Sarana Publikasi Farmasi Klinik Indonesia
Volume. 1, Issue 1, November 2025
Page No: 1-14

Enhancing Diabetes Management Through Clinical Pharmacist Interventions: A Narrative Review

Andi Kartiani[1], Sadli Syam[2]
[1]Universitas Widya Nusantara, Indonesia
[2]Universitas Tadulako, Indonesia
Correspondent: kartiani@gmail.com[1]

Received : October 13, 2025
Accepted : November 19, 2025
Published : November 30, 2025

Citation: Kartiani, A., & Syam, S., (2025). Enhancing Diabetes Management Through Clinical Pharmacist Interventions: A Narrative Review. Sarana Publikasi Farmasi Klinik Indonesia. 1(1), 1-14.

ABSTRACT: Type 2 Diabetes Mellitus (T2DM) presents an escalating global health challenge, necessitating innovative approaches in chronic disease management. This narrative review critically examines the role of clinical pharmacists in enhancing T2DM care, focusing on their impact on clinical outcomes, patient education, interdisciplinary collaboration, and cost effectiveness. A structured literature search was conducted across PubMed, Scopus, ScienceDirect, and CINAHL databases for studies published between 2010 and 2023. Inclusion criteria targeted peer reviewed articles and empirical research examining pharmacist led interventions in T2DM management. The review identified strong evidence supporting the effectiveness of clinical pharmacists in improving glycemic control, blood pressure, lipid profiles, and patient adherence. Interventions such as therapeutic regimen adjustments, counseling, and promotion of self-monitoring significantly improved patient outcomes and reduced hospitalization rates. Collaborative models like Collaborative Drug Therapy Management (CDTM) were found to enhance the quality and continuity of care. Additionally, pharmacist engagement contributed to reduced healthcare costs and improved patient reported outcomes, including quality of life and satisfaction. Despite these benefits, systemic barriers such as limited regulatory authority and insufficient clinical training in some regions hinder the broader implementation of pharmacist led care. The review highlights the need for policy reforms, interdisciplinary training, and expanded clinical roles to optimize pharmacist integration. Enhancing the pharmacist's role in T2DM management offers a promising strategy to advance chronic disease care globally.

Keywords: Clinical Pharmacist, Type 2 Diabetes Mellitus, Interdisciplinary Care, Pharmacist Intervention, Collaborative Drug Therapy, Medication Adherence, Chronic Disease Management.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) has emerged as a pressing global health concern over the past few decades. The prevalence of T2DM has increased significantly worldwide, primarily due to rapid

urbanization, sedentary lifestyles, poor dietary habits, and the aging global population. According to the International Diabetes Federation (IDF), the global number of individuals diagnosed with diabetes rose from 108 million in 1980 to 463 million in 2019, with projections estimating a rise to 700 million by 2045. T2DM accounts for more than 90% of all diabetes cases, highlighting its significance in the broader diabetes epidemic (Li et al., 2020). In the same period, the prevalence of diabetes increased from 5.9% in 2007 to 8.8% in 2017, illustrating the growing public health burden (Song & Lee, 2018).

In Southeast Asia, particularly Indonesia and neighboring Malaysia, the situation mirrors global trends. Despite concerted public health efforts to raise awareness, the prevalence of T2DM remains high. In Kedah, Malaysia, for example, approximately 25% of the adult population is affected by T2DM (Soffian et al., 2019). This increase is attributed not only to genetic predisposition but also to modifiable risk factors, such as physical inactivity and poor dietary choices (Rodríguez-Gutiérrez & Montori, 2016). The disparities in access to healthcare services, education, and diabetes prevention programs are evident across countries, particularly between low and middle income countries and high income nations. While developed countries offer better infrastructure, issues with medication adherence and lifestyle management persist (Lin et al., 2016).

T2DM management poses multifaceted challenges, especially in designing effective prevention and treatment strategies and increasing public awareness of early detection and disease control. These challenges are amplified by demographic transitions that reflect a growing population of elderly individuals and high risk groups with obesity or a family history of diabetes (Jensen et al., 2021). Effective management necessitates a holistic approach, which includes continuous monitoring, patient education, dietary interventions, and pharmacological strategies.

In clinical practice, particularly within primary and secondary healthcare settings, managing T2DM is often complicated by resource constraints. Limited access to qualified healthcare personnel, essential medications, and diagnostic tools hampers optimal diabetes care, especially in low resource settings (Hussein et al., 2016). Many patients in these environments do not receive the level of care necessary for successful long term disease management. Studies reveal that patients often experience suboptimal glycemic control due to inadequate monitoring and education (Salama et al., 2023).

Additionally, the personalization of therapy remains a critical concern. Factors such as socioeconomic status, access to healthy foods, health literacy, and cultural beliefs influence therapeutic adherence (Chadha et al., 2023). Challenges such as insulin aversion, the complexity of initiating basal bolus regimens, and reluctance to adopt novel pharmacotherapies like GLP 1 receptor agonists and SGLT2 inhibitors highlight the need for structured and supportive interventions (Khera et al., 2021) The COVID 19 pandemic further exacerbated these issues by disrupting health services and altering lifestyle patterns, underscoring the importance of resilience in healthcare systems (Metwally et al., 2021).

