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Medication Reconciliation and Review Among Pharmacists in Kirkuk Province Iraq a Kap Study

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Abstract: Medication reconciliation and review are essential processes to ensure medication safety, particularly during transitions of care. Despite their proven effectiveness in reducing adverse drug events, variability in implementation persists across healthcare settings. To assess pharmacists' knowledge, attitudes, practices, and perceived barriers regarding medication reconciliation and review in various healthcare institutions. A cross-sectional survey was conducted among 155 pharmacists working in different healthcare sectors. The questionnaire included demographic data, knowledge-based multiple-choice questions, attitudinal Likert-scale items, and frequency-based practice assessments. Descriptive statistics, medians, and interquartile ranges (IQR) were calculated, and findings were compared with current literature. Participants demonstrated strong positive attitudes toward medication reconciliation and review, with all attitudinal statements yielding a median response of "Strongly Agree" (score = 5; IQR = 2). However, knowledge scores varied; only 44.5% correctly identified the primary purpose of medication reconciliation, and just 29.6% recognized the essential procedural steps. While 54.2% reported always performing reconciliation, the median practice score for medication review was lower (score = 3), indicating inconsistent implementation. Furthermore, 41.3% of participants experienced two concurrent barriers, with time constraints and lack of interprofessional collaboration frequently cited. Although pharmacists generally value medication reconciliation and review, significant gaps in procedural knowledge and consistency of practice remain. Targeted educational interventions, workflow integration, and institutional support are necessary to strengthen the effective implementation of these safety-critical processes.

Introduction

Medication reconciliation and review is a critical process in healthcare, essential for preventing medication errors and ensuring patient safety during hospital staying and transitions between different health care services. The World Health Organization (WHO) defines medication reconciliation as the process of creating the most accurate list possible of all medications a patient is taking and comparing that list against the physician's orders to provide correct medications at all transition points within the hospital. (1) . While the medication review defines by the Pharmaceutical Care Network Europe (PCNE) as a "structured evaluation of patient's medicines with the aim of optimizing medicines uses and improving health outcomes. This entails detecting drug related problems and recommending interventions." (2). Those two process aims to identify and resolve discrepancies, thereby preventing adverse drug events (ADEs) which are common yet preventable causes of harm in patients.

Pharmacists, as medication experts, play a pivotal role in the medication reconciliation and review processes. Their involvement in these processes has been shown to significantly reduce

medication discrepancies and improve patient outcomes. Pharmacists possess the necessary skills and knowledge to effectively review patients' medication regimens, identify potential drug interactions, and educate patients about their medications (3). However, the success of medication reconciliation initiatives depends largely on the pharmacists' knowledge, attitudes, and practices (KAP) regarding this process (4).

Medication reviews are essential in healthcare, particularly for patients with complex medication regimens. They help identify and rectify medication errors, such as prescribing mistakes, dispensing issues, and administration faults, which are significant contributors to patient morbidity and mortality worldwide. A systematic review highlighted that pharmacist-led medication reconciliation effectively reduces prescribing errors in acute medical and surgical settings (5).

Beyond error prevention, medication reviews ensure that each prescribed drug is appropriate for the patient's current clinical condition, thereby enhancing therapeutic outcomes and minimizing adverse effects. This process is particularly crucial for elderly patients managing multiple chronic conditions, as they are at a higher risk for adverse drug reactions and drug interactions. Regular medication reviews facilitate the optimization of pharmacotherapy, ensuring that medications align with the patient's evolving health status and treatment goals (6).

This is the first study to evaluate the knowledge, attitudes, and practices (KAP) of pharmacists in Kirkuk to ward medication review and reconciliation.

Materials and methods

A cross-sectional study was conducted among pharmacist in Kirkuk province Iraq. The questionnaire was developed after reviewing articles papers with AI assistants (paid version of ChatGPT), consisting four sections demographics characteristics, knowledge, attitudes and practice, each sections contains four or five choices questions based on topics related to the sections.

Independent pharmacy students who were not involved in the research, collected data and obtained verbal consent to ensure compliance with ethical standards. Before participating in the study, participants were informed about the purpose and benefits of the study. They had the opportunity to ask any questions they may have. Verbal consent was obtained from each participant to confirm their voluntary participation.

The statistical software for the social sciences (SPSS) version 26 (7) was used for coding and analysis, the data was double-checked to minimize data entry errors. To examine the data for normality, the Kolmogorov-Smirnov test was applied. The respondents' socio-demographic data and items of knowledge, attitudes, and practice of medication review and reconciliation services provided by pharmacists were all calculated using frequencies and percentages. We applied the Chi-square test to compare the pharmacists' responses to items of their knowledge and practice of medication review and reconciliation services to their socio-demographic variables.

