



Cover Page



PHARMACIST AS A KEY PARTNER IN CKD CARE: STRATEGIES FOR IMPROVING ADHERENCE AND REDUCING COMPLICATIONS

Nowab Md Arif
 Health Department, GOA

Abstract

Chronic Kidney Disease is a complex and progressive disease that is linked to significant morbidity, mortality and economic burden globally. Multidisciplinary care is essential for managing CKD, with a growing role for pharmacists. This review seeks to examine the emerging role of pharmacists in the management of CKD, including medication management, medication adherence, early diagnosis, and patient empowerment. Recent clinical guidelines, systematic reviews, randomized controlled trials, and observational studies show pharmacist interventions effectively decrease medication-related issues, improve medication adherence and impact on clinical outcomes, including blood pressure, blood glucose and slowing the progression of renal disease. Pharmacists also play a role in nephrotoxic stewardship, patient education and clinical guideline implementation (such as KDIGO 2024). Moreover, their participation in community screening programs facilitates early detection and delay of CKD progression. Although there is a large body of evidence supporting their value, there is a need for more standardised outcome measures and high-quality trials. This review examines 20 landmark studies to demonstrate the clinical, humanistic, and economic benefits of pharmacists in CKD. The research shows that pharmacists must be part of the multidisciplinary team managing patients with CKD to enhance patient outcomes and health care efficiency.

Keywords: CKD, Pharmacist Interventions, Medication Therapy Management, Drug-Related Problems

INTRODUCTION

CKD is a serious global public health issue, defined as progressive loss of kidney function and an increased risk of cardiovascular complications, end-stage renal disease (ESRD) and death. The impact of CKD is especially pronounced in low- and middle-income nations, such as India, where the disease is often diagnosed at a late stage, is poorly understood and has limited access to specialist care. Treatment of CKD is complex, given the presence of coexisting diabetes, hypertension, and cardiovascular diseases, and the need for ongoing pharmacotherapy and monitoring.

Medication therapy for CKD is complicated by altered drug pharmacokinetics, potential for drug toxicity, and polypharmacy. In this evolving landscape, the pharmacist's role has shifted from dispensing drugs to providing clinical and patient-focused services. Pharmacists are increasingly seen as integral components of interdisciplinary health-care teams, providing medication therapy management, counselling and clinical decision support.

The KDIGO 2024 clinical practice guideline highlights the integral role of pharmacists in CKD care, including the adjustment of drug dosages, reduction of nephrotoxic drugs, and patient education (Awdishu et al., 2025). These roles are crucial for avoiding adverse drug reactions and disease progression. Moreover, pharmacists are crucial in the management of other conditions, such as type 2 diabetes, where pharmacotherapy can impact on the course of CKD (Neumiller et al., 2024).

Non-adherence to medication is a critical issue in the management of CKD, resulting in suboptimal health outcomes and higher healthcare expenditure. Pharmacist services such as medication therapy management (MTM), education and follow-up have been demonstrated to enhance medication adherence and prevent inappropriate medication use. For example,



Cover Page



interventions have successfully decreased the use of potentially harmful drugs (such as NSAIDs) that can compromise renal function (Wang et al., 2024).

Additionally, pharmacists help identify and resolve drug-related problems (DRPs), which are common in CKD patients because of polypharmacy and complicated drug therapy. The role of clinical pharmacists in the outpatient setting has led to better adherence to therapeutic recommendations and fewer medication errors (Schütze et al., 2021). This not only improves therapeutic outcomes but also patient safety.

Pharmacists' involvement in the care of patients with CKD has also shown benefits. Research has shown that pharmacist services result in better disease-related outcomes, such as better control of blood pressure, haemoglobin and proteinuria (Stemer et al., 2011). Additionally, pharmacists are vital in medication reconciliation during care transitions, to ensure medication accuracy and continuity (St. Peter et al., 2013).

However, the integration of pharmacists in the care of CKD patients is still in its infancy, with differences in practice settings and health care systems. Although numerous studies demonstrate the success of pharmacist interventions, there is a need for consistent clinical outcomes and well-designed clinical trials to firmly establish pharmacist interventions' effectiveness. This is crucial for better incorporating pharmacists in the management of CKD.

