



OPTIMIZING DIABETES MANAGEMENT: A REVIEW OF PHARMACIST- LED INTERVENTIONS

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Abstract: Diabetes poses a significant global health burden, with millions of individuals affected, particularly in low and middle-income countries. This review explores pharmacist-led interventions in managing type 2 diabetes mellitus (T2DM), emphasizing their effectiveness in improving clinical outcomes. Studies from diverse settings highlight pharmacist involvement in patient education, medication management, and support. Structured programs like the Diabetes Medication Therapy Adherence Clinic (DMTAC) in Malaysia and collaborative care models demonstrate significant improvements in glycemic control and medication adherence. Innovative approaches, including group-based interventions and mobile health platforms, underscore the importance of personalized support and patient engagement. Pharmacists play a critical role in addressing medication access barriers and enhancing adherence among diverse patient populations. This review underscores the need for ongoing evaluation and optimization of pharmacist-led interventions to enhance diabetes care outcomes globally.

Index Terms - Type 2 diabetes mellitus, DMTAC, pharmacist led intervention, Medication adherence

I. INTRODUCTION

Diabetes is a major health issue globally, affecting millions of adults, especially in poorer countries. The International Diabetes Federation (IDF) reports a persistent rise in diabetes cases worldwide, estimating that around 537 million adults had the condition in 2021, with over 75% residing in low and middle-income nations. Diabetes contributes to higher mortality rates due to complications such as infections, cardiovascular issues, stroke, and chronic kidney disease, resulting in over 6.7 million deaths in 2021. The majority of diabetes patients seek treatment in primary and tertiary care facilities. The effectiveness of a multidisciplinary team approach in enhancing diabetes health outcomes has been well-established. In recent times, pharmacists have extended their roles beyond conventional tasks like screening and dispensing medications. Particularly in diabetes management, pharmacists are pivotal due to their accessibility in primary care settings. (1)

Since 2006, pharmacists in hospitals and health clinics across Malaysia have been running a program called the Diabetes Medication Therapy Adherence Clinic (DMTAC) for diabetic outpatients. Before offering services in DMTAC, pharmacists undergo structured training within the Ministry of Health Malaysia. Patients participating in this program are obligated to meet with pharmacists approximately once a month for education on medication and the disease itself, as well as for monitoring treatment outcomes and addressing any issues related to medication (1).

Pharmacists in tertiary care hospitals in Malaysia actively collaborate with physicians and endocrinologists through the Diabetes Medication Therapy Adherence Clinics (DMTAC) to manage diabetes effectively. The Malaysian Ministry of Health established the DMTAC program to achieve better glycemic control and reduce diabetes-related complications. In the DMTAC program, pharmacists work closely with physicians to determine the most effective medication regimens for patients. They are deeply involved in patient education, offering comprehensive counselling on various aspects of diabetes management. This includes the frequency of medication intake, proper storage, and usage of insulin, as well as general diabetes care. Patients with inadequate glycemic control are referred by their physicians to a qualified pharmacist within the DMTAC department. These pharmacists conduct monthly meetings with the patients, providing detailed counselling on diabetes management. They educate patients on self-monitoring of blood glucose levels, such as random blood glucose and fasting blood glucose, and instruct them on the correct use and storage of insulin and insulin devices. Additionally, they discuss potential diabetic complications, necessary dietary and lifestyle changes, self-management strategies, and possible side effects of medications. During these monthly follow-ups, pharmacists also monitor and evaluate patients' self-care practices and medication adherence (3).

Various retrospective and single-centre prospective studies in Malaysia have shown that the DMTAC program significantly improves medication adherence and glycemic control among patients (3).

