Role of Pharmacists in Detecting Medication Errors in Saudi Arabia: A Systematic Review

Mohammed Ahmed Al-Anzi [1], Hamed Wadi D Alenezi [2], Ibrahim Muqbil W Alanazi [3], Khalid Mohammed Alanazi [4], Mohammed Moteeb Kh Alenezi [5], Naif Suwailem Salem Alanazi[6], Hani Mowaness W Alrawili [7], Khamis Ayed Albishri Alhazmi [8], Mohammad Abduallah Hoymel Alrowili [9], Adel Fraih H Alanazi [10]

1. Consultant Family Medicine, Maternity and Children Hospital, Arar, Saudi Arabia. Email: Malanazi152@moh.gov.sa
2. Pharmacist Assistant, Irada and Mental Health Complex, Arar, Saudi Arabia. Email: hwalenazi@moh.gov.sa
3. General Practitioner, Maternity & Pediatric Hospital of Arar, Saudi Arabia. Email: Ibrahim.enizi@gmail.com
4. Pharmacist Assistant, Maternity and Children's Hospital, Arar, Saudi Arabia. Email: kalanazi40@moh.gov.sa
5. Male Pharmacist Assistant, Maternity and Children's Hospital, Arar, Saudi Arabia. Email: malenazi28@moh.gov.sa
6. Pharmacist Assistant, Irada and Mental Health Complex, Arar, Saudi Arabia. Email: nasoalanazi@moh.gov.sa
7. Senior Pharmacist (Poisons), Irada and Mental Health Complex, Arar, Saudi Arabia. Email: hamoalrawili@moh.gov.sa
8. Pharmacist Assistant, Irada and Mental Health Complex, Arar, Saudi Arabia. Email: khamisaa@moh.gov.sa
9. Male Pharmacist Assistant, Irada and Mental Health Complex, Arar, Saudi Arabia. Email: moaalrowili@moh.gov.sa
10. Pharmacist, Forensic Medical Services Center, Saudi Arabia. Email: adfalanazi@moh.gov.sa

Abstract

Objectives: To study the pharmacists' contributions to medication error (ME) prevention in Saudi Arabia **Methods:** To locate research that met the inclusion criteria, a thorough computerized search of relevant databases was carried out. A comprehensive search was carried out on PubMed, SCOPUS, Science Direct, Cochrane Library, and Web of Science to locate relevant material.

Results: Our data included seven trials with 83,705 MEs. MEs reported by pharmacists varied across studies, with rates ranging from approximately 54% to over 96%. The majority of errors reported were related to prescribing and dispensing, with pharmacists consistently identifying more errors compared to other healthcare professionals. Key challenges included poor communication between pharmacists and physicians, which contributed to the occurrence of MEs. The review also highlighted the lack of reporting by other healthcare providers, underscoring the need for a more collaborative approach to reducing MEs.

Conclusion: Pharmacists play a critical role in improving medication safety, but there are gaps in research and practice. While they have proven to be effective in reducing errors, more work is needed to encourage other healthcare professionals to take a more active role in reporting and preventing these errors. Future studies should focus on prospective designs, improving inter-professional communication, and exploring the role of pharmacists in non-hospital settings.

Keywords: *Pharmacists; Medication errors; Error prevention; Prescribing errors; Dispensing errors; Clinical pharmacists; Saudi Arabia; Systematic review.*

Introduction

MEs, which refer to preventable mistakes in prescribing, dispensing, or administering drugs, are a major issue in healthcare today. These errors can lead to serious consequences, ranging from adverse drug reactions to increased hospital stays, and in extreme cases, even death [1]. They occur at various stages of the medication process, whether it's during the initial prescription by a doctor, the pharmacist's dispensation, or when the patient actually takes the medication [2]. Causes of MEs are often linked to miscommunication among healthcare providers, lack of attention to drug interactions, and incorrect interpretation of prescriptions [3].

Pharmacists play a critical role in identifying and preventing these errors. They are not only responsible for ensuring that the right medications are dispensed but also for educating both patients and healthcare teams on proper drug use [4]. Numerous studies have demonstrated that pharmacists are instrumental in reducing the number of MEs, ultimately leading to better patient outcomes [5]. Around the world, pharmacists are increasingly integrated into healthcare teams, working closely with physicians, nurses, and other staff to catch potential MEs before they reach patients [6].