This review paper will integrate evidence from 20 studies to provide an overview of pharmacists in the management of CKD. Through the analysis of clinical, humanistic and economic measures, this research aims to offer a holistic picture of the impact of pharmacist interventions on CKD care and patient outcomes.

OBJECTIVES

The aim of this review is to critically evaluate and integrate the published evidence on pharmacists' involvement in the care of patients with CKD. The research seeks to assess the effectiveness of pharmacist interventions on patient outcomes, adherence to medication regimens and quality of life in CKD. The review also aims to investigate the role of pharmacists in detecting and resolving medication-related issues, medication optimisation and promoting collaborative care strategies.

A further aim is to explore the pharmacists' role in the early identification and prevention of CKD through screening and education programs. The review also seeks to highlight the research gaps, particularly in relation to the use of consistent outcome measures and the need for high-quality clinical trials. This review aims to combine the results of different study types, such as systematic reviews, randomized controlled trials, and observational studies to offer a valuable insight into the growing role of pharmacists in the management of CKD and how their contribution can be applied to enhance health care delivery and patient outcomes.

METHODOLOGY

This review paper draws on an in-depth review of 20 studies about pharmacists' role in CKD. The studies reviewed are a combination of systematic reviews, meta-analyses, randomized controlled trials (RCTs), observational studies, and clinical guidelines, offering a comprehensive and well-rounded view of the subject.

The studies were chosen based on their focus on important aspects of pharmacist contributions in the management of CKD, such as medication therapy management, adherence to medication, identification and resolution of drug-related problems, patient education and counselling, and improvement of clinical outcomes. Preference was given to recent publications to ensure an up-to-date perspective on current practices and innovations in clinical pharmacy, with equally a number of most-cited original studies to establish an historical perspective and provide strength of evidence.



Cover Page



Information from each study was extracted and analysed under pre-specified themes, such as clinical (e.g., blood pressure, renal function), humanistic (e.g., quality of life, patient knowledge) and economic (e.g., cost, healthcare service use) outcomes. Findings from each study were independently interpreted to provide clear understanding and prevent unnecessary citations, as per the academic standard for research publications.

The synthesis strategy involved grouping of findings into themes, enabling a systematic exploration of the role of pharmacists in various areas of CKD management. Particular emphasis was placed on the role of pharmacists as part of an interdisciplinary healthcare team and its effects on patient outcomes.

The approach has limitations, including the possibility of diverse study designs, sample sizes, and intervention approaches, which could affect the applicability of results. Furthermore, the absence of consistent measures of outcomes across studies limits comparability. But the variety of study designs adds to the depth and rigour of this review.

RESULTS

Our analysis of the 20 chosen studies presents clear evidence of the impact of pharmacists in the care of CKD. The results have been grouped into the following key themes: medication adherence, drug-related problem (DRP) resolution, clinical outcomes, quality of life, medication optimisation and early detection.

Impact on Medication Adherence

Adherence to medication is a key factor in the successful management of CKD, and several studies show the impact of pharmacist interventions on adherence. Pharmacists use various tools, including medication counselling, follow-up support and medication therapy management (MTM), to improve adherence.

A scoping review by Calleja et al. (2023) highlighted the effectiveness of pharmacist-led interventions, such as patient education and medication reconciliation, in enhancing adherence in CKD patients. These strategies promote an understanding of medication use, thus preventing missed doses and incorrect medication administration. Likewise, a quasi-experimental study by Mohammadnezhad et al. (2024) found significant improvements in patient adherence after pharmacist-led MTM interventions. They found improved knowledge and awareness among patients led to improved adherence to treatment. Additionally, Anisya et al. (2025) found that pharmacist-led interventions, such as the use of digital educational resources, improve participation in self-care, as well as adherence. This suggests that pharmacists are an important part of the behaviour management of CKD. Moreover, Sahu et al. (2025) conducted a randomized controlled trial that demonstrated pharmacist interventions markedly increase adherence and also reduce health care costs. This research highlights the value of both improved health outcomes and cost reduction.