Result

A total of the 155 pharmacists who participated in this survey, 35.5% (55) were women, 64.5% (100) were men, 43.9% (68) were over 30 years old, and 56.1% (87) were between 20-30 years of age. 76% of the participants had 5-10 years of experience, while 20% (31) have experience between 0-20 and only 3.2% (5) have experience more than 20 years in the fields of pharmacy at different health care institutes. Moreover, 40.6% (63) among participant pharmacist working as clinical pharmacist, while 38.7%(60) having a job of pharmacy manger. Regarding the type of health care institutes, 5.8% (9) working in teaching hospital, and 39.3%(61) in community hospital, while 35.5%(55). As shown in table 1.

Table-1: Demographic characteristics of Pharmacists

Variables		N(%)
age	20-30	87 (56.1)
	>30	68 (43.9)
sex	Male	100(64.5)
	female	55(35.5)
Years of Experience	5-10 years	119(76.8)
	10-20	31(20)
	>20	5(3.2)
Current Position	Clinical Pharmacist	63(40.6)
	Pharmacy Manager	60(38.7)
	Other	32(20.6)
Type of Institution	Teaching Hospital	9(5.8)
	Community Hospital	61(39.3)
	Health care centers	55(35.5)
	Other	30(19.4)

Assessment of participants' knowledge regarding medication reconciliation and review revealed **mixed levels of understanding**, with correct response rates varying significantly across the three items. For Statement 6, which addressed the **primary purpose** of medication reconciliation and review, only **44.5%** of respondents answered correctly, while **55.5%** provided incorrect responses, suggesting a notable gap in conceptual clarity. In contrast, **58.1%** correctly identified a true statement regarding reconciliation and review practices in Statement 7, indicating a relatively better grasp of procedural knowledge. However, the lowest performance was observed in Statement 8, where only **29.6%** correctly identified the **essential steps** of the reconciliation process, and **70.4%** responded incorrectly. These findings suggest that while general awareness of the importance and nature of medication reconciliation may be present, there is a **significant deficiency in detailed procedural knowledge**, particularly regarding the structured steps involved. This highlights the **need for targeted educational interventions** to improve comprehensive understanding and practical application among healthcare professionals. As revealed in table 2.

Table-2: Knowledge assessment.

Statement	Correct N(%)	Incorrect N(%)
6. What is the primary purpose of medication reconciliation and review?	69 (44.5)	86 (55.5)
7. Which of the following statements is true regarding medication reconciliation and review?	90 (58.1)	65 (41.9)
8. What are the essential steps in the medication reconciliation and review process?	46 (29.6)	109 (70.4)

Analysis of participants' perceptions toward medication reconciliation and review revealed strong overall agreement on their importance and implementation. For all three attitudinal statements, the median response was "Strongly Agree" (score = 5), indicating a high level of consensus among respondents. The interquartile range (IQR) for each statement was 2, showing that the middle 50% of responses ranged between "Neutral" and "Strongly Agree." Specifically, participants strongly agreed that medication reconciliation and review are essential for patient safety, that they feel confident in conducting these processes, and that such practices should involve collaboration among multiple healthcare professionals. While the median scores highlight widespread support, the IQR values suggest some variability in opinions—particularly the presence of neutral or less confident respondents—indicating a potential need for targeted

training or institutional support to ensure uniform confidence and engagement across all staff members. As demonstrated in table 3.

Table-3: Attitude assessment.

Statement		Response, n(%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Median (IQR)
9. I believe that medication reconciliation and review are essential for patient safety.	95(61.3)	12(7.7)	22(14.2)	15(9.7)	11(7.1)	5(2)
10. I feel confident in my ability to conduct comprehensive medication reconciliation and review.	86(55.5)	23(14.8)	21(13.5)	14(9.0)	11(7.1)	5(2)
11. Medication reconciliation and review should be a collaborative effort involving multiple healthcare professionals.	90(58.1)	22(14.2)	14(9.0)	16(10.3)	13(8.4)	5(2)

The frequency of medication reconciliation and review practices among participants was assessed using a 5-point Likert scale. For Statement 12, over half of respondents (**54.2%**) reported **always** performing medication reconciliation, with an additional **18.7%** indicating they did so **often**. The median response was **5 (Always)** with an **interquartile range (IQR) of 2**, suggesting a high level of engagement in reconciliation activities, albeit with some variability in consistency across respondents. In contrast, for Statement 13 regarding the frequency of conducting medication reviews, **54.8%** reported doing so **always**, while the remaining responses were more dispersed across lower frequency categories. The median score for this item was **3 (Sometimes)** with an IQR of 2, indicating greater variability and a lower central tendency compared to medication reconciliation. These findings highlight that while a majority of participants consistently engage in medication reconciliation, **medication reviews are performed less frequently and with greater inconsistency**, suggesting a potential area for improvement in clinical practice and workflow integration. As shown in table 4.