One notable area that has gained increasing recognition is the role of clinical pharmacists in chronic disease management. Clinical pharmacists are uniquely positioned to support T2DM care through medication therapy management (MTM), patient counseling, and collaborative practice with

physicians. Their involvement is particularly valuable in medication reconciliation, adherence monitoring, and addressing drug related problems (Nurfauzi et al., 2020) In Indonesia, programs such as Home Pharmacy Care (HPC) exemplify this role, where pharmacists engage directly with diabetic patients to optimize therapeutic outcomes and reduce complications.

Several studies have confirmed the value of pharmacist led interventions in enhancing patient understanding and compliance with T2DM regimens. Educational sessions and regular follow ups facilitated by pharmacists have been shown to improve glycemic control and health outcomes ,(Khairunnisa et al., 2021; Syifannisa et al., 2022). However, limitations remain. Despite their positive attitudes towards diabetes care, pharmacists often face systemic barriers such as inadequate training, underutilization within healthcare teams, and limited access to patient information ,(Khotimah et al., 2022; Pratiwi et al., 2021).

Consequently, the insufficient integration of pharmacists into diabetes care leads to suboptimal patient outcomes, including increased complication rates and reduced quality of life ,(Fadilah et al., 2023; Razak et al., 2022). These issues are exacerbated by a lack of patient education and the absence of pharmacist involvement in therapeutic decision making. A more proactive and collaborative approach is needed to leverage pharmacists' potential in improving diabetes management.

Despite promising results from pharmacist led initiatives, significant research gaps remain. Much of the existing literature focuses narrowly on glycemic control (e.g., HbA1c levels) while overlooking other crucial outcomes such as quality of life, patient empowerment, and medication adherence (Cowart & Sando, 2018). Furthermore, variability in study settings, patient demographics, and intervention models complicates the generalizability of findings (Alghadeer et al., 2021).

This narrative review aims to critically examine the contributions of clinical pharmacists in managing T2DM, emphasizing their impact on a broad range of clinical and humanistic outcomes. The review will explore various pharmacist led interventions, including education, medication optimization, monitoring adverse effects, and interdisciplinary collaboration. It will also assess the effectiveness of these interventions in improving glycemic control, lipid profiles, blood pressure, and patient reported outcomes ,(Anderegg et al., 2018; Dril & Schumacher, 2019).

Moreover, the review will address implementation challenges, such as system level barriers and training deficiencies, and offer strategic recommendations to strengthen the role of pharmacists in T2DM care. This comprehensive approach is intended to inform the development of future intervention models and support policy reforms that facilitate the integration of clinical pharmacists into chronic disease management (Bateman et al., 2023; Clements & Schumacher, 2025).

The primary population focus of this review includes adult T2DM patients receiving care across various healthcare levels, encompassing primary clinics, secondary hospitals, and referral centers. The review considers a wide demographic range, accounting for differences in age, gender, socioeconomic status, comorbidities, and geographic location (Ayadurai et al., 2019; Nabulsi et al., 2020). Special attention is given to vulnerable populations, such as ethnic minorities and residents in rural areas, who may face barriers to accessing comprehensive diabetes care (Halalau et al., 2018; Maiguma et al., 2019).

By analyzing pharmacist led interventions across diverse populations and healthcare systems, this review seeks to provide evidence based insights for optimizing T2DM management. The ultimate goal is to highlight the strategic value of involving clinical pharmacists in chronic disease care and to contribute to the evolving discourse on interdisciplinary approaches to improving diabetes outcomes (Iqbal et al., 2019).

METHOD

This study adopted a narrative review approach to examine the role and effectiveness of clinical pharmacist interventions in the management of Type 2 Diabetes Mellitus (T2DM). A comprehensive literature search was conducted across multiple academic databases, including PubMed, Scopus, ScienceDirect, and CINAHL. The search targeted studies published between 2010 and 2023 to capture recent developments and practices in clinical pharmacy relevant to T2DM management. The search strategy employed predefined combinations of keywords using Boolean operators to maximize precision and coverage. Keywords included "clinical pharmacist," "type 2 diabetes mellitus," "pharmacist intervention," "clinical outcomes," and "self-management."

Selection criteria were established to include peer reviewed studies, systematic reviews, and meta analyses that empirically or theoretically evaluated the impact of clinical pharmacist interventions on patient outcomes in T2DM. Eligible studies were limited to those published in English or Indonesian to ensure linguistic accessibility. Studies focusing on randomized controlled trials, observational studies, and relevant qualitative research were included if they directly assessed pharmacist led initiatives within diabetes care. Excluded were articles that did not explicitly address clinical pharmacist interventions, those centered solely on type 1 diabetes, and studies lacking methodological transparency or relevant outcome measures.