Reduction of Drug-Related Problems (DRPs)

CKD patients have a high incidence of drug-related problems due to multiple medications, altered drug metabolism and common co-morbidity. Pharmacists are vital in the detection, prevention and resolution of these problems.

In a recent randomized controlled trial, Zafar et al. (2025) found a 46.52% decrease in DRPs after pharmacist interventions. This substantial reduction highlights pharmacists' role in enhancing medication safety and therapeutic outcomes. Likewise, Alam et al. (2024) reported that clinical pharmacist intervention reduces the rate of DRPs among patients with CKD. It showed an enhancement in the appropriateness of medication and a decrease in adverse drug events (ADEs). Fahmidha et al. (2025) further confirmed these results, showing pharmacist interventions increase treatment efficacy by identifying and treating DRPs. This involves dose changes, alternate drug use, and checking for drug interactions. Furthermore, Schütze et



Cover Page



al. (2021) highlighted the pharmacists' contribution in ambulatory care, where they help to decrease DRPs by facilitating the implementation of nephrologists' recommendations. This multidisciplinary approach improves medication safety and effectiveness.

Improvement in Clinical Outcomes

The role of pharmacists in managing CKD has been found to have a positive impact on several clinical indicators. This encompasses blood pressure, blood glucose levels, haemoglobin and markers of kidney disease.

Ardavani et al. (2024) meta-analysis found that pharmacist initiatives lead to substantial improvements in blood pressure and haemoglobin among CKD patients. This helps slow the progression and complications of the disease. Wang et al. (2024) found that pharmacist medication therapy management (MTM) led to not only better adherence, but reduced proteinuria and delays in the decline of kidney function. This implies that pharmacists may be able to impact disease progression through their interventions. Also, Salgado et al. (2011) showed that the interventions by a pharmacist led to fewer hospitalizations and a slower progression to end-stage renal disease (ESRD). It also showed benefits in anaemia and dyslipidaemia. Neumiller et al. (2024) also noted the contribution of pharmacists in the management of CKD patients with type 2 diabetes where pharmacist-delivered pharmacotherapy resulted in improved glycaemic control and decreased complications. This is crucial as diabetes is strongly linked to the progression of CKD.

Enhancement of Quality of Life

Pharmacist interventions also improve the quality of life of CKD patients. Better adherence, fewer DRPs and disease knowledge lead to improved patient outcomes.

Zafar et al. (2025) found that pharmacist interventions are associated with an improved quality of life in CKD patients. The reasons for this are improved symptom control, reduced side effects and increased patient self-esteem in managing the disease. Anisya et al. (2025) also noted that pharmacist-led educational and counselling programs improve the patient's well-being through increased self-care and awareness of the disease. These programs promote patient autonomy in managing their disease.

Medication Optimization and Therapeutic Management

Pharmacists play a pivotal role in medication optimization and management of CKD patients, which includes drug selection, dose adjustment and therapeutic monitoring.

The recent KDIGO 2024 guideline highlights the role of pharmacists in renal dose adjustments and stewardship of nephrotoxins (Awdishu et al., 2025). This is essential for avoiding drug-induced kidney damage and safe medication use. St. Peter et al. (2013) noted that pharmacist-led medication reconciliation decreases medication discrepancies and enhances accuracy, especially in transitions of care. Khokhar et al. (2020) showed that pharmacist intervention programs enhance patients' knowledge and adherence to medication, resulting in better medication management and patient outcomes. Al Raiisi et al. (2019) also showed that pharmacist review and monitoring of medication use improve outcomes and decrease health care services.

Role in Early Detection and Prevention

Community-based pharmacists can have a critical role in the early detection and prevention of CKD. Their widespread presence enables them to participate in screening and educational initiatives. Oskroba et al. (2025) show that pharmacist-



Cover Page



led screening programs enhance early diagnosis of CKD. This allows for early treatment, which helps reduce the progression of the disease. These initiatives also raise awareness of risk factors, leading to prevention and early referral to health care.

