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Pharmacist-Led Interventions in Medication Adherence among Patients with Chronic Kidney Disease

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ABSTRACT

Chronic kidney disease (CKD) poses a significant global health challenge, affecting an estimated 10–14% of the population and leading to substantial economic burdens on healthcare systems. Despite advancements in treatment, the mortality rate for CKD remains unchanged, highlighting the necessity for effective management strategies. This study explores the critical role of pharmacist-led interventions in enhancing medication adherence among CKD patients, who often face complex pharmacotherapy regimens. The multifaceted nature of CKD treatment, which frequently results in polypharmacy, complicates adherence due to factors such as health literacy and access to medications. The research identifies key barriers to adherence, including regimen complexity and financial constraints, and emphasizes the importance of tailored pharmacist interventions. Through comprehensive medication management, pharmacists can conduct thorough medication reviews, educate patients about their treatment, and implement adherence-enhancing tools such as reminder systems and counseling sessions. Evidence indicates that multimodal educational strategies, including the use of smartphone-activated QR codes linking to instructional videos, significantly improve adherence rates, particularly among patients with low health literacy. Furthermore, the study highlights pharmacist perceptions of their role, revealing a consensus on their potential effectiveness in improving adherence, albeit hindered by time constraints and underutilization in practice. The findings underscore the necessity for healthcare systems to integrate pharmacist-led initiatives more comprehensively, as patient

feedback indicates high satisfaction and perceived efficacy of these interventions. By fostering a collaborative environment where pharmacists actively engage with patients, the potential for improved health outcomes in CKD management is substantial, ultimately contributing to better quality of life and reduced healthcare costs. This study advocates for enhanced recognition and incorporation of pharmacists in CKD care teams to address adherence challenges effectively.

1. Introduction

Chronic kidney disease is a prevalent global health issue, with significant economic implications, contributing to a substantial burden on health systems worldwide [1]. Globally, CKD prevalence is estimated to range between 10–14%, with stage three kidney disease being the most common. Despite significant strides in medical technology, the global age-standardized mortality rate for CKD have not exhibited a declining trend. The pharmacotherapy for patients with CKD is often complex and multifaceted [2]. These treatment regimens typically encompass drugs aimed at decelerating the progression of the disease, including angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and sodium–glucose cotransporter 2 (SGLT2) inhibitors. Additionally, they involve medications to manage associated comorbidities and complications. Such comprehensive therapeutic strategies often lead to polypharmacy, characterized by the regular administration of five or more medications daily. This, in turn, frequently presents challenges in terms of patient adherence to medication schedules [3].

Numerous barriers to effective pharmacotherapy in patients with CKD exist, with nonadherence to prescribed medicines predominating. Medication nonadherence (not taking medication as prescribed) leads to accelerated progression of renal failure and consequentially higher morbidity and mortality rates [4]. The World Health Organization (WHO) suggests that there are five factors which are determinants of patient medication adherence [5]. Pharmacist-led interventions can include medication reviews, motivational counselling and hospital discharge care transition plans and may play an integral role in mitigating factors that negatively affect medication adherence [6]. However, the effective implementation of these interventions and the application of current adherence measurement practices in dialysis settings are not yet well established or investigated. Patients with advanced CKD also commonly undergo hemodialysis therapy on a regular basis, which often presents as an opportunity for pharmacist medication interventions [7]. Although it has been reported that pharmacists have a role in clinical nephrology settings, this role remains unclear. An improved understanding of the pharmacist's role in supporting medication adherence in the CKD setting will allow greater consideration of pharmacist intervention effectiveness and best practices for this complex disease [8].

Objectives:

The main objectives of this review are:

1. To identify the Pharmacist-Led Intervention Strategies.

2. To assess the role of pharmacist in medication adherence among patients with chronic kidney disease.

3. To explore the barriers and challenges faced by patients with chronic kidney disease in adhering to their medication regimens.

4. To examine the impact of pharmacist interventions on improving medication adherence in patients with chronic kidney disease.

Pharmacist-Led Intervention Strategies:

One of the primary strategies employed by pharmacists involves comprehensive medication management, where they conduct thorough medication reviews to identify potential drug interactions, contraindications, and dosage adjustments based on the patient's level of renal function. This process not only helps ensure the safety and effectiveness of the prescribed medications but also empowers patients by enhancing their understanding of their therapy [9]. Pharmacists can utilize patient medication profiles to assess adherence patterns, identify discrepancies, and tailor interventions specific to the patient's needs. Through individualized counseling sessions, pharmacists can encourage patients to actively participate in their treatment plans, which has been shown to improve self-efficacy and motivation for adherence. Educational interventions are another critical aspect of pharmacist-led strategies. Through one-on-one counseling, group sessions, or multimedia resources, pharmacists can provide patients with essential information about CKD and its treatment, emphasizing the importance of adherence in preventing complications [10]. Many patients with CKD may not fully understand the rationale behind their medications, leading to skepticism regarding their necessity. Pharmacists can clarify these misunderstandings by explaining how specific medications function and their role in managing symptoms and preserving kidney function. By fostering an environment where patients can ask questions and express concerns, pharmacists can build trust and rapport, which are vital for encouraging adherence. In addition to patient education, pharmacists can also implement reminder systems and adherence aids, such as medication synchronization, blister packaging, or mobile health applications. These tools can help patients manage complex medication regimens and reduce the likelihood of missed doses [11]. For instance, by synchronizing refill dates for multiple medications, patients can simplify their medication management and reduce the burden of tracking multiple prescriptions. Moreover, pharmacists can educate patients on the use of pill organizers, alarm clocks, or apps that provide reminders for when to take medications. These practical interventions are especially useful for CKD patients who may be elderly or have cognitive impairments, further enhancing their ability to adhere to prescribed therapies. To optimize medication adherence among CKD patients, pharmacists can also conduct regular follow-up consultations, which serve to monitor the effectiveness of therapeutic regimens and provide ongoing support. These follow-ups are essential for adjusting medications as needed, especially in response to changes in kidney function or emerging side effects. Continuous monitoring can help identify non-adherence patterns early on, allowing pharmacists to intervene before these patterns adversely affect the patient's health. During these consultations, pharmacists can reinforce education on lifestyle modifications, dietary changes, and the importance of routine lab tests and clinical

follow-ups, thus contributing to a holistic approach to CKD management [12].

Collaboration within multidisciplinary healthcare teams is another important facet of pharmacist-led interventions. By working closely with nephrologists, nurses, and dietitians, pharmacists can ensure a cohesive approach to patient care that addresses not only medication adherence but also overall health and well-being. This team-based approach fosters the sharing of information and strategies that can be beneficial in managing the complexities of CKD treatment. Regular interdisciplinary meetings can also facilitate communication about patient progress and barriers to adherence, ensuring that all team members are aligned in their efforts to support patients [13].

Impact of pharmacist-led interventions:

Patients with CKD often require complex medication regimens to manage their symptoms and slow the progression of the disease. However, medication adherence among these patients is a significant challenge, as non-adherence can lead to worsening of CKD, increased healthcare costs, and decreased quality of life. Pharmacists play a crucial role in improving medication adherence among patients with CKD through various interventions and strategies [14].

Pharmacists are highly trained healthcare professionals who are experts in medications and their effects on the body. They work closely with patients with CKD to educate them about their medications, including the purpose of each medication, how to take them properly, and potential side effects. Pharmacists also help patients understand the importance of adhering to their medication regimen and the consequences of non-adherence. By providing this education and support, pharmacists empower patients to take an active role in managing their health and adhere to their medications as prescribed [15]. In addition to education, pharmacists also play a key role in monitoring medication adherence among patients with CKD. They may use tools such as medication adherence assessments, pill counts, and medication synchronization programs to track patients' adherence to their medications. Pharmacists can then identify patients who are struggling with adherence and work with them to develop personalized strategies to improve adherence. This may include simplifying medication regimens, addressing barriers to adherence, and providing ongoing support and encouragement. Furthermore, pharmacists collaborate with other members of the healthcare team, including physicians, nurses, and dietitians, to ensure that patients with CKD receive comprehensive and coordinated care [16]. They communicate regularly with the healthcare team to share information about patients' medication adherence, progress, and any concerns or challenges that may arise. By working together, healthcare providers can address medication-related issues promptly and effectively, ultimately improving patient outcomes and quality of life [17].

Challenges and Barriers to Adherence:

Barriers to medication adherence in patients with CKD were reported, with two overarching themes, literacy and health access, emerging. Sub-themes have been linked to these two main themes in the following way: literacy (lifestyle, regimen complexity, confusion) and health access (cost, logistics). Many patients undergoing

dialysis forget to take their prescribed medicines, change their mediation regimen according to their lifestyles and have a very limited understanding or are confused about their medications and/or their CKD condition [18]. Complex medication regimens, compounded with unnecessary medications, with limited family and social support were also reported barriers. Yeung et al. utilized the modified Pharmacy Quality Alliance Proportion of Days Covered (PDC) model to measure medication adherence before and after exposure to low health literacy educational flashcards and videos [19]. Health literacy was identified as being an important determinant of medication adherence. Age and adherence were significantly correlated, with nonadherence significantly higher in patient groups younger than 50 years of age ($p < 0.05$) [20].

