



## AWARENESS AND KNOWLEDGE OF PHARMACISTS IN SAUDI ARABIA ABOUT MEDICATION ERRORS AND PATIENTS' SAFETY: A SYSTEMATIC REVIEW

Fayez Mohammad Asiri<sup>1\*</sup>, Ohud Farhan B Alanazi<sup>2</sup>, Zayed Abdullah Aseri<sup>1</sup>, Abdulaziz Abdulhadi Alshehri<sup>1</sup>, Adel Ibrahim Assiri<sup>3</sup>

### Abstract

**Objectives:** to investigate the role and knowledge of pharmacists toward medication errors (MEs) and patients' safety in Saudi Arabia. **Methods:** We conducted a thorough search of PubMed, SCOPUS, Web of Science, and Science Direct to find pertinent literature. Rayyan QRCI was utilized during the entire process. **Results:** We included ten studies and all of them were cross-sectional studies. Studies reported that MEs are common among clinical pharmacists, including errors in prescriptions were observed in the inpatient pharmacy services of the teaching hospital, they also understood the significance of reporting MEs and how doing so could enhance the standard of healthcare delivery. Additionally, community pharmacists are not well-versed in informing pregnant patients about the safety of prescription drugs. The prevalence of drug-related problems appears to be reduced by pharmacist interventions, highlighting the significance of an ideal pharmaceutical care plan for clinical care settings. **Conclusion:** The majority of MEs documented in the included publications included prescribing, which includes choosing improper drugs and doing so at the incorrect dosage. Reducing medication mistakes in children is mostly dependent on pharmacist interventions. The implementation of a ward-based pharmacist or a pharmacist-led medication safety program is one of these strategies, along with instructional sessions and the review and validation of drug orders.

**Keywords:** Community pharmacists; Clinical pharmacists; Medication errors; Patient safety; Saudi Arabia; Systematic review.

<sup>1</sup>\*Pharmacy Technician, Medical Store, Abha Maternity And Children Hospital, Abha, Saudi Arabia

<sup>2</sup>Technician Pharmacist, Compliance Management, Ministry Of Health, Arar, Saudi Arabia

<sup>3</sup>Pharmacy Technician, Duty Management, Abha Maternity And Children Hospital, Abha, Saudi Arabia

**\*Corresponding Author:** Fayez Mohammad Asiri

\*Pharmacy Technician, Medical Store, Abha Maternity And Children Hospital, Abha, Saudi Arabia

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## Introduction

Given the prevalence of adverse occurrences in health services, patient safety is one of the primary obstacles to quality of care. Medical errors are the third most common cause of death in the US, accounting for about 250,000 deaths annually [1]. According to a Norwegian study, the incidence of major adverse outcomes is seven times higher for hospitalized patients who pass away [2].

These days, one of the primary concerns is patient safety because, in many situations, health professionals are also responsible for patient care in addition to system malfunctions, subpar organizational procedures, and inadequate management. Since various studies suggest that human errors in communication, cooperation, and psychological well-being among health professionals also contribute to patient safety failures, it is necessary to provide these professionals with improved training in order to help them change their behaviors [3, 4].

A number of reports, including those released by the World Health Organization (WHO) [5], have attempted to persuade medical professionals that reporting adverse drug reactions (ADRs) is their ethical and professional duty, while also bringing attention to the scope of the drug safety issue. The ultimate objective is to decrease drug-related morbidity and death by identifying drug safety issues in patients early on and by enhancing medication selection and judicious usage. The WHO predicts that the situation regarding ADRs in emerging and transitional nations will worsen. There is currently relatively little data on ADRs in these regions. Several factors contribute to this issue, including a lack of appropriate drug laws and regulations in some nations, insufficient funding, and a lack of ADR reporting [5].