Need for Standardization and Research Gaps

While the results of pharmacist interventions are promising, there are studies that call for standardization of research and interventions. Ardavani et al. (2023) highlighted the need for uniformity in outcome measures when assessing pharmacist interventions. This hampers comparisons between studies and obscures conclusions. Stemer et al. (2011) also expressed a need for additional high-quality clinical trials to support pharmacist interventions in CKD.

Summary of Results

In summary, the results show that pharmacists have a pivotal role in the care of CKD. They are involved in medication adherence, DRP resolution, and improvement in clinical outcomes, quality of life, medication optimisation and early detection. Evidence strongly supports their effectiveness, but more research using consistent methods is needed to confirm their impact and to support their integration into health care.

DISCUSSION

The results of this review unambiguously demonstrate that pharmacists are increasingly integral in the care of patients with CKD. Pharmacist integration in the care of patients with CKD has been shown to have substantial benefits across clinical, humanistic and economic outcomes. This analysis critically examines these results, placing them in the context of the multidisciplinary health-care team and the implications for practice and future research.

A key role for pharmacists in managing CKD patients is medication optimization. Patients with CKD are at high risk of medication-related problems given altered drug pharmacokinetics, polypharmacy and the presence of multiple comorbidities. The KDIGO 2024 guideline highlights the role of pharmacists in correct medication dose adjustment, as well as avoiding exposure to nephrotoxic drugs (Awdishu et al., 2025). This reflects a shift in the role of pharmacists from dispenser to therapeutic decision-maker. The focus on nephrotoxic stewardship is particularly important in CKD, where medication-related issues can lead to CKD progression.

Related to medication optimization is the prevention of drug-related problems (DRPs), which was a common theme across many studies. DRPs in CKD patients include inappropriate medication choices, incorrect doses and adverse effects. The marked decrease in DRPs observed by Zafar et al. (2025) highlights the impact of pharmacist interventions in enhancing pharmacotherapy safety. Likewise, Alam et al. (2024) highlight the role of pharmacists in the detection and resolution of DRPs, leading to decreased risk of complications. These results indicate that pharmacists play a vital role in the health system as a safety net to ensure safe and effective pharmacotherapy.

A second major theme emerging from this review is the role of pharmacists in improving medication adherence, a significant issue in the treatment of CKD. This can result in poor disease outcomes, hospital admissions and increased costs to the healthcare system. The studies in this review consistently show that pharmacist interventions improve adherence by educating, counselling and monitoring patients. Calleja et al. (2023) underscore the impact of interventions in increasing adherence, and Mohammadnezhad et al. (2024) stress the pharmacist's role in improving patient knowledge and self-management skills. These studies highlight the need to consider psychological and behavioural factors in the management of CKD, where pharmacists can play a key role.



Cover Page



The positive impact of pharmacist interventions on clinical outcomes also supports the inclusion of pharmacists in the management of CKD. The meta-analysis conducted by Ardavani et al. (2024) offers evidence that pharmacist intervention results in improved management of important clinical factors such as blood pressure and haemoglobin levels. These outcomes are important because they translate to lower morbidity and disease progression. Similarly, Wang et al. (2024) show that medication therapy management by pharmacists can reduce proteinuria and improve renal function, suggesting a direct effect on disease progression. This evidence suggests that pharmacist-led interventions are not only supportive but also impact outcomes.

This review also emphasises the impact of pharmacists on the quality of life. CKD has a profound impact on patients' physical, psychological and social functioning. Zafar et al. (2025) show that pharmacist interventions result in increased quality of life, probably as a result of improved symptom management and patient empowerment. Anisya et al. (2025) also support this by showing that patients who receive education and counselling are empowered to manage their condition better and have improved well-being. This is consistent with the shift towards patient-centred care, which prioritises not just clinical measures but also quality of life.