An initial screening of titles and abstracts was followed by a full text evaluation to determine methodological rigor and alignment with the inclusion criteria. To enhance reliability, a multi stage screening process was applied wherein four independent reviewers assessed each study. This process ensured consistency in the selection and minimized bias. Thematic synthesis was then conducted to identify recurring patterns in how pharmacist led interventions influence clinical outcomes, adherence, and patient empowerment in T2DM care. These findings provide valuable insights into the mechanisms and contextual factors that shape the success of clinical pharmacy interventions in chronic disease management.

RESULT AND DISCUSSION

The findings from this narrative review underscore the pivotal role of clinical pharmacists in managing Type 2 Diabetes Mellitus (T2DM), as demonstrated across a range of studies focusing on therapeutic optimization, patient education, interdisciplinary collaboration, and economic and humanistic outcomes. Four thematic domains were identified and explored: medication monitoring and

adjustment, patient education and self-management, interprofessional collaboration and special programs, and the economic and quality of life effects of pharmacist interventions.

Clinical pharmacists have shown significant involvement in the adjustment of antidiabetic medication regimens, particularly through Collaborative Drug Therapy Management (CDTM) approaches. These professionals contribute to dose titration and personalized treatment planning by evaluating patients' responses to medications such as insulin and oral hypoglycemic agents (Andy, 2023; Blood et al., 2025). Their role in multidisciplinary care teams, whether in primary or specialty care settings, has led to demonstrably improved clinical outcomes. Umeh et al. (2025) emphasized the clinical gains achieved through pharmacist integrated primary care, while Reff et al. (2019) highlighted the importance of patient counseling as a mechanism to support therapy adherence and emergency preparedness (Reff et al., 2019; Umeh et al., 2025).

Empirical evidence consistently supports the clinical impact of pharmacist interventions on biomarkers in T2DM patients. One study recorded an average HbA1c reduction of 1.63% in patients receiving pharmacist led coaching and therapy management compared to controls (Aldaajani et al., 2024). In addition to glycemic control, pharmacist involvement in diabetes care has improved hypertension management. Significant reductions in systolic and diastolic blood pressure were observed in patients under pharmacist led care (Dietrich & Gums, 2018). Similarly, pharmacist programs targeting dyslipidemia achieved reductions in LDL cholesterol and elevations in HDL levels, further enhancing cardiovascular risk profiles (Shammari et al., 2022).

These results demonstrate that medication adjustment, proactive monitoring, and patient education form the cornerstone of successful diabetes management. Together, these interventions reduce the risk of long term complications and enhance patients' overall health outcomes (Afrihyia, 2025; Williams, 2020).

The educational role of pharmacists in T2DM self-management has proven essential. Structured counseling programs significantly improved medication adherence and lifestyle choices. For instance, a study in Sukapura, Jakarta, found that pharmacist led self-care education contributed to better glycemic control and behavioral change (Silalahi et al., 2021). Another study by Rismayanti et al. (2021) reported a statistically significant decline in blood glucose levels ($p<0.001$) following pharmacist provided diabetes education (Rismayanti et al., 2021)

Educational interventions enhance patient understanding of diabetes and promote healthy habits, including dietary and physical activity modifications. Merlin et al. (2017) demonstrated that a combination of educational booklets and pharmacist counseling improved both knowledge and self-management behaviors (Merlin et al., 2017). Though no direct correlation was observed between knowledge gains and blood glucose outcomes, the improvement in patient behavior underscored the educational value of pharmacist interventions.

Moreover, pharmacists play a critical role in enhancing patient self-monitoring capabilities. By providing accurate guidance on the use of glucose monitoring devices, pharmacists empower patients to manage their conditions more effectively. Programs like Diabetes Self-Management Education

(DSME) have resulted in significant improvements in self-monitoring behavior and glycemic control (Etlidawati et al., 2024; Megawaty et al., 2023). Technological integration, such as diabetes tracking applications, further supports patients in maintaining motivation and engagement in their care (Salsabila, 2023). These findings illustrate how pharmacist facilitated education and technology adoption improve self-management and clinical outcomes.

Interprofessional collaboration is a central feature in chronic disease management, and the involvement of pharmacists in T2DM care teams is increasingly recognized as beneficial. Pharmacists work alongside physicians and nurses in treatment planning, medication monitoring, and patient counseling (Putri SSF et al, 2023;Lusiana I, Wijoyo Y, 2024). Effective communication among team members enables dynamic care adjustments based on real time patient feedback. Pranata et al. (2023) highlighted how pharmacists' input during interdisciplinary meetings led to more responsive therapy modifications.

This collaborative approach also redistributes responsibilities among care providers. Pharmacists alleviate the burden on physicians by handling medication counseling and adherence monitoring, allowing doctors to focus on diagnosis and complex interventions (Rahmawati D, 2024; Putri DR et al, 2023). This team based model aligns with comprehensive chronic care frameworks that emphasize continuous, coordinated care.

The CDTM model has emerged as a formal structure for pharmacist integration in diabetes care. Under CDTM, pharmacists are authorized to modify drug regimens according to collaborative protocols, participate in goal setting, and monitor treatment progress. Evidence indicates that CDTM enhances glycemic control and reduces the incidence of adverse events (Pranata MM et al, 2023, Setyani ETA et al, 2023). The model's ongoing surveillance mechanisms allow for timely therapeutic adjustments and alignment with lifestyle modifications.