Furthermore, community pharmacists are in the greatest position to report suspected ADRs because the success of a nationwide post-marketing surveillance program directly depends on the active participation of all health providers. Since they have a direct bearing on medication administration and counseling, these ADRs can really be seen in their routine patient care [6-8]. "The science and activities relating to the detection, assessment, understanding, and prevention of adverse effects or any other drug-related problem" is the definition of pharmacovigilance. based on the WHO [9] Studies have shown that while pharmacists are generally supportive of pharmacovigilance, they are not very experienced in reporting ADRs. Inadequate understanding of the idea of pharmacovigilance and a lack of awareness and culture surrounding the screening, detection, investigation, and reporting of

ADRs may be the causes of subpar reporting [10]. The purpose of this study was to use systematic review techniques to investigate the role and knowledge of pharmacists toward MEs and patients' safety in Saudi Arabia.

## Methodology

### Study Design and Duration

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards were followed in the conduct of this systematic review [11]. February 2024 marked the start of this systematic review.

### Search strategy

PubMed, SCOPUS, Web of Science, and Science Direct were the four main databases that were thoroughly searched in order to locate pertinent literature. We looked through exclusively English databases, taking into consideration each one's particular needs. We transformed the following keywords to PubMed Mesh terms in order to locate the pertinent studies; "Medication errors," "Patient safety," "Pharmacists," and "Saudi Arabia." "OR," "AND," and "NOT," three Boolean operators, matched the necessary keywords. Full-text English publications, freely accessible articles, and human trials were among the search results.

### Selection criteria

We considered the following criteria for inclusion in this review:

- Studies that summarized to investigate the role and knowledge of pharmacists toward MEs and patients' safety.
- Only licensed pharmacists (not students).
- Studies conducted in Saudi Arabia.
- Only human subjects.
- English language.
- Free accessible articles.

### Data extraction

Two verifications of the search method's output were conducted using Rayyan (QCRI) [12]. By applying inclusion/exclusion criteria to the aggregated search results, the researchers evaluated the relevance of the titles and abstracts. Every paper that met the inclusion requirements was thoroughly scrutinized by the reviewers. The authors talked about methods for resolving disputes. A pre-made data extraction form was used to upload the approved study. The authors extracted data about the study titles, authors, study year, city, participants, gender, objectives, and main outcomes. A separate sheet was created for the risk of bias assessment.

### Strategy for data synthesis

By assembling summary tables with information from relevant studies, a qualitative assessment of the research's findings and components was given. After gathering the data for the systematic review, the most efficient way to use the information from the included study articles was chosen.

### Risk of bias assessment

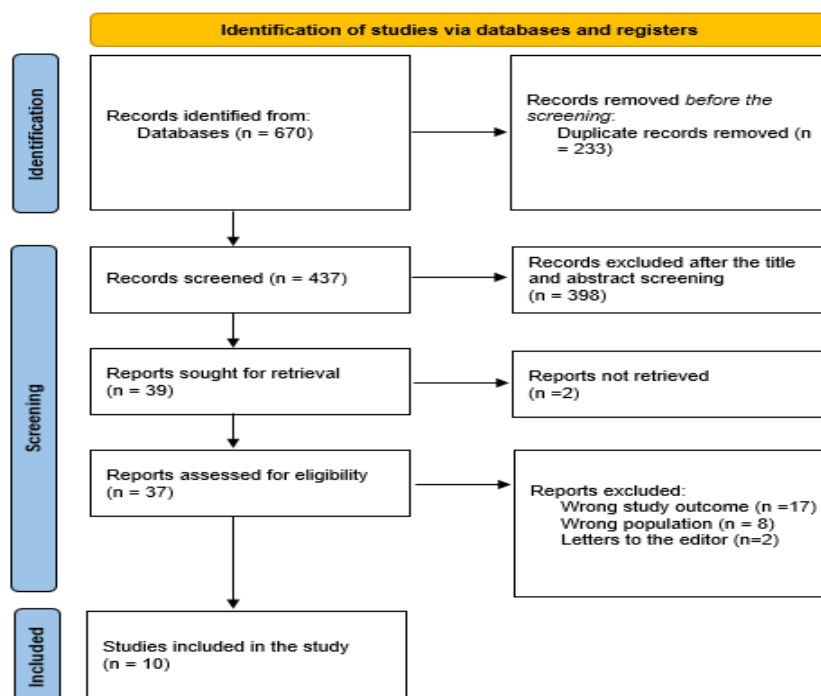
Using the ROBINS-I risk of bias assessment technique for non-randomized trials of treatments, the quality of the included studies was evaluated [13]. The seven examined themes included confounding, study participant selection, intervention classification, deviation from planned

interventions, incomplete data, outcome evaluation, and choice of reported result.