Pharmacists' role in multi-disciplinary care is another key aspect of CKD management. Managing the complexities of CKD requires the expertise of nephrologists, physicians, nurses, dieticians and pharmacists. Neumiller et al. (2024) describe the contributions of pharmacists in caring for CKD patients with diabetes, showing that integrated care can have a positive impact. Likewise, St. Peter et al. (2013) highlight the role of pharmacists in medication reconciliation and transitions of care, which are known to be vulnerable to medication-related risks. This research indicates that involving pharmacists in healthcare teams improves patient care and transitions.

A new focus is on pharmacist intervention in the early identification and prevention of CKD. Community pharmacists are accessible and can initiate screening and awareness campaigns. The study by Oskroba et al. (2025) shows that screening programs led by pharmacists can enhance the rate of early detection, allowing for early intervention and potentially delaying the progression of the disease. This early intervention is crucial in low- and middle-income countries, where access to health care may be limited. Through early detection and intervention, pharmacists can help to alleviate the impact of CKD.

Despite the wealth of evidence in support of pharmacists, there are some issues with the evidence. A notable concern is the variability in outcome measures, as discussed by Ardavani et al. (2023). The lack of consistency in designs and outcome measures hampers the ability to compare studies and generalise the results. This highlights the need for the establishment of standardised approaches to assess the impact of pharmacists in CKD.

Furthermore, although many studies show positive results, more rigorous randomized controlled trials are needed to determine causal links and build on the evidence base. Stermer et al. (2011) suggests while clinical pharmacy services are promising, more rigorous studies are needed to establish their long-term positive impact. This is crucial for policy development and better integration of pharmacists into the health system.

The second thought is the cost-effectiveness of pharmacist interventions. Although some studies, like Sahu et al. (2025), show economic benefits due to improved adherence and fewer hospital admissions, there is a need for more holistic economic analyses. Cost-effectiveness of pharmacist interventions is important for policymakers, especially in the resource-strapped developing world.

Overall, the discussion has shown that pharmacists have a complex and key role in the management of CKD. Their roles go beyond the conventional to include medication management, patient education, improved clinical outcomes and prevention. But to maximize their impact, we need to overcome the barriers, including a lack of consistency in outcome measures, quality research and economic analyses. Further integration of pharmacists into interdisciplinary teams will play a vital role in optimising CKD outcomes and health care.



Cover Page



CONCLUSION

CKD continues to be a major global health concern, and its burden can be reduced through holistic, multidisciplinary approaches to manage it. This review emphasises the important and growing role of pharmacists in the management of CKD, with evidence drawn from a broad spectrum of studies, including guidelines, systematic reviews, randomised controlled trials and observational studies.

These studies show that pharmacists play a pivotal role in medication optimization, improving adherence, reducing DRPs and improving patient outcomes. The KDIGO 2024 guideline highlights the role of pharmacists in the appropriate dosing of medications and avoiding nephrotoxic medications to enhance medication safety (Awdishu et al., 2025). Pharmacists have also demonstrated the ability to improve clinical outcomes, including blood pressure, haemoglobin and renal function, which are essential in the management of CKD (Ardavani et al., 2024).

Pharmacists also play a vital role in enhancing medication adherence and education. And research indicates that pharmacist-provided medication counselling and medication therapy management improve patients' knowledge of their condition and medications, improving adherence and self-management (Mohammadnezhad et al., 2024). This is crucial in CKD, where sustained adherence to multiple therapies is required to achieve good outcomes.

Additionally, the review notes the impact of pharmacists on the identification and management of DRPs - an issue that is common among CKD patients due to polypharmacy and co-existing conditions. Pharmacist interventions are effective in resolving DRPs and improving treatment outcomes (Zafar et al., 2025). The involvement of pharmacists has been linked to better quality of life, fewer hospital admissions, and slower progression to ESRD (Salgado et al., 2011).

Pharmacists also play a pivotal role in early identification and prevention of CKD through community screening and education initiatives. Their accessibility and expertise make them well-positioned to play a key role in public health strategies to prevent and manage CKD (Oskroba et al., 2025).

However, there remain several challenges, including a lack of consistent outcome measures, diverse intervention models and limited high-quality trials. These areas need to be addressed to enhance the evidence base and facilitate the integration of pharmacists in CKD care.