Table-4: Practice assessment.

service	Response, n(%)					Median (IQR)
	Always	Often	Sometimes	Rarely	Never	
12. How often do you perform medication reconciliation?	84 (54.2)	29 (18.7)	32 (20.6)	5 (3.2)	5 (3.2)	5(2)
13. How often do you conduct medication reviews for patients?	85 (54.8)	26 (16.8)	23 (14.8)	15 (9.7)	6 (3.9)	3(2)

Analysis of the barriers encountered in performing medication reviews revealed that most respondents faced multiple challenges, with varying levels of complexity. Among the participants, 64 individuals (41.3%) reported experiencing two concurrent barriers, representing the most common category. This was followed by 53 respondents (34.2%) who reported facing a single barrier, while 27 (17.4%) and 11 (7.1%) participants indicated experiencing three and four barriers, respectively. The distribution suggests that a majority of healthcare professionals face more than one barrier, which may cumulatively hinder the implementation of effective medication review practices. These findings emphasize the importance of identifying and addressing overlapping challenges—such as time constraints, lack of training, or interprofessional communication gaps—to enable consistent and comprehensive medication review services. As demonstrated in fig 1.

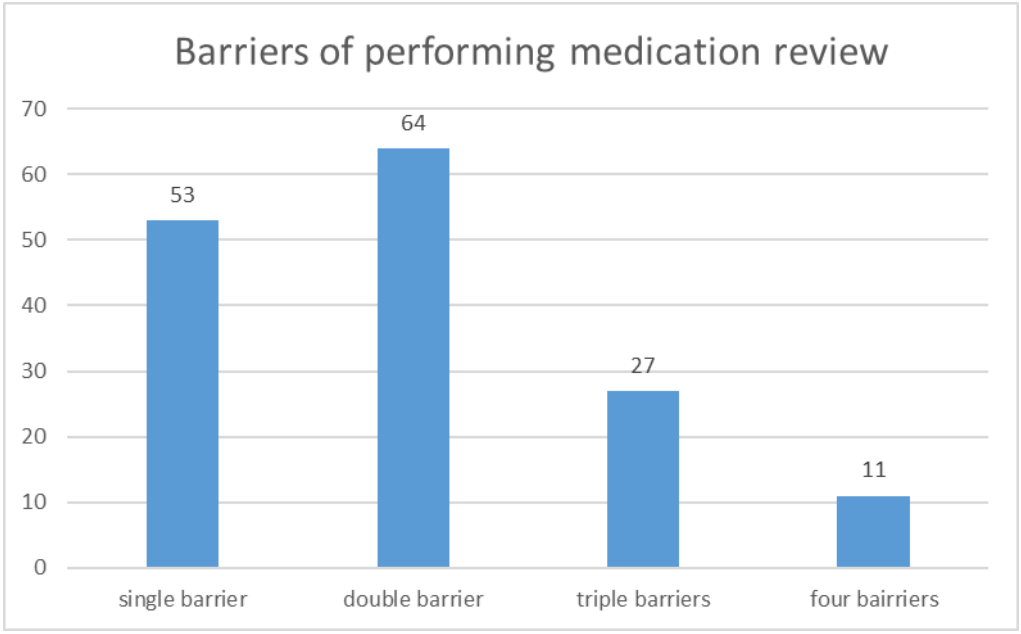

Fig-1: Barriers of performing medication review.

Discussion

Medication reconciliation and review are critical processes for enhancing patient safety by minimizing medication discrepancies, preventing adverse drug events, and ensuring continuity of care across healthcare transitions (8,9). These practices are especially vital in hospital settings, where complex medication regimens increase the risk of errors. The findings of this study demonstrate strong awareness and generally positive attitudes toward medication reconciliation and review among participants, although notable gaps in procedural knowledge and practice consistency persist. By identifying both strengths and barriers in current practices, this study contributes valuable insights for designing targeted interventions and educational programs to improve implementation. Enhancing these processes aligns with global patient safety goals and can significantly reduce preventable medication-related harm (10,11).

Of the 155 pharmacists who participated in this study (Table 1), the majority were male (64.5%), with 56.1% aged between 20 and 30 years. A large proportion (76%) reported having 5–10 years of professional experience, indicating a relatively experienced but still early- to mid-career cohort. This demographic profile is comparable to studies conducted in similar healthcare settings in the Middle East and Asia, where younger pharmacists with less than 10 years of experience make up the majority of the workforce (12,13). In terms of job roles, 40.6% of respondents worked as clinical pharmacists and 38.7% as pharmacy managers, suggesting active involvement in both patient-facing and administrative roles. This aligns with findings from recent studies that highlight the expanding roles of pharmacists beyond traditional dispensing, especially in clinical decision-making and medication safety initiatives (14,15). Regarding institutional settings, most pharmacists were employed in community hospitals (39.3%) or general hospitals (35.5%), with only a small proportion (5.8%) working in teaching hospitals—reflecting current employment trends in non-academic healthcare institutions (16). These demographics provide important context for interpreting practice patterns and identifying targeted areas for professional development.