### Results

#### Search results

The systematic search produced 670 study articles in total, of which 233 duplicates were eliminated. After 437 studies had their titles and abstracts screened, 398 were not included. After 39 reports were requested to be retrieved, two articles were found. After screening 37 studies for full-text assessment, 17 were rejected due to incorrect study results, 8 were rejected due to incorrect population type, and 2 articles were editor's letters. This systematic review included ten eligible study articles. A synopsis of the procedure for choosing studies is provided in **Figure 1**.



**Figure (1):** Study selection is summed up in a PRISMA flowchart.

### Characteristics of the included studies

**Table (1)** presents the sociodemographic characteristics of the included study articles. Our results included ten studies and all of them were cross-sectional studies [17]. Four studies were conducted in Riyadh [14, 16, 20, 21], two in Jeddah [18, 23], one in Najran [15], one in Jazan [17], one in Taif [19], and one in The Southern region [22]. **Table (2)** presents the clinical characteristics. Studies reported that MEs are common among clinical pharmacists, including errors in prescriptions were observed in the inpatient pharmacy services of the teaching hospital [14, 15], they also understood the significance of reporting MEs and how doing so could enhance the standard of healthcare delivery [22, 23]. Additionally,

community pharmacists are not well-versed in informing pregnant patients about the safety of prescription drugs [15, 16]. **Al-Mutairi et al.** reported that pharmacists had poor knowledge and understanding regarding the identification, evaluation, comprehension, and mitigation of side effects or any other issue relating to medication [20], but **Mobrad et al.** reported that they are well-educated in identifying drug misuse or dependence during their pharmacy college study, enabling them to offer suitable guidance to individuals who may be abusing drugs [21]. The prevalence of drug-related problems appears to be reduced by pharmacist interventions, highlighting the significance of an ideal pharmaceutical care plan for clinical care settings [17-19].

**Table (1): Sociodemographic characteristics of the included participants.**

Study	Study design	City	Participants	Mean age	Gender (Males)
Al-Dhawaliie, 2011 [14]	Cross-sectional	Riyadh	NM	NM	NM
Alshabi, 2020 [15]	Cross-sectional	Najran	80	50% ranged from 22-35 years	NM
Alrabiah et al., 2017 [16]	Cross-sectional	Riyadh	256	25-55	116 (45.3%)
Babelghaith et al., 2020 [17]	Cross-sectional	Jazan	369	NM	NM
Aljabri et al., 2021 [18]	Cross-sectional	Jeddah	NM	NM	NM
Althomali et al., 2022 [19]	Cross-sectional	Taif	NM	NM	NM
Al-Mutairi et al., 2021 [20]	Cross-sectional	Riyadh	289	21 to >40	88 (30.4)
Mobrad et al., 2020 [21]	Cross-sectional	Riyadh	239	24 to >51	239 (100%)
Al Hamid, 2024 [22]	Cross-sectional	The Southern region	91	21 to >60	72 (82.4%)
Alfahmi et al., 2023 [23]	Cross-sectional	Jeddah	157	NM	NM