Beyond improved clinical outcomes, pharmacist involvement under CDTM reduces medication errors and enhances patient satisfaction (Yuliansyah MH et al, 2025). This structured collaboration offers a comprehensive framework for improving diabetes management and mitigating the social and economic burdens of the disease.

Economic and humanistic outcomes from pharmacist interventions reveal substantial benefits. Clinical pharmacy services reduce healthcare costs by decreasing hospitalization rates and emergency department visits. A systematic review by Masu et al. (2023) reported significant cost savings attributable to pharmacist led diabetes education and therapy management. In hospital settings, pharmacist counseling reduced both hospitalization frequency and total care expenses (Israwati I et al, 2022).

These financial impacts stem from improved medication adherence and the prevention of costly complications such as nephropathy and diabetic foot ulcers. Santi et al. (2022) found that better medication management by pharmacists led to fewer emergency interventions and intensive treatments. Thus, pharmacist integration in diabetes care can alleviate financial strain on both patients and healthcare systems.

Pharmacist interventions also positively influence patients' quality of life. Counseling addresses not only physical health but also psychological well-being, helping patients build confidence and autonomy in managing T2DM (Toyyibah A et al, 2024). Enhanced health literacy and behavioral change reduce stress levels and improve emotional resilience.

Patients receiving pharmacist led education report higher levels of disease control, self-efficacy, and social functioning. These outcomes reflect a broader role for pharmacists as health educators and patient advocates. Studies by Sinuraya et al. (2019) and Santi et al. (2022) confirmed that pharmacist engagement improves patients' emotional outlook, social relationships, and perceived control over their health.

Ultimately, the integration of pharmacists into diabetes care pathways enhances both the tangible clinical outcomes and the lived experiences of patients. Their contributions extend beyond medication management to encompass holistic, patient centered support that addresses the multifaceted nature of chronic disease management (Lorensia A, Lamur E, 2021). This multifactorial impact affirms the indispensable role of clinical pharmacists in the modern healthcare landscape, particularly in managing complex, chronic conditions such as T2DM.

The findings of this narrative review align strongly with prior international research, reinforcing the notion that pharmacist interventions significantly improve clinical outcomes, reduce healthcare costs, and enhance the quality of life for patients with Type 2 Diabetes Mellitus (T2DM). This consistency across global settings indicates that the inclusion of clinical pharmacists in chronic disease management teams is not merely contextually effective but a broadly applicable strategy. In Iran, for instance, Noormandi et al. (2019) documented that pharmacist led interventions improved medication use and reduced costs associated with diabetes care. Their study emphasized the critical role of hospital pharmacists in therapy management and achieving more efficient treatment outcomes. These conclusions support our review's findings that pharmacist involvement reduces hospital admissions and financial burden in Indonesia.

In Canada, Cheema et al. (2018) found that pharmacist counseling enhanced patient adherence and minimized medication errors during care transitions. Their results demonstrated how structured pharmacist involvement could lower healthcare expenditure while improving patient safety and clinical control, aligning with our findings regarding the benefits of interdisciplinary collaboration and proactive therapeutic adjustments. Furthermore, a systematic review by Noormandi et al. noted improvements in patients' quality of life due to pharmacist interventions, echoing our review's emphasis on education driven empowerment. This consistency across regions highlights the universal applicability of pharmacist led education programs in shifting patient behavior and enhancing diabetes self-management (Laali E,, 2020).

Humanistic outcomes were also consistently observed across various settings. Almontashiri (2024) emphasized the role of pharmacists in improving patient participation and knowledge, further substantiating our findings on how pharmacist provided information enhances disease understanding and therapeutic adherence. Collectively, these studies reinforce the argument that pharmacists serve

as accessible, knowledgeable, and trusted healthcare professionals capable of guiding patients through complex treatment regimens and lifestyle adjustments.

The convergence of these findings across diverse healthcare systems illustrates that pharmacist integration in diabetes care contributes significantly to disease control, cost reduction, and overall well-being. This reinforces the need for global and national policy efforts to expand access to pharmacist led education and therapeutic programs, particularly in low resource settings. Such initiatives can bridge systemic gaps and enhance chronic disease management outcomes universally.

The effectiveness of pharmacists in T2DM management is substantially shaped by systemic and policy related factors. In healthcare systems with supportive legislation, pharmacists often operate within Collaborative Drug Therapy Management (CDTM) frameworks, allowing them to modify therapy regimens and participate actively in clinical decisions. In the United States, Medication Therapy Management (MTM) programs have granted pharmacists the authority to deliver structured, patient centered care. These initiatives are made viable through interprofessional trust, institutional support, and regulatory clarity regarding pharmacist responsibilities (Fazel MT et al, 2017).