In summary, pharmacists have a significant and complex role in the care of patients with CKD, impacting clinical, humanistic and economic domains. Their involvement in multidisciplinary care teams is crucial to improving patient outcomes and countering the burden of CKD.

Policy Support and Recognition: Government initiatives should support and acknowledge pharmacists' involvement in CKD management, including regulations, funding, and programs.

Recommendation

This review suggests several key recommendations to enhance pharmacists' involvement in the care of patients with CKD. First, pharmacists need to be incorporated into the multidisciplinary care team, including nephrologists, physicians, and other health professionals to provide integrated care. Secondly, there is a need to enhance pharmacist-led Medication Therapy Management (MTM) services, which have been shown to be effective in improving medication adherence, optimizing pharmacotherapy and preventing medication-related problems. Moreover, there is an urgent need for the development of outcome measures for the evaluation of pharmacist interventions in CKD, to improve consistency and comparability of studies, as Ardavani et al. (2023) pointed out. Increasing community pharmacists' involvement in the



Cover Page



screening, early diagnosis and education of CKD patients can help prevent the disease and provide timely treatment. Furthermore, capacity building through training and education in nephrology and CKD management is required to develop pharmacists' expertise. Encouraging rigorous research, especially randomized controlled trials, is also essential to build evidence and confirm the long-term impact of pharmacist interventions, as highlighted by Stemer et al. (2011). Adopting digital health solutions, such as telepharmacy and mobile health apps, can also improve patient monitoring, adherence, and access to care, particularly in rural areas. Lastly, robust policy backing and institutional recognition are needed to embed pharmacists within CKD care paradigms, ensuring adequate funding and regulatory support, and incorporation into national health programs.

References

1. Awdishu, L., Maxson, R., Gratt, C., Rubenzik, T., & Battistella, M. (2025). KDIGO 2024 clinical practice guideline on evaluation and management of chronic kidney disease: A primer on what pharmacists need to know. *American Journal of Health-System Pharmacy*, 82, 660–671. <https://doi.org/10.1093/ajhp/zxaf044>
2. Neumiller, J. J., St. Peter, W. L., & Shubrook, J. H. (2024). Type 2 diabetes and chronic kidney disease: An opportunity for pharmacists to improve outcomes. *Journal of Clinical Medicine*, 13. <https://doi.org/10.3390/jcm13051367>
3. Wang, T., Kang, H., Chen, C., Lai, T., Huang, C., & Wu, C. (2024). The effects of pharmacist-led medication therapy management on medication adherence and use of non-steroidal anti-inflammatory drugs in patients with pre-end stage renal disease. *Patient Preference and Adherence*, 18, 267–274. <https://doi.org/10.2147/PPA.S436952>
4. Schütze, A., Hohmann, C., Haubitz, M., Radziwill, R., & Benöhr, P. (2021). Medicines optimization for patients with chronic kidney disease in the outpatient setting: The role of the clinical pharmacist. *International Journal of Pharmacy Practice*. <https://doi.org/10.1093/ijpp/riab033>
5. Stemer, G., & Lemmens-Gruber, R. (2011). Clinical pharmacy activities in chronic kidney disease and end-stage renal disease patients: A systematic literature review. *BMC Nephrology*, 12, 35. <https://doi.org/10.1186/1471-2369-12-35>
6. St. Peter, W. L., Wazny, L. D., & Patel, U. D. (2013). New models of chronic kidney disease care including pharmacists: Improving medication reconciliation and medication management. *Current Opinion in Nephrology and Hypertension*, 22(6), 656–662. <https://doi.org/10.1097/MNH.0b013e328365b364>
7. Ardavani, A., Curtis, F., Hopwood, E., Highton, P., Katapa, P., Khunti, K., & Wilkinson, T. (2024). Effect of pharmacist interventions in chronic kidney disease: A meta-analysis. *Nephrology Dialysis Transplantation*, 40, 884–907. <https://doi.org/10.1093/ndt/gfae221>
8. Ardavani, A., Curtis, F., Khunti, K., Wilkinson, T., & Highton, P. (2023). The need for standardised outcomes in pharmacist interventions in chronic kidney disease: A systematic review of randomized controlled trials. *International Journal of Pharmacy Practice*. <https://doi.org/10.1093/ijpp/riad074.006>
9. Zafar, R., Rehman, I., Shah, Y., Ming, L. C., Goh, K. W., Suleiman, A. B., & Khan, T. M. (2025). Impact of pharmacist-led intervention for reducing drug-related problems and improving quality of life among chronic kidney disease patients: A randomized controlled trial. *PLOS ONE*, 20. <https://doi.org/10.1371/journal.pone.0317734>
10. Fahmidha, M., Lateef, A., V., V., & T., T. (2025). A review on the role of pharmacist interventions in identifying and resolving drug-related problems among chronic kidney disease patients. *Journal for Research in Applied Sciences and Biotechnology*. <https://doi.org/10.55544/jrasb.4.4.13>
11. Al Raiisi, F., Stewart, D., Fernandez-Llimos, F., Salgado, T., Mohamed, M. F., & Cunningham, S. (2019). Clinical pharmacy practice in the care of chronic kidney disease patients: A systematic review. *International Journal of Clinical Pharmacy*, 41, 630–666. <https://doi.org/10.1007/s11096-019-00816-4>
12. Alam, K., Hayat, A., Ullah, A., Sulaiman, S. A. S., Ahmad, W., & Ooi, G. S. (2024). The prevalence and impact of clinical pharmacists' intervention on drug-related problems in patients with chronic kidney disease. *Cureus*, 16. <https://doi.org/10.7759/cureus.59402>
13. Calleja, L., Glass, B., Cairns, A., & Taylor, S. (2023). Pharmacist-led interventions for medication adherence in patients with chronic kidney disease: A scoping review. *Pharmacy*, 11. <https://doi.org/10.3390/pharmacy11060185>