\*NM=Not-mentioned

**Table (2): Clinical characteristics and outcomes of the included studies.**

Study	Objectives	Main outcomes	ROBIN-I
Al-Dhawaliie, 2011 [14]	To determine how frequently hospitalized patients receive prescription errors and to assess the clinical effect of a pharmacist's intervention on the identification of these errors	Errors in prescriptions were observed in the inpatient pharmacy services of the teaching hospital. The most common errors in the study were incorrect medication strength and incorrect drug administration frequency, accounting for 35% and 23% of the total errors, respectively.	High
Alshabi, 2020 [15]	To evaluate community pharmacists' understanding of the safety of medications throughout lactation and pregnancy.	The majority of participants overestimated the risk associated with using medications during pregnancy and breastfeeding and lacked sufficient understanding about drug usage during pregnancy.	Moderate
Alrabiah et al., 2017 [16]	To assess community pharmacists' understanding of the safety of medications during pregnancy.	Community pharmacists are not well-versed in informing pregnant patients about the safety of prescription drugs. Most found that certain medications, such as statins and accutane, have teratogenic potential and should not be used during the first trimester. Additionally, they accurately identified	High

		medications that are most frequently provided to expectant mothers as safe to use, such as acetaminophen and amoxicillin.	
<b>Babelghaith et al., 2020 [17]</b>	To investigate the prevalence of drug-related issues in various inpatient units and the reaction of the medical staff to the actions taken by the pharmacist to resolve drug-related issues.	The prevalence of drug-related problems appears to be reduced by pharmacist interventions, highlighting the significance of an ideal pharmaceutical care plan for clinical care settings.	Moderate
<b>Aljabri et al., 2021 [18]</b>	To outline the state of pharmacy departments today and the roles that pharmacists play in terms of being prepared for emergencies	Hospitals agreed that pharmacists should maintain effective distribution and control, work together on medication management, and continue to develop and maintain first-aid abilities, notwithstanding differences on their roles during disasters.	Moderate
<b>Althomali et al., 2022 [19]</b>	To evaluate how clinical pharmacists' clinical interventions affected the intensive care unit's dosage schedule and expenses.	This 6-month retrospective study demonstrates how clinical pharmacist interventions and prescription reviews affected clinical outcomes, leading to fewer hospital days. Clinical pharmacists prevented medication-related problems, which was a key factor in optimizing drug therapy. Drug expenditures for patients and the hospital may be reduced when a clinical pharmacist works in the intensive care unit. This service is very efficient since it allows for large financial savings for the public health through the prevention of pharmaceutical errors and therapeutic optimization through pharmacist analysis and prescription validation.	Moderate
<b>Al-Mutairi et al., 2021 [20]</b>	To evaluate hospital pharmacists' perceptions, attitudes, and understanding of medication safety with relation to pharmacovigilance and ADRs at a variety of tertiary care facilities throughout Saudi Arabia.	This study revealed a lack of expertise among practicing pharmacists in the areas of pharmacovigilance and ADR reporting. Pharmacists who were assessed showed a favorable attitude and excellent practices regarding reporting ADRs and pharmacovigilance. The most common reasons given for not reporting ADRs were time constraints, lack of knowledge regarding the necessity of reporting ADRs, and missing or unavailable information about ADRs.	Moderate
<b>Mobrad et al., 2020 [21]</b>	To evaluate the pharmacists at a community pharmacy's knowledge, attitudes, and beliefs on drug usage and misuse	Most community pharmacists were educated in identifying drug misuse or dependence during their pharmacy college study, enabling them to offer suitable guidance to individuals who may be abusing drugs. Furthermore, the majority of them stated that they advised or cautioned patients of the possibility of ADRs to particular medications. Nonetheless, the majority of community pharmacists concurred that it is unethical to offer prohibited substances in a community pharmacy.	Moderate
<b>Al Hamid, 2024 [22]</b>	To look into Saudi pharmacists' attitudes and opinions about reporting MEs.	The results demonstrated that the majority of pharmacists understood the significance of reporting MEs and how doing so could enhance the standard of healthcare delivery. Nonetheless, pharmacists expressed a great deal of worry about obstacles to reporting. These obstacles to reporting included the establishment of standard operating procedures for ME reporting, inadequate protocols, and the placing of blame on patients or medical personnel.	Moderate
<b>Alfahmi et al., 2023 [23]</b>	To evaluate pharmacists' attitudes and knowledge about the possible health effects of PIM use on older persons and the advantages of avoiding or switching to an appropriate alternative	Of the pharmacists, 44.6% claimed to have sufficient information regarding possibly unsuitable prescriptions, with 10.8% of them having knowledge of such medications. The study's findings demonstrated how important it is for the healthcare sector to use a standardized PIM tool.	Low