Conversely, countries like Indonesia face systemic challenges, including limited recognition of pharmacists' clinical competencies and constrained practice environments. Despite growing educational efforts, pharmacists often lack the formal authority to fully engage in diabetes care planning or to make clinical adjustments independently (Mekdad S, Alsayed L , 2022; Alhabib S et al, 2016). These limitations are compounded by inconsistent implementation of educational reforms and insufficient continuing professional development opportunities. As a result, pharmacists are underutilized in chronic care teams, and their interventions, while valuable, remain under deployed.

Another significant barrier lies in the lack of performance based remuneration systems. In settings where pharmacists are not financially incentivized to deliver clinical services, their participation in T2DM management may be diminished. Studies have demonstrated a positive correlation between pharmacist remuneration and their engagement in clinical activities, suggesting that a performance linked incentive model could enhance clinical pharmacy services (Bharadia R et al, 2017). Moreover, inadequate awareness among physicians and healthcare administrators regarding pharmacists' potential further inhibits collaborative practice, limiting opportunities for pharmacists to contribute meaningfully to therapeutic decision making.

Solutions to these challenges must address multiple levels, beginning with improved training and education for pharmacists. Clinical and community health competencies, alongside communication and team based care skil ls, should be integrated into pharmacy curricula to prepare graduates for active roles in chronic disease management. Educational reforms must also include hands on experiential learning and interdisciplinary clinical placements to enhance real world preparedness.

Policy reforms are equally essential. Governments should develop frameworks that recognize and formalize pharmacists' clinical roles, particularly within models like CDTM. Such policies must clearly delineate pharmacists' responsibilities in chronic care, provide legal backing for their participation in

collaborative therapeutic planning, and ensure regulatory alignment across professional boards (Mawardi F et al, 2024).

Incentive structures also require reconfiguration. Remuneration models that reflect pharmacists' contributions to patient outcomes are necessary to motivate and retain qualified clinical pharmacists. These systems should compensate for clinical services such as medication reconciliation, therapeutic monitoring, and patient counseling, reinforcing pharmacists' value in the healthcare continuum (Alqifari SF et al, 2022).

Furthermore, cross sector collaborations among professional associations, policymakers, and health institutions are vital. These partnerships can elevate public and institutional awareness of pharmacists' roles, strengthen advocacy efforts, and promote the inclusion of pharmacists in national health initiatives. Initiatives such as public diabetes awareness campaigns, community based health screenings, and education programs are potential platforms to amplify the pharmacist's impact (Athiyah U et al, 2019).

REFERENCES

Li M, Ding L, Hu Y, Qin L, Wu Y, Liu W, et al. Herbal Formula LLKL Ameliorates Hyperglycaemia, Modulates the Gut Microbiota and Regulates the Gut-liver Axis in Zucker Diabetic Fatty Rats. J Cell Mol Med. 2020;25(1):367–82.

Song S, Lee JE. Dietary Patterns Related to Triglyceride and High-Density Lipoprotein Cholesterol and the Incidence of Type 2 Diabetes in Korean Men and Women. Nutrients. 2018;11(1):8.

Soffian SSS, Ahmad SB, Chan H, Soelar SA, Hassan MRA, Ismail N. Management and Glycemic Control of Patients With Type 2 Diabetes Mellitus at Primary Care Level in Kedah, Malaysia: A Statewide Evaluation. Plos One. 2019;14(10):e0223383.

Rodríguez-Gutiérrez R, Montori VM. Glycemic Control for Patients With Type 2 Diabetes Mellitus: Our Evolving Faith in the Face of Evidence. Circ Cardiovasc Qual Outcomes. 2016;9(5):504–12.

Lin S, Hufanga S, Linhart C, Morrell S, Taylor R, Magliano DJ, et al. Diabetes and Obesity Trends in Tonga Over 40 Years. Asia Pac J Public Health. 2016;28(6):475–85.

Jensen ET, Stafford JM, Saydah S, D'Agostino RB, Dolan LM, Lawrence JM, et al. Increase in Prevalence of Diabetic Ketoacidosis at Diagnosis Among Youth With Type 1 Diabetes: The SEARCH for Diabetes in Youth Study. Diabetes Care. 2021;44(7):1573–8.

Hussein Z, Taher SW, Singh HKG, Chee WSS. Diabetes Care in Malaysia: Problems, New Models, and Solutions. Ann Glob Health. 2016;81(6):851.

Salama MA, Biggs BK, Creo AL, Prissel R, Nofal AA, Kumar S. Adolescents With Type 2 Diabetes: Overcoming Barriers to Effective Weight Management. Diabetes Metab Syndr Obes Targets Ther. 2023;Volume 16:693–711.

Chadha M, Jain S, Chawla R, Dharmalingam M, Chaudhury T, Talwalkar PG, et al. Evolution of Guideline Recommendations on Insulin Therapy in Type 2 Diabetes Mellitus Over the Last Two Decades: A Narrative Review. Curr Diabetes Rev. 2023;19(8).