The primary goal of managing diabetes is to achieve optimal blood glucose levels and prevent complications. This necessitates that patients engage in multiple therapeutic strategies, including sticking to prescribed medications, maintaining a suitable diet, regularly testing blood sugar, and staying physically active. Given that 98% of diabetes care relies entirely on the patient, adherence to these self-care practices is both complex and demanding. Numerous studies have highlighted a common issue of poor adherence to self-care routines and medications. This lack of adherence can result in uncontrolled diabetes and eventually lead to various diabetes-related complications. Having a solid understanding of diabetes is essential for improving patient's adherence to treatment. Research has shown that sufficient knowledge about diabetes significantly influences good self-care practices and greatly reduces the risk of complications. Educating patients about diabetes not only enhances their ability to manage the condition themselves but also helps them adhere more effectively to treatment plans. It is crucial to continuously evaluate the adherence levels to medication and self-care behaviours in individuals with type 2 diabetes mellitus. Such assessments aids healthcare providers in identifying patients who struggle with medication adherence and in developing effective strategies to boost adherence to both medication and self-care practices (2).

Effective management of diabetes and achieving optimal glycemic control are complex processes that hinge on multiple factors. One of the key elements is the adherence of physicians to established clinical guidelines. These guidelines are designed to ensure that patients receive the most appropriate and evidence-based care. However, the cooperation of patients is equally crucial. Patients must comply with their prescribed medication regimens, follow dietary recommendations, engage in regular physical activity, and monitor their blood sugar levels as advised. Non-compliance with medication regimens is a significant issue among patients with type 2 diabetes, leading to various health complications. For instance, skipping doses or improper use of medications can result in poorly controlled blood sugar levels, which increases the risk of complications such as cardiovascular disease, neuropathy, retinopathy, and nephropathy. Therefore, ensuring that patients adhere to their medication schedules, use insulin correctly, and store their medications properly is vital (3).

Healthcare providers play a pivotal role in promoting medication adherence. They can do this by offering comprehensive counselling and education to patients, highlighting the serious consequences of unmanaged diabetes. Education helps patients understand their condition better, recognize the importance of adherence, and feel more empowered to manage their diabetes effectively. Pharmacists are instrumental in the educational process (3) within healthcare due to their extensive expertise in medications and their direct patient interactions. They educate patients on the proper use of prescriptions, including dosage, administration, potential side effects, and what to do in case of missed doses. By providing this critical information, pharmacists help ensure that medications are used safely and effectively, which can significantly improve health outcomes. They also support adherence by identifying barriers and offering practical solutions such as counselling and medication reminders. Additionally, pharmacists play a key role in public health initiatives, offering advice on vaccinations, smoking cessation, and chronic disease management. Their collaborative efforts with doctors, nurses, and other healthcare professionals help create comprehensive care plans for patients with complex conditions. Furthermore, pharmacists contribute to the ongoing education of healthcare providers by sharing updates on the latest pharmacotherapy developments, thereby enhancing overall medical knowledge and practice. Studies from various parts of the world have demonstrated that pharmacist-led counselling significantly enhances clinical outcomes for diabetes patients. Pharmacists can provide detailed instructions on how to take medications, manage side effects, and integrate diabetes care into daily routines. Their regular interaction with patients allows for ongoing monitoring and support, which is critical for maintaining adherence. (3) Moreover, pharmacists can implement and support the use of various adherence aids, such as pill organizers, medication reminders, and mobile apps that alert patients when it's time to take their medications. For patients facing financial barriers, pharmacist can help identify cost-saving opportunities, such as generic medications, patient assistance programs, and discount cards.

The collaborative efforts of endocrinologists and pharmacists have been shown to be particularly effective. This team-based approach to diabetes care leverages the specialized knowledge of endocrinologists in managing complex diabetes cases and the accessibility and patient-centred focus of pharmacists. Together, they can provide a more cohesive and comprehensive care plan, which has been shown to result in better glycemic control and overall health outcomes for patients. (3)

A well-balanced diabetic diet is crucial in conjunction with medications for effective diabetes management. Proper nutrition helps maintain stable blood glucose levels, preventing both hyperglycemia and hypoglycemia, which ensures medications work effectively. It aids in weight management, particularly important for type 2 diabetes, by improving insulin sensitivity and reducing medication dependency. A nutritious diet also prevents complications such as cardiovascular and kidney diseases, enhancing overall health and medication efficacy. Additionally, it provides essential nutrients for energy and well-being, empowering patients to make informed dietary choices that support their treatment plan. Pharmacists play a pivotal role in this process by counselling patients on the importance of a diabetic diet, providing personalized dietary advice, and helping create meal plans that align with their health goals. Through education and support, pharmacists ensure that patients understand how their diet complements their medication regimen, thereby promoting optimal diabetes control and improved health outcomes.