## Discussion

Studies in this review reported that MEs are common among clinical pharmacists, including errors in prescriptions were observed in the inpatient pharmacy services of the teaching hospital [14, 15], they also understood the significance of reporting MEs and how doing so could enhance the standard of healthcare delivery [22, 23]. Positive effects were noted, primarily decreases in DRPs and increases in adherence, notwithstanding the community pharmacists' contributions to medication review initiatives. There was a dearth of direct clinical evidence as well as proof of the therapies' economic effects. **Gillian et al.** reported that the screened literature demonstrated how pharmaceutical errors have significantly decreased in quantity while identification and awareness of medication errors have increased. According to these results, pharmacists play a critical role in healthcare policy aimed at preventing prescription errors and promoting patient safety.

In this review, **Al-Mutairi et al.** reported that pharmacists had poor knowledge and understanding regarding the identification, evaluation, comprehension, and mitigation of side effects or any other issue relating to medication [20], but **Mobrad et al.** reported that they are well-educated in identifying drug misuse or dependence during their pharmacy college study, enabling them to offer suitable guidance to individuals who may be abusing drugs [21]. The greatest contributions from community pharmacists were found in compliance and concordance evaluations, wherein these professionals engaged patients by conducting interviews to determine DRPs and provide medication advice. Community pharmacists can assume greater responsibility for patient care than they presently do, according to these results and contributions. Improving information exchange between community pharmacists and other healthcare providers—for example, through electronic health records, assuming community pharmacists had access to them—could make their involvement easier. The medication reviews that produced the most significant results were those that resulted in improved adherence and prescription modifications that decreased actual or anticipated drug-related issues. Changes in the quantity of medications that patients took, as well as the acceptance of pharmacist recommendations by general practitioners, have received a great deal of attention. These are all illustrative results and general measures of how well a drug therapy is working. If there is no assessment performed (e.g., for possibly harmful medicines and combining medicines) or untreated diseases, the number of medications in use does not always indicate how sensible the pharmaceutical regimen is [25, 26].

We found that the prevalence of drug-related problems appears to be reduced by pharmacist interventions, highlighting the significance of an ideal pharmaceutical care plan for clinical care settings [17-19]. **Kallio et al.** reported that the community pharmacist's contributions to the interventions ranged from delivering the dispensing history to other health care professionals to accessing medical histories, conducting interviews with patients, carrying out medication reviews, consulting with the GP or case-conferencing the findings, discussing the results with the patient, and monitoring the execution of the medication changes. The interventions ranged in comprehensiveness from prescription reviews to clinical medication reviews. Positive effects were noted, primarily decreases in DRPs and increases in adherence, notwithstanding the community pharmacists' contributions to medication review initiatives. There was a dearth of direct clinical evidence as well as proof of the therapies' economic effects [27].

The evaluation of pharmacist interventions' impact on medication mistakes in outpatient settings ought to be the main objective of future research. This will make it possible to understand the role that pharmacists play in society better and will help the healthcare system pinpoint the places and situations that need more focus and advancements.

This systematic study used a thorough search technique that encompassed all major potential scientific databases. To make sure that all pertinent papers were found, the reference lists of the included articles were also examined. Two or three researchers participated in the selection procedure in order to prevent selection bias.

## Conclusion

The majority of MEs documented in the included publications included prescribing, which includes choosing improper drugs and doing so at the incorrect dosage. Reducing medication mistakes in children is mostly dependent on pharmacist interventions. The implementation of a ward-based pharmacist or a pharmacist-led medication safety program is one of these strategies, along with instructional sessions and the review and validation of drug orders.

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