Khera R, Scheumie MJ, Lu Y, Ostropolets A, Chen R, Hripcsak G, et al. RESEARCH PROTOCOL: Large-Scale Evidence Generation and Evaluation Across a Network of Databases for Type 2 Diabetes Mellitus. 2021;

Metwally AA, Mehta P, Johnson BS, Nagarjuna A, Snyder M. COVID-19–Induced New-Onset Diabetes: Trends and Technologies. Diabetes. 2021;70(12):2733–44.

Nurfauzi Y, Wahyono D, Rahmawati F, Yasin NM. Penilaian Kebutuhan Home Pharmacy Care Untuk Pasien Diabetes Mellitus Tipe 2 Yang Disertai Hipertensi Pada Usia Lanjut. J Farm Indones. 2020;17(1):63–77.

Syifannisa R, Muthoharoh A, Ningrum WA, Rahmatullah St. Pengaruh Konseling Apoteker Terhadap Kepatuhan Pengobatan Dan Outcome Klinis Pasien DM Tipe 2 Puskesmas Mulyoharjo. J Ilm Kesehat. 2022;15(2):93–102.

Khairunnisa K, Rawitri K, Wiryanto, Wahyuni S. Pengaruh Asuhan Kefarmasian Terhadap Outcome Klinis Dan Kualitas Hidup Pada Pasien Diabetes Melitus Tipe 2. Jfionline Print Issn 1412-1107 E-Issn 2355-696x. 2021;13(2):118–28.

Khotimah K, Rahem A, Adhitama L. Pengetahuan, Sikap, Dan Praktik Apoteker Dalam Penilaian Kepatuhan Pasien Diabetes Di Puskesmas Kota Surabaya. Mpi Media Pharm Indones. 2022;4(1):84–93.

Pratiwi A, Fudholi A, Satibi S. Analisis Faktor Yang Mempengaruhi Implementasi Pelayanan Kefarmasian Puskesmas Di Kota Semarang. Maj Farm. 2021;17(1):1.

Fadilah TN, Kurniawan T, Pebrianti S. Pengetahuan Tentang Pengelolaan Diri Pada Pasien Diabetes Melitus Tipe 2 Beserta Faktor – Faktor Yang Berkontribusi. J Ilm Kesehat Keperawatan. 2023;19(2):151.

Razak A, Ramadhani S, Syafar Muh, Suardi. Studi Pengetahuan, Sikap, Keterampilan Manajemen Diri Dan Dukungan Keluarga Pada Penderita DM Tipe 2 Di Puskesmas Polongbangkeng Selatan. Media Publ Promosi Kesehat Indones Mppki. 2022;5(5):576–81.

Cowart K, Sando KR. Pharmacist Impact on Treatment Intensification and Hemoglobin A1C in Patients With Type 2 Diabetes Mellitus at an Academic Health Center. J Pharm Pract. 2018;32(6):648–54.

Alghadeer S, Alsuwayni B, Almuwayjid AK, Almadi MS, Mubarak A, Khunayn RM b., et al. Glycemic Control and Management in Pharmacist-Led Diabetic Clinic vs. Physician-Led Diabetic Clinic. Medicina (Mex). 2021;58(1):14.

Anderegg MD, Gums TH, Uribe L, MacLaughlin EJ, Hoehns JD, Bazaldua OV, et al. Pharmacist Intervention for Blood Pressure Control in Patients With Diabetes and/or Chronic Kidney Disease. Pharmacother J Hum Pharmacol Drug Ther. 2018;38(3):309–18.

Dril EV, Schumacher C. Impact of Professional Continuous Glucose Monitoring by Clinical Pharmacists in an Ambulatory Care Setting. J Am Coll Clin Pharm. 2019;2(6):638–44.

Bateman MT, McCarthy C, Prioli KM, Wagner M. Post Hoc Depression Analysis From a Pharmacist-Led Diabetes Trial. Ment Health Clin. 2023;13(1):18–24.

Clements JN, Schumacher C. Pharmacists in Diabetes Management: Enhancing Patient Care Through Practice, Education, and Advocacy. J Am Coll Clin Pharm. 2025;8(2):74–6.

Ayadurai S, Sunderland B, Tee LB, Hattingh L. A Training Program Incorporating a Diabetes Tool to Facilitate Delivery of Quality Diabetes Care by Community Pharmacists in Malaysia and Australia. Pharm Pract. 2019;17(2):1457.

Nabulsi NA, Yan CH, Tilton J, Gerber BS, Sharp LK. Clinical Pharmacists in Diabetes Management: What Do Minority Patients With Uncontrolled Diabetes Have to Say? J Am Pharm Assoc. 2020;60(5):708–15.

Maiguma T, Komoto A, Shiraga E, Hagiwara S, Onishi J, Li M, et al. Influence of Pharmacist Intervention on Re-Elevation of Glycated Hemoglobin for Diabetic Outpatients. Hosp Pharm. 2019;56(3):191–7.

Halalau A, Sonmez M, Uddin A, Karabon P, Scherzer ZA, Keeney S. Efficacy of a Pharmacist-Managed Diabetes Clinic in High-Risk Diabetes Patients, a Randomized Controlled Trial - "Pharm-Md." BMC Endocr Disord. 2022;22(1).

