat University of Medical & Health Sciences, LUMHS.

Conflict of Interest Statement: The author declares no conflict of interest.

Ethics Statement: Before conducting the study, all subjects provided their informed consent to participate. The research protocol was reviewed and approved by the Research Ethics Committee of LUMHS, Jamshoro (LUM/REC/-91, dated 09-05-2022).

REFERENCES

1. Hämmerlein A, Griese N, Schulz M. Medication safety: survey of drug-related problems identified by community pharmacies. Ann Pharmacother. 2007;41(11):1825–32.
2. Garin N, Sole N, Lucas B, Matas L, Moras D, Rodrigo-Troyano A, et al. Drug related problems in clinical practice: a cross-sectional study on their prevalence, risk factors and associated pharmaceutical interventions. Sci Rep. 2021;11(1):883.
3. Silva C, Ramalho C, Luz I, Monteiro J, Fresco P. Drug-related problems in institutionalized, polymedicated elderly patients: opportunities for pharmacist intervention. Int J Clin Pharm. 2015;37(2):327–34.
4. Meyer-Massetti C, Meier CR, Guglielmo BJ. The scope of drug-related problems in the home care setting. Int J Clin Pharm. 2018;40(2):325–34.
5. Pfister B, Jonsson J, Gustafsson M. Drug-related problems and medication reviews among old people with dementia. BMC Pharmacol Toxicol. 2017;18(1):52.
6. Watanabe JH, McInnis T, Hirsch JD. Cost of Prescription Drug–Related Morbidity and Mortality. Ann Pharmacother. 2018 Mar;52(9):829–37.
7. Abunahlah N, Elawaisi A, Velibeyoglu FM, Sancar M. Drug related problems identified by

clinical pharmacist at the Internal Medicine Ward in Turkey. Int J Clin Pharm. 2018;40(2):360–7.
8. Baena MI, Faus MJ, Fajardo PC, Luque FM, Sierra F, Martinez-Olmos J, et al. Medicine-related problems resulting in emergency department visits. Eur J Clin Pharmacol. 2006;62(5):387–93.
9. Hafner Jr JW, Belknap SM, Squillante MD, Bucheit KA. Adverse drug events in emergency department patients. Ann Emerg Med. 2002;39(3):258–67.
10. Ayalew MB, Tegegn HG, Abdela OA. Drug related hospital admissions; a systematic review of the recent literatures. Bull Emerg Trauma. 2019;7(4):339.
11. Saldanha V, Martins RR, Lima SIVC, de Araujo IB, Oliveira AG. Incidence, types and acceptability of pharmaceutical interventions about drug related problems in a general hospital: an open prospective cohort. BMJ Open. 2020;10(4):e035848.
12. Paisansirikul A, Ketprayoon A, Ittiwattanakul W, Petchlorlian A. Prevalence and Associated Factors of Drug-Related Problems Among Older People: A Cross-Sectional Study at King Chulalongkorn Memorial Hospital in Bangkok. Drugs - Real World Outcomes. 2021;8(1):73–84.
13. PCNE. Analisis Drug Related Problems (DRPs) pada Hipertensi tanpa Komplikasi terhadap Pasien Rawat Jalan di Rumah Sakit Umum Kabupaten Tangerang Periode Januari 2012- Juni 2012. Farmagazine [Internet]. 2020;1(2):22–8. Available from: http://www.pcne.org/upload/files/15_PCNE_classification_V4-00.pdf
14. KARA E, İNKAYA AÇ, AYDIN HAKLI D, DEMİRKAN SK, ÜNAL S. Polypharmacy and drug-related problems among people living with HIV/AIDS: a single center experience. TURKISH J Med Sci [Internet]. 2019 Jan 17; Available from: https://journals.tubitak.gov.tr/medical/vol49/iss1/33
15. Mustapha S, Mohammed M, Mustapha L, Yunusa I, Basgut B. A survey on drug related problems in cervical cancer patients receiving chemotherapy in Ahmadu Bello University Teaching Hospital Zaria. Bayero J Pure Appl Sci [Internet]. 2018 Jan 24;10(1):489. Available from: https://www.ajol.info/index.php/bajopas/article/view/165666