In Saudi Arabia, the healthcare landscape has been evolving rapidly over the past few decades. As part of these changes, the role of pharmacists has expanded significantly. Traditionally, pharmacists focused primarily on dispensing medications, but now they are becoming more involved in direct patient care, medication management, and collaboration with other healthcare professionals [7]. This shift reflects broader global trends but also highlights the growing recognition of pharmacists as key players in ensuring medication safety in the Kingdom [8].

Studies conducted in Saudi Arabia have underscored the significant impact that pharmacists can have on preventing MEs, particularly in hospital settings [9]. Research shows that the majority of these errors occur during the prescribing and dispensing stages, making pharmacists a crucial line of defense [10]. In particular, clinical pharmacists in Saudi hospitals have been effective in detecting prescription errors, reviewing patients' medication histories, and identifying dangerous drug interactions [11]. Additionally, programs led by pharmacists that focus on medication review and use clinical decision-support tools have proven successful in reducing errors in both outpatient and inpatient settings [12].

With the importance of medication safety growing, it's essential to explore just how much pharmacists in Saudi Arabia contribute to detecting and preventing MEs. This review pulls together findings from existing studies, looking specifically at the types of errors pharmacists can detect, where they are most effective, and the challenges they face in doing so. By synthesizing this evidence, we aim to study the pharmacists' contributions to MEs prevention in Saudi Arabia, while also identifying areas where further research and policy work are needed.

Methods

We implemented this systematic review in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [13] criteria. An online search was conducted on PubMed, Web of Science, SCOPUS, Cochrane Library, and Science Direct in order to locate studies in the English language on the role of Saudi pharmacists in MEs detection. Relevant keywords were used in the search method in these instances. Several reviewers combed through the search results, selected pertinent papers, gathered information, and applied the proper evaluation techniques in order to appraise the included study's quality. Through independent material extraction, rigorous evaluation of the included research's quality using established assessment techniques and data extraction, these reviewers guaranteed that reliable studies and data were selected for further examination and summary in this systematic review.

Eligibility Criteria

Inclusion criteria:

1. Studies that reported the prevalence of MEs detection by pharmacists.
2. Studies that focused specifically on pharmacists.
3. Studies conducted in Saudi Arabia
4. Research that is printed in publications with peer review.
5. Studies available in the English language.

Exclusion criteria:

1. Studies that did not focus on the role of Saudi pharmacists in MEs detection.
2. Studies not conducted in the determined geographic region (i.e. Saudi Arabia).
3. Nursing students.
4. Qualitative studies.
5. Studies not available in the English language.
6. Reviews, case reports, editorials, and opinion pieces.

Data Extraction

Rayyan (QCRI) was utilized to confirm the accuracy of the search results [14]. The inclusion and exclusion criteria were applied to ascertain the relevance of the titles and abstracts of the search results. The study team thoroughly reviewed all papers that satisfied the inclusion criteria. Consensus was employed to resolve disputes. Using a standard data extraction form, important study data were recorded, including study titles, authors, year of publication, city, participant demographics, data collection tool, the prevalence of MEs detection by pharmacists, and main outcomes. To investigate the probability of bias, a neutral evaluation instrument was developed.

Strategy for Data Synthesis

The features and research findings descriptions that were generated with data from relevant studies allowed for a qualitative review. The optimal approach to ensure the exploitation of the data from the included studies was determined after the data collection for the systematic review was finished.

Risk of Bias Assessment

The critical assessment criteria developed by the Joanna Briggs Institute (JBI) [15] for studies reporting prevalence data will be applied to evaluate the quality of the research included in this analysis. Nine questions make up this tool, and the answers are ranked as (1) positive, (0 being the lowest score), uncertain, or irrelevant. For studies with total ratings below 4, between 5 and 7, and above 8, there will be three categories: poor, moderate, and excellent quality. Researchers will independently evaluate the studies they undertake, and disagreements in the assessments will be settled through constructive communication in order to guarantee agreement and accuracy in the quality assessment process.

Results

Systematic search outcomes

A comprehensive search turned up 406 study papers after 256 duplicates were discarded. 116 manuscripts were rejected after 150 studies' titles and abstracts were examined. Two articles were not located out of the 34 reports that were required. 5 papers had an inappropriate study setting, 2 were editor's letters, and 11 were rejected due to incorrect study results. Of the 34 articles that made it through the full-text screening process, 7 were rejected due to incorrect population types. The seven research publications that make up this systematic review meet the eligibility criteria. The method used to choose the literature is shown in a diagram in **Figure 1.**