Iqbal MZ, Khan AH, Iqbal M, Sulaiman SAS. A Review of Pharmacist-Led Interventions on Diabetes Outcomes: An Observational Analysis to Explore Diabetes Care Opportunities for Pharmacists. J Pharm Bioallied Sci. 2019;11(4):299.

Blood A, Saag HS, Chesler A, Ameripour D, Gutiérrez M, Nguyễn VH, et al. Abstract 4137479: Integrating Ambulatory Care Pharmacists Into Value-Based Primary Care: A Scalable Model for Addressing Cardiometabolic Disease. Circulation. 2024;150(Suppl_1):A4137479–A4137479.

Andy A. The Expanding Role of Pharmacists in Patient Centered Diabetes Care Impacts on Management and Outcomes. J Pharm Res Rep. 2023;1–5.

Umeh AU, Chima UE, Agbo CE, Chiekwe OS, Eze AR, Nwachuya CA, et al. Pharmacist-Led Medication Therapy Management: Impact on Healthcare Utilization and Costs. Am J Pharmacother Pharm Sci. 2025;4:4.

Reff MJ, Shillingburg A, Shah B, Elder CT, Prescott H, Kennerly-Shah J. Front-Line Use of Tyrosine Kinase Inhibitors in Chronic Phase Chronic Myeloid Leukemia: Practice Considerations. J Oncol Pharm Pract. 2019;26(1):156–74.

Aldaajani MZ, Almutairi AM, Almuteriee EH, Almorshed ASA, Alrbian AAM, Alwalie MS, et al. The Role of Clinical Pharmacists in Chronic Disease Management: Review. Int J Health Sci. 2024;8(S1):1766–76.

Dietrich E, Gums JG. Incident-to Billing for Pharmacists. J Manag Care Spec Pharm. 2018;24(12):1273–6.

Shammari YHA, Shammari HAA, Barak TMB, Alharbi BS, Alshammari ST, Alnais SA, et al. Role of Pharmacists in Healthcare Delivery. Int J Health Sci. 2022;5086–98.

Afrihyia E. Evaluating the Role of Pharmacists in Chronic Disease Management: A Review of Patient Outcomes and Healthcare Efficiency. Ijamrs. 2025;5(1):1337–43.

Williams D. The Role of the Pharmacist in Optimizing Outcomes With Roflumilast, a PDE4 Inhibitor for the Treatment of COPD. J Pharm Pract. 2020;35(3):445–54.

Silalahi LE, Prabawati D, Hastono SP. Efektivitas Edukasi Self-Care Terhadap Perilaku Manajemen Diri Pada Pasien Diabetes Melitus Di Wilayah Puskesmas Sukapura Jakarta. Media Publ Promosi Kesehat Indones Mppki. 2021;4(1):15–22.

Rismayanti IDA, Sundayana IM, Ariana PA, Heri M. Edukasi Diabetes Terhadap Penurunan Glukosa Darah Pada Penderita Diabetes Mellitus Tipe 2. J Telenursing Joting. 2021;3(1):110–6.

Merlin R, Arozal W, Sauriasari R, Keban SA. Evaluasi Penerapan Booklet Dan Edukasi Apoteker Pada Pasien Diabetes Melitus Tipe 2 Di Rumah Sakit Mayapada Tangerang. Pharm Sci Res. 2017;4(2):102–10.

Etlidawati E, Romdhoni MF, Yulistika D, Linggardini K. Self-Management Education Pada Pasien Diabetes Melitus. Faletehan Health J. 2024;11(01):45–50.

Megawaty I, Indrawati I, Harli K, Amin M, Wabula I. Efektifitas DSME Pada Penderita Dan Keluarga Terhadap Penurunan Kadar Gula Darah. J-Hest J Health Educ Econ Sci Technol. 2023;5(2):278–86.

Putri SSF, Irfannuddin I, Murti K, Kesuma Y, Darmawan H, Koibuchi N. The Role of Gut Microbiota on Cognitive Development in Rodents: A Meta-Analysis. J Physiol Sci. 2023;73(1):10.

Lusiana I, Wijoyo Y. Pengaruh Edukasi Apoteker Terhadap Keberhasilan Terapi Pasien Diabetes Mellitus Tipe 2: Literature Review. J Surya Med. 2024;10(3):334–9.

Pranata MM, Dahlia D, Arista L. Efektifitas Intervensi Manajemen Diabetes Berbasis Pemberdayaan Terhadap Kontrol Glikemik: Studi Literatur. J Keperawatan. 2023;15(2):643–52.

Rahmawati D. Kualitas Hidup Pasien Diabetes Melitus Dan Hipertensi Dalam Program Penyakit Kronis (Prolanis) Di Indonesia: Narative Review. J Mandala Pharmacon Indones. 2024;10(1):116–22.

Putri DR, Komalasari DR, Muazarroh S. Efektivitas Pemberian Neurosensorimotor Reflex Integration (NSMRI) Dan Play Therapy Movement Terhadap Anak Dengan Autism Spectrum Disorder (ASD): A Case Report. Ahmar Metastasis Health J. 2023;3(3):148–53.