An effective diabetes management is a multifaceted endeavour that requires the active involvement of both healthcare providers and patients. Physician adherence to guidelines, patient compliance with treatment regimens, and the collaborative efforts of healthcare professionals, particularly pharmacists and endocrinologists, are all critical components in achieving optimal glycemic control and preventing diabetes-related complications (3)

II. DISCUSSION

Both studies delve into the effectiveness of pharmacist-led interventions in enhancing clinical outcomes for patients with type 2 diabetes mellitus (T2DM), yet they approach the topic from different angles and methodological perspectives. Lim and Tan's study in Malaysia focuses on evaluating the impact of pharmacist interventions within a structured medication therapy adherence clinic program across multiple centers. Their findings highlight the significance of factors like follow-up frequency and patient default rates in influencing glycemic control. Conversely, Iqbal and Alqahtani's study adopts a randomized controlled trial (RCT) design to assess the effects of pharmacist-led collaborative care on clinical outcomes in T2DM. Their research spans multiple centers and provides insights into the holistic approach of pharmacist-led interventions tailored to individual patient needs. While Lim and Tan's study offers real-world evidence from diverse healthcare settings, Iqbal and Alqahtani's RCT design strengthens causal inference. Integrating insights from both studies could inform comprehensive strategies for optimizing diabetes management, acknowledging the importance of structured adherence programs and collaborative care models while considering contextual nuances and resource constraints. However, further investigation is warranted to assess the long-term sustainability and scalability of pharmacist-led interventions across varied healthcare contexts.(1,3)

The studies collectively provide strong evidence that the DMTAC program is effective in managing diabetes, particularly through pharmacist-led interventions. The consistent reduction in HbA1c levels across different settings and appointment frequencies highlights the program's adaptability and effectiveness. Lee and Selvadurai's focus on appointment intervals adds valuable insight into optimizing visit schedules for better outcomes. Meanwhile, Ying and Keshamalini's extensive data on demographic variables and comprehensive results offer a robust validation of the program's success.

Both studies underscore the critical role of pharmacists in diabetes management, advocating for their increased involvement in patient care. The results suggest that enhancing the frequency of DMTAC appointments could further improve glycemic control, and this insight could be used to refine the program's structure. Overall, these studies affirm the DMTAC's effectiveness and provide actionable recommendations for enhancing diabetes care in public health settings. (4,5)

Both studies provide robust evidence that pharmacist-led interventions significantly improve the management of type-2 diabetes, particularly in glycemic control and patient adherence. The findings suggest that involving pharmacists in diabetes care enhances patient outcomes through regular follow-up, medication management, and personalized education.

Ebid et al.'s study highlights the critical role of pharmacists in improving follow-up and adherence, which are essential for effective diabetes management. Simon's study complements these findings by demonstrating that pharmacist-led interventions not only improve clinical outcomes but also enhance patient satisfaction, indicating a more comprehensive and patient-centred approach to care.