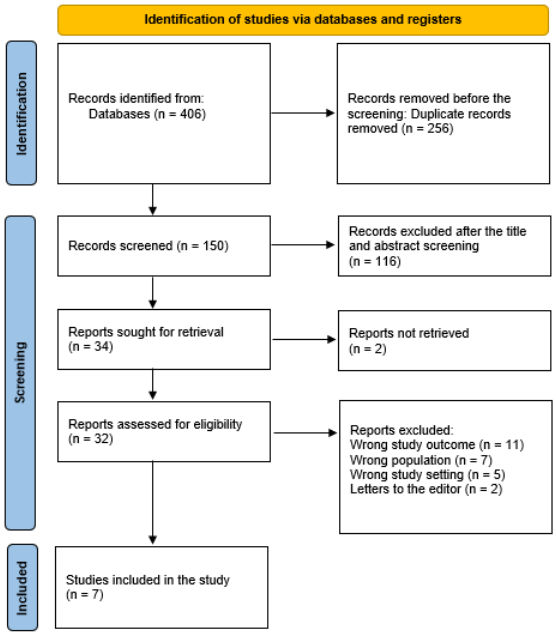

Figure 1: A PRISMA diagram is used to summarize the study decisions.

Sociodemographics and clinical parameters of the comprised participants and studies

Table 1 displays the sociodemographic information from the research articles. Our data included seven trials with 83,705 MEs. All of the included studies were in cross-sectional design [16-22]. Five studies were conducted in Riyadh [17, 18, 19, 21, 22], one in Al Ahsa [16], and one in Hail [20]. The earliest study was conducted in 2020 [22] and the latest in 2024 [16, 17].

Three studies used self-administrated data [16, 17, 20], and four studies used data retrospectively retrieved from medical reports [18, 19, 21, 22]. The percentage of MEs reported by pharmacists varied across studies, with rates ranging from approximately 54% [21] to over 96% [20]. In several instances, pharmacists were found to report more MEs compared to other healthcare professionals, such as physicians and nurses. The data also indicated that prescribing errors were the most frequently reported type of error, particularly those related to incorrect medication prescriptions.

Moreover, some studies highlighted communication barriers between healthcare professionals, particularly between pharmacists and doctors, as a key factor contributing to the occurrence of MEs. In instances where pharmacists were involved, there was a higher likelihood of identifying errors related to medication dispensing, transcription, and administration. Studies focusing on the use of self-administered questionnaires indicated that pharmacists' vigilance played a crucial role in identifying prescribing and transcribing errors, potentially preventing harm to patients. Furthermore, it was observed that clinical pharmacists were more likely to report MEs, especially in settings with higher numbers of patient interactions, underscoring their role in enhancing patient safety.

Table (1): Clinical parameters and outcomes of the comprised research.

Study ID	Study design	City	Number of MEs	Data collection tool	MEs reported by pharmacists (%)	Main outcomes	JBI
Al Hamid et al., 2024 [16]	Cross-sectional	Al Ahsa	91	Self-administrated questionnaire	52 (57.1%)	The current study's conclusions emphasized the necessity of a reporting system and the role that reporting plays in enhancing health care services. A significant obstacle to reporting MEs was poor communication across healthcare personnel (such as between pharmacists and doctors).	Moderate
AlAmri et al., 2024 [17]	Cross-sectional	Riyadh	1165	Self-administrated questionnaire	695 (59.6%)	Given that pharmacists reported the majority of MEs, there is a chance that pharmacists will record more prescribing errors than dispensing errors, which might lead to a higher percentage of errors being attributed to physicians.	Moderate
Alzaagi et al., 2023 [18]	Cross-sectional	Riyadh	43	Retrospectively retrieved	33 (76.7%)	The most frequent kind of pharmaceutical error was taking the incorrect prescription, indicating a critical area for improvement and intervention. Compared to other healthcare providers, pharmacists were more likely to report prescription errors, which emphasizes the significance of their involvement in enhancing pilgrims' medication safety.	Moderate
Alshammari et al.,	Cross-sectional	Riyadh	71,332	Retrospectively retrieved	54,169 (75.9%)	Despite the Ministry of Health's ongoing efforts, the low reporting rate of pharmaceutical errors remains a significant problem, as evidenced by the fact that	Low