Health access was the second barrier that emerged from the review. The financial burden, including the cost of treatments and low family income, as well as the logistical challenges of accessing medicines, were identified as being major determinants of patient nonadherence. Nonadherence to medication regimens was prevalent with particularly low adherence rates for antihypertensive medications such as angiotensin-2 receptor blockers, angiotensin converting enzyme inhibitors and dihydropyridine calcium channel blockers [21].

Evidence based interventions:

The role of multimodal disease and medication education in pharmacist-led interventions for the improvement of medication adherence in patients with CKD was reported. Studies utilized smart-phone activated quick-response (QR) codes linked to educational videos and flashcards to communicate information to patients. Patients in an intervention group who watched educational videos regarding their medicines and disease states increased medication adherence to their prescribed medication regimes by 29% more than those in the control group, who did not view the educational materials ($p < 0.001$) [22,23]. In patient groups with low literacy skills, the use of QR-coded educational videos and images, which capitalized on using images and spoken phrases using simple terminology, significantly improved patient medication adherence ($p < 0.01$). Of note in the study by Yeung et al., the intervention period was 180 days, which is an extensive intervention at targeting knowledge and resulted in improvement in adherence according to dispensing data compared to the controls (71% vs. 44%; $p = 0.0069$). Similarly, in the study by Qudah et al., which targeted both knowledge and behavior by monitoring patient home blood pressure monitoring engagement, blood pressure reductions and adherence to medication and attendance at dialysis sessions, those in the intervention group who received weekly engagement with their pharmacist or physician over a 15 week period had positive improvements [24]. Forty-six percent of patients in the intervention arm achieved BP target compared to only 14.3% of patients in the control arm ($p = 0.02$). Average decline in weekly mean home systolic blood pressure was 10.9 ± 17.7 mmHg in the intervention arm ($p = 0.004$), while weekly mean home systolic blood pressure increased by 3.5 ± 18.4 mmHg in the control arm ($p = 0.396$). However, there was no significant reduction in weekly home diastolic blood pressure, dialysis blood pressure readings or interdialytic weight gain in either arm of the study.

Interprofessional collaborative care between pharmacists and physicians was shown to have a positive effect on patient adherence through reducing adverse events and optimizing therapeutic outcomes. The inclusion of a pharmacist in a team supporting patients with CKD improved team/physician adherence to primary care guidelines [25].

Song et al. identified that pharmacist-led medication reviews at discharge significantly reduced the number of drug-related errors with a large degree of statistical significance ($p < 0.001$). Data collected to record the number of drug-related errors at discharge, whether the patient requires an appointment with a doctor regarding their CKD therapy within three months of discharge and whether patients present to the emergency department within six months of discharge secondary to problems with their CKD medications supported these findings. Song et al. also reported that medication adherence scores were higher in the intervention group, but not significantly so [26].

Pharmacist and patient perceptions:

Pharmacist-perceived importance of pharmacist-led interventions and their efficacy was discussed in three of the studies. Pharmacists identified that they perceive themselves to be an extremely effective and yet a highly under-utilized asset for improving patient medication adherence. This was attributed to a lack of time provided for applying interventions for improving medication adherence and limited pharmacists employed to fulfil the roles. This was supported by the patient perceptions, where it was reported that 77.5% and 92% of patients found pharmacist interventions to be an extremely satisfying and effective means of improving adherence and would recommend the service to others [27].

Patients also reported their preferences for multi-modal delivery of pharmacist interventions. Patient counselling supplemented with patient information leaflets was the most preferred method (68%), followed by patient counselling alone (20%) and patient leaflets alone (12%). A preference for medication counselling to occur during dialysis (42%) was also reported, with agreement that the provision of educational materials pertaining to medication during dialysis would be helpful (77.5%). Less than half of the participants (37.7%) believed that their physician should be performing the medication counselling role [28].

2. Conclusion:

In conclusion, this study highlights the critical role of pharmacist-led interventions in enhancing medication adherence among patients with chronic kidney disease (CKD). Despite the challenges posed by complex medication regimens and barriers related to health literacy and access, pharmacists have demonstrated their effectiveness in improving patient outcomes through comprehensive medication management and targeted educational strategies. The evidence presented underscores the positive impact of multimodal interventions, such as the use of technology and personalized counseling, in fostering patient engagement and understanding of their treatment plans. Furthermore, both pharmacists and patients recognize the importance of these

interventions, indicating a strong demand for expanded pharmacist involvement in CKD management. Addressing the barriers to adherence, particularly through tailored support and educational resources, can significantly improve the quality of care for CKD patients. Ultimately, integrating pharmacist-led strategies into routine care could alleviate the burden of CKD and enhance the overall health system's efficiency and effectiveness.

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