Assessment of participants' knowledge (Table 2), regarding medication reconciliation and review revealed a wide variation in understanding, indicating uneven familiarity with core concepts and procedural steps. While 58.1% of respondents correctly identified a true statement about reconciliation and review practices, only 44.5% were able to correctly define the primary purpose of these processes, and just 29.6% identified the essential steps involved. These findings point to a substantial knowledge gap, especially in the structured implementation of medication reconciliation. Similar patterns have been observed in previous studies across both high- and

middle-income countries, where pharmacists demonstrate general awareness of the importance of reconciliation but lack depth in operational knowledge and guidelines adherence (8,9,17). For instance, a multi-country survey reported that fewer than half of hospital pharmacists could correctly outline the procedural elements of medication review despite acknowledging its relevance (13). These results emphasize the urgent need for standardized training programs and institutional policies that reinforce not only the value of medication reconciliation but also its practical execution across clinical settings (18).

Participants' perceptions of medication reconciliation and review demonstrated strong overall agreement with their importance and necessity for safe clinical practice (Table 3). All three attitudinal statements assessed in the survey yielded a median response of "Strongly Agree" (score = 5), reflecting a high level of consensus. However, the interquartile range (IQR) for each item was 2, indicating that while most respondents expressed strong support, a portion of the participants remained neutral or less confident. These findings are consistent with previous studies in various healthcare systems, where pharmacists reported positive attitudes toward medication reconciliation but revealed variability in self-assessed readiness and role clarity (9,19). Confidence in conducting these processes is a critical factor for successful implementation, and as highlighted in recent literature, discrepancies in engagement often stem from institutional support, training access, and interprofessional collaboration (20,21). Moreover, promoting team-based approaches to medication review has been shown to enhance the consistency and safety of medication practices, underscoring the value of reinforcing collaborative models within pharmacy-led interventions (18).

The frequency of medication reconciliation and review practices among participants was evaluated using a 5-point Likert scale (Table 4). Over half of respondents (54.2%) reported always performing medication reconciliation, with a median score of 5 (Always) and an interquartile range (IQR) of 2, indicating high engagement but some variation in practice consistency. In contrast, although a similar proportion (54.8%) reported always conducting medication reviews, the median score was lower at 3 (Sometimes), also with an IQR of 2, reflecting a broader distribution of responses and less consistent implementation. These findings suggest that while medication reconciliation is relatively well-integrated into routine clinical workflow, medication review is less consistently practiced, possibly due to time constraints, lack of standardization, or unclear role delineation. Similar trends have been reported in international studies, where reconciliation is more routinely adopted in hospital settings compared to comprehensive medication reviews, which require additional clinical judgment and multidisciplinary collaboration (8,9,15). Addressing this gap may require targeted institutional support, workflow optimization, and expanded clinical training to enhance pharmacist involvement in medication review processes (14,18).

Analysis of the barriers encountered in performing medication reviews revealed that a substantial proportion of participants faced multiple overlapping challenges (fig 1). Specifically, 41.3% of respondents reported experiencing two concurrent barriers, while 34.2% faced one, and smaller proportions experienced three (17.4%) or four (7.1%) barriers. These findings indicate that most healthcare professionals are confronted with more than one barrier, which may cumulatively undermine their ability to perform effective medication reviews. Similar results have been reported in prior studies, where time limitations, insufficient clinical training, lack of access to complete patient information, and poor interprofessional collaboration were consistently cited as major obstacles (22-24). The cumulative effect of such barriers has been shown to reduce pharmacist engagement in medication safety initiatives and contribute to inconsistent implementation of review practices (21). Addressing these challenges requires a multifaceted strategy that includes institutional policy changes, interprofessional education, workflow restructuring, and enhanced communication protocols to support pharmacists in fulfilling their clinical roles effectively (18).

This study has several limitations. First, some of the data were self-reported, which may introduce response bias due to social desirability or misestimation of actual practice behavior. Second, the cross-sectional design limits the ability to assess causality or change over time. Third, the sample, while representative of various hospital types, was geographically limited, which may affect the generalizability of the findings. Lastly, the knowledge assessment included a small number of items, which may not fully capture participants' understanding of all components of medication reconciliation and review.

Conclusion

This study highlights a strong commitment among pharmacists to medication reconciliation and review, particularly in terms of perceived importance and willingness to engage in these practices. However, gaps in procedural knowledge and inconsistencies in the frequency of medication review activities point to a need for targeted educational and system-level interventions. Addressing the identified barriers and enhancing interprofessional collaboration will be critical to improving the consistency and impact of medication safety practices across healthcare settings.

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