2022 [19]						pharmacists identify and report the majority of errors.	
Alshammari et al., 2021 [20]	Cross-sectional	Hail	980	Self-administrated questionnaire	139 (96.5%)	This study reveals a deficiency in reporting MEs in Saudi Arabia, in addition to inadequate teaching and training about pharmaceutical errors. To prevent putting patients in danger, these are significant problems that ought to have been resolved earlier.	Moderate
Egunsola et al., 2021 [21]	Cross-sectional	Riyadh	9123	Retrospectively retrieved	4924 (54%)	More MEs were reported by pharmacists than by any other medical professional. Errors occur at every level of treatment, from the physician to the patient, and the majority of them happen during transcribing. The three most frequent medications that caused MEs were salbutamol, amoxicillin, and paracetamol.	Moderate
Al-Dossari et al., 2020 [22]	Cross-sectional	Riyadh	971	Retrospectively retrieved	733 (75.5%)	The majority of errors (92.2%) were made by nurses, whereas the majority of MAEs (75.5%) were reported by clinical pharmacists.	High

Discussion

The findings from this review highlight the critical role pharmacists play in detecting and preventing MEs in healthcare settings across Saudi Arabia. The review shows that pharmacists are responsible for identifying a significant portion of MEs, often more so than other healthcare professionals like physicians or nurses. Pharmacists' ability to detect MEs, particularly those related to prescribing and dispensing, underscores their importance in the overall medication management process and patient safety [1-3].

The high rates of pharmacist-reported MEs, with some studies reporting detection rates of over 96%, reflect their vigilance and the pivotal role they play in ensuring the safe use of medications. These findings align with global studies that highlight the importance of integrating pharmacists into multidisciplinary healthcare teams to reduce the incidence of MEs [23]. Furthermore, the data from these studies underscore the need for improved communication among healthcare providers, especially between pharmacists and physicians. Poor communication was identified as a significant obstacle in reducing MEs, emphasizing the need for better inter-professional collaboration [16-22].

Pharmacists in Saudi Arabia are increasingly taking on more clinical roles, such as medication therapy management and patient education, which allows them to play a direct role in preventing MEs [24]. This review supports the need for continued expansion of pharmacists' roles in Saudi healthcare systems to maximize their contribution to patient safety. However, despite these advancements, several challenges remain, particularly in relation to the limited reporting of MEs by other healthcare professionals. Pharmacists continue to be the primary reporters of MEs, suggesting that additional efforts are required to encourage active reporting by physicians and nurses.

The included studies also emphasized the importance of ongoing training for pharmacists to maintain their role in reducing MEs. In certain settings, particularly in hospitals, pharmacists were identified as the key healthcare providers responsible for detecting MEs at a higher rate than other professionals. The findings suggest that

pharmacists' proactive involvement in the medication management process is vital for ensuring medication safety and reducing preventable errors in healthcare institutions across Saudi Arabia.

The findings of this review have important takeaways for healthcare providers across Saudi Arabia. The active involvement of pharmacists in reducing MEs is clear, and hospitals and clinics should continue to promote their integration into care teams, especially in high-risk areas like intensive care units (ICUs) and emergency departments. Investment in ongoing training for pharmacists is crucial, so they stay up to date with the latest in medication safety and technology. Giving pharmacists access to tools like clinical decision support systems could further reduce MEs. Creating a culture that encourages all healthcare professionals—not just pharmacists—to report errors without fear of blame is another key takeaway

Limitations

While this review sheds light on the critical role of pharmacists in preventing MEs, it does have a few limitations. Most of the studies reviewed were either cross-sectional or retrospective, which makes it difficult to establish a clear cause-and-effect relationship between pharmacists' involvement and a reduction in errors. Additionally, much of the data came from self-reported surveys, which could introduce biases, such as underreporting or recall errors. Also, since the review focuses only on studies conducted in Saudi Arabia, the results may not be entirely applicable to other countries or regions. Another limitation is that many of the studies were based in hospital settings, leaving a gap in understanding pharmacists' roles in community pharmacies or primary care clinics.

A significant limitation is the lack of similar literature from other regions or countries to directly compare our findings. While global research supports the critical role of pharmacists in reducing MEs, there is limited specific data from similar Middle Eastern or Gulf countries. This lack of comparable studies makes it difficult to contextualize our findings on a broader scale and highlights the need for more research in this area.

Conclusion

This review highlights that pharmacists play a crucial role in detecting and preventing MEs in healthcare settings across Saudi Arabia. The high rates of errors reported by pharmacists underscore the need to further expand their roles in patient care and medication management. While they have proven to be effective in reducing errors, more work is needed to encourage other healthcare professionals to take a more active role in reporting and preventing these errors. By addressing these challenges and continuing to improve pharmacist training, as well as adopting new technologies, Saudi Arabia can move closer to ensuring safer medication practices and better patient outcomes.

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