Cover Page



14. Khokhar, A., Khan, Y. H., Mallhi, T. H., Khan, A. H., Alotaibi, N. H., Alzarea, A. I., & Bokharee, N. (2020). Effectiveness of pharmacist intervention model for chronic kidney disease patients: A prospective comparative study. *International Journal of Clinical Pharmacy*, 42, 625–634. <https://doi.org/10.1007/s11096-020-00982-w>
15. Mohammadnezhad, G., Ehdaivand, S., Sebt, M., Azadmehr, B., Ziaie, S., & Esmaily, H. (2024). Chronic kidney disease and adherence improvement program by clinical pharmacist-provided medication therapy management: A quasi-experimental assessment of patients' self-care perception and practice. *BMC Nephrology*, 25. <https://doi.org/10.1186/s12882-024-03902-6>
16. Anisya, K., Molidia, S., Aqsa, K., Wirastuti, A., Deisberanda, F., Ajwad, M., & Dermawan, A. (2025). Intervensi apoteker terhadap kepatuhan pengobatan pada pasien penyakit ginjal kronis: A scoping review. *Journal of Current Pharmaceutical Sciences*. <https://doi.org/10.35747/jcps.v9i2.1450>
17. Ardavani, A., Curtis, F., Khunti, K., & Wilkinson, T. (2023). The effect of pharmacist-led interventions on the management and outcomes in chronic kidney disease (CKD): A systematic review and meta-analysis protocol. *Health Science Reports*, 6. <https://doi.org/10.1002/hsr2.1064>
18. Oskroba, A., Dworakowska, A., Rdzanek, M., & Bujalska-Zadrożny, M. (2025). Enhancing chronic kidney disease screening through community pharmacists: A systematic review of pharmacist-led strategies. *Polish Archives of Internal Medicine*. <https://doi.org/10.20452/pamw.17136>
19. Salgado, T., Moles, R., Benrimoj, S., & Fernandez-Llimos, F. (2011). Pharmacists' interventions in the management of patients with chronic kidney disease: A systematic review. *Nephrology Dialysis Transplantation*, 27(1), 276–292. <https://doi.org/10.1093/ndt/gfr287>