The convergence of results from both studies underscores the importance of pharmacist involvement in diabetes management programs. By providing continuous support, education, and medication management, pharmacists help patients achieve better glycemic control and overall health outcomes. Additionally, the high patient satisfaction reported by Simon's study suggests that patients value and benefit from the personalized care provided by pharmacists, which can lead to sustained engagement and adherence to treatment plans. Overall, these studies collectively reinforce the value of pharmacist-led interventions in managing type-2 diabetes, advocating for their integration into routine diabetes care to optimize patient outcomes and satisfaction. (6,7)

Two notable studies have explored innovative approaches to improving medication adherence and glycemic control in patients with type-2 diabetes mellitus. Chuo Yew Ting and Shahren Ahmad Zaidi Aduce examined the effectiveness of a pharmacist-led structured group-based intervention, while Ben S. Gerber and Alana Biggers focused on the impact of a mobile health (mHealth) intervention. The pharmacist-led intervention involved face-to-face group sessions that provided diabetes education, medication adherence guidance, and lifestyle modification support, resulting in significant reductions in HbA1c levels and improved medication adherence. This approach emphasized personalized interaction and direct accountability, albeit being resource-intensive and less scalable. Conversely, the mHealth intervention utilized digital tools such as text messages, app-based reminders, and educational content, also leading to significant improvements in HbA1c levels and medication adherence. The strength of mHealth lies in its scalability and continuous support, making it accessible to a broader audience despite lacking the personal touch of in-person interactions. Both interventions highlight the importance of patient engagement, suggesting that a hybrid approach combining initial pharmacist-led education with ongoing mHealth support could maximize patient outcomes. This integration would offer personalized care initially, followed by continuous digital support, ensuring comprehensive diabetes management. Efficient resource allocation between these methods could enhance overall diabetes care in a cost-effective manner, particularly benefiting underserved populations. In conclusion, both pharmacist-led and mHealth interventions are effective in managing type-2 diabetes, and their combined use could provide an optimal strategy for improving patient adherence and glycemic control. (8,9)

Two studies explore the role of pharmacist interventions in managing type 2 diabetes, each focusing on different aspects and patient populations. Alisha A. Bias and Rachael A. Hiday's study examines the impact of pharmacist interventions to improve medication access for diabetes patients. Their findings indicate that pharmacist involvement significantly enhances medication accessibility, leading to better medication adherence and glycemic control. The study highlights the pharmacists' role in identifying barriers to access, such as cost and supply issues, and implementing strategies to overcome these obstacles. As a result, patients experience improved health outcomes and a higher quality of diabetes management.

On the other hand, the study by Richard Adongo Afaya, Victoria Bam, and Thomas Bavo Azongo investigates medication adherence and self-care behaviors among type 2 diabetes patients in Ghana. This research reveals considerable challenges in adherence and self-care, primarily due to limited healthcare access, inadequate patient education, and socioeconomic factors. The findings suggest that many patients in Ghana struggle with consistent medication use and effective self-management, resulting in poor glycemic control and increased risk of complications. The study emphasizes the need for enhanced patient education and support systems to improve adherence and self-care practices.

Comparing these studies, both underscore the critical role of pharmacist interventions in improving diabetes management but focus on different aspects of care. Bias and Hiday demonstrate how pharmacists can directly improve medication access, addressing cost and supply issues to enhance adherence and health outcomes. In contrast, Afaya, Bam, and Azongo highlight the broader challenges faced in a resource-constrained setting, where comprehensive support and education are essential to overcoming adherence barriers.(8,10)

III. CONCLUSION

This review highlights the pivotal role of pharmacist-led interventions in enhancing clinical outcomes for patients with type 2 diabetes mellitus (T2DM). Through various approaches such as structured adherence programs, collaborative care models, and mobile health interventions, pharmacists significantly improve glycemic control, medication adherence, and patient satisfaction. The review emphasizes the importance of considering contextual nuances and resource constraints in designing effective interventions, suggesting a hybrid approach that combines pharmacist-led education with digital support for optimal outcomes. Overall, the review emphasizes the need for comprehensive strategies that integrate insights from various studies to optimize diabetes management. It underscores the critical role of pharmacists in providing personalized care, enhancing medication adherence, and improving glycemic control for patients with type 2 diabetes mellitus, necessitating further research to refine strategies and ensure long-term sustainability across diverse healthcare settings.

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