Setyani ETA, Anggraini D, Aulia RA, Mukti AW. Artikel Review : Peranan Apoteker Dalam Pelayanan Kefarmasian Pada Pasien Diabetes Melitus (DM). Farm J Sains Farm. 2023;4(2):93–106.

Yuliansyah MH, Triharini M, Yuni I, Prayoga DH. Inovasi Pengembangan Instrumen Perawatan Luka Dalam Meningkatkan Cost Effectiveness. J Manaj Kesehat Yayasan Rs Dr Soetomo. 2024;10(1):91.

Masu VIF, Riwu M, Kareri DGR, Damanik EMB. Diabetes Self Management Education Sebagai Perawatan Mandiri Pasien Diabetes Melitus Di Tengah Masa Pandemi COVID-19 Systematic Review. Cendana Med J Cmj. 2023;11(1):182–92.

Israwati I, Lukman L, Hamid AN. Efektivitas Media Flashcard Untuk Meningkatkan Kemampuan Kognitif Anak Usia Dini. Sultra Educ J. 2022;2(1):1–9.

Santi MDS, Ni Wayan Rika Kumara Dewi, Yasa GT. Peningkatan Pemahaman Siswa Farmasi Tentang Peran Farmakoekonomi Dalam Pelayanan Kesehatan Di SMK Bintang Persada Denpasar. J Pengabdi Kpd Masy Wahana Usada. 2022;4(2):82–8.

Toyyibah A, Niluh Putu Dian Rosalina Handayani Narsa, Romadhon F. Pengaruh Intervensi Pemerintah Dalam Penanganan Covid-19 Terhadap Return Saham. Wahana Ris Akunt. 2024;12(1):63.

Sinuraya RK, Oktrina A, Handayani NK, Destiani DP, Puspitasari IM. Pelayanan Farmasi Klinis Meningkatkan Kontrol Gula Darah Pasien Diabetes Melitus. Indones J Clin Pharm. 2019;8(4):271.

Lorensia A, Lamur E. Persepsi Apoteker Terhadap Apoteker Online Di Wilayah Surabaya Timur. Keluwih J Kesehat Dan Kedokt. 2021;2(2):96–101.

Noormandi A, Karimzadeh I, Mirjalili M, Khalili H. Clinical and Economic Impacts of Clinical Pharmacists' Interventions in Iran: A Systematic Review. Daru J Pharm Sci. 2019;27(1):361–78.

Cheema E, Alhomoud FK, Kinsara ASA, Alsiddik J, Barnawi MH, Al-Muwallad MA, et al. The Impact of Pharmacists-Led Medicines Reconciliation on Healthcare Outcomes in Secondary Care: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Plos One. 2018;13(3):e0193510.

Laali E, Ghorbani A, Najafi S, Sarayani A, Ghafari S, Makarem J, et al. Evaluation of Pharmacist-based Interventions to Optimise Utilisation of Parenteral Paracetamol in a Teaching Hospital in Iran. J Pharm Pract Res. 2020;50(1):65–70.

Almontashiri MH. The Evolving Role of Pharmacists in Healthcare: A Systematic Review of Clinical, Community, and Digital Health Interventions. Ajbr. 2024;1085–91.

Fazel MT, Bagalagel A, Lee JK, Martin J, Slack M. Impact of Diabetes Care by Pharmacists as Part of Health Care Team in Ambulatory Settings: A Systematic Review and Meta-Analysis. Ann Pharmacother. 2017;51(10):890–907.

Mekdad S, Alsayed L. Quality Improvement Project to Study the Impact of Clinical Pharmacist in Diabetic Management of Admitted Cardiac Patients. 2022;

Alhabib S, Aldraimly M, Alfarhan A. An Evolving Role of Clinical Pharmacists in Managing Diabetes: Evidence From the Literature. Saudi Pharm J. 2016;24(4):441–6.

Bharadia R, Lorenz K, Cor K, Simpson SH. Financial Remuneration Is Positively Correlated With the Number of Clinical Activities: An Example From Diabetes Management in Alberta Community Pharmacies. Int J Pharm Pract. 2017;26(1):77–80.

Mawardi F, Lestari AS, Kusnanto H, Sasongko EPS, Hilmanto D. Infringement of Clinical Pharmacist's Authority. Br J Clin Pharmacol. 2024;91(6):1607–9.

Alqifari SF, AlMharwal BT, Aldawish R, Almokhlef SA. Impact of Pharmacist-Led Clinics on Health Outcomes of Patients With Diabetes at a Ministry of Health Diabetes &Amp; Endocrinology Center, Saudi Arabia: A Retrospective Study. Cureus. 2022;

Athiyah U, Setiawan CD, Nugaheni G, Zairina E, Utami W, Hermansya A. Assessment of Pharmacists' Knowledge, Attitude and Practice in Chain Community Pharmacies Towards Their Current Function and Performance in Indonesia. Pharm Pract. 2019;17(3):1518.