

# Impact of Clinical Pharmacist, Laboratory Specialist, and Nutritionist Collaboration on the Management of Type 2 Diabetes

Mona A. Alhalal<sup>1</sup>, Moutaz F. Alluhaydan<sup>2</sup>, Najla A. Alturki<sup>3</sup>,  
Hayat M. Almussad<sup>4</sup>, Rawan S. Aleidi<sup>5</sup>, Moneerah M. Alsubieg<sup>6</sup>,  
Awad M. Alqahtani<sup>7</sup>

Health Affairs at the Ministry of National Guard

## Abstract

The prevalence of type 2 diabetes mellitus (T2DM) is rising globally, presenting a significant public health challenge. This study aimed to evaluate the impact of multidisciplinary care involving clinical pharmacists, laboratory specialists, and clinical nutritionists on glycemic control, medication adherence, and patient satisfaction in hospitalized T2DM patients. A retrospective cohort study was conducted over 12 months in a tertiary hospital, involving 200 patients receiving multidisciplinary care. The findings demonstrated significant improvements in HbA1c levels, medication adherence, and patient satisfaction compared to standard care. Multidisciplinary care was associated with reduced length of hospital stay and fewer diabetes-related complications, underscoring the benefits of an integrated care approach in managing T2DM.

**Keywords:** Type 2 Diabetes Mellitus, Multidisciplinary Care, Clinical Pharmacists, Laboratory Specialists, Clinical Nutritionists, Glycemic Control, Medication Adherence, Patient Satisfaction.

## Introduction

The prevalence of type 2 diabetes mellitus (T2DM) has been on the rise globally, becoming a significant public health challenge that demands an integrated approach to its management (Saeedi et al., 2019). Effective management of T2DM requires more than glycemic control, as it involves comprehensive care addressing lifestyle modifications, dietary counseling, and medication adherence (American Diabetes Association, 2023). Multidisciplinary approaches that include clinical pharmacists, laboratory specialists, and clinical nutritionists have shown potential in improving health outcomes for patients with T2DM by offering a holistic care model (Bain et al., 2019).

Clinical pharmacists play a crucial role in optimizing medication regimens, improving adherence, and reducing the risk of adverse drug events (Alsuwayni and Alhossan, 2020). Pharmacist-led interventions have been shown to enhance glycemic control through medication adjustments and patient education, leading to improved health-related quality of life for diabetes patients (Santschi et al., 2012). The involvement of laboratory specialists is equally important, as their expertise ensures accurate and timely monitoring of key biomarkers, including HbA1c, lipid profiles, and renal function, which are vital for optimizing treatment strategies and evaluating disease progression (Sacks et al., 2011).

Nutritional management is a cornerstone in the control of T2DM, and the role of clinical nutritionists cannot be understated. Evidence suggests that individualized dietary interventions guided by nutritionists improve glycemic control, facilitate weight management, and reduce the need for medication escalation (Evert et al., 2019). The collaboration between pharmacists, laboratory specialists, and nutritionists provides an integrated approach that has demonstrated improved clinical outcomes in several chronic disease management settings, highlighting the importance of team-based care in diabetes management (Smith et al., 2016).

Despite the recognized benefits of multidisciplinary interventions, there remains a gap in understanding the extent of impact when these roles are combined specifically for the management of T2DM in hospital settings. Therefore, this study aims to evaluate the impact of the collaborative efforts of clinical pharmacists, laboratory specialists, and nutritionists on glycemic control, medication adherence, and overall quality of care among hospitalized patients with T2DM.

## Literature Review

Multidisciplinary care has increasingly been recognized as a gold standard in chronic disease management, including for type 2 diabetes mellitus (T2DM). Several studies have highlighted the benefits of involving different healthcare professionals, such as pharmacists, nutritionists, and laboratory specialists, in the integrated management of T2DM. This review will explore the existing literature on the roles of each of these professionals in managing T2DM and how their collaboration enhances patient outcomes.

### Role of Clinical Pharmacists in Diabetes Management

The involvement of clinical pharmacists in diabetes care has shown significant improvements in patient outcomes, particularly regarding medication adherence and glycemic control. Studies have demonstrated that pharmacist-led interventions, which include medication counseling, adjustments in medication regimens, and education on diabetes management, are associated with better glycemic control and reduced hospital admissions (Santschi et al., 2012; Alsuwayni and Alhossan, 2020). According to Alsuwayni and Alhossan (2020), pharmacist-led diabetes management programs significantly improved patients' HbA1c levels, indicating better glycemic control. Similarly, a systematic review by Santschi et al. (2012) found that pharmacist interventions effectively reduced cardiovascular risk factors in patients with diabetes, thereby reducing the incidence of diabetes-related complications.

Pharmacists also play a pivotal role in identifying and mitigating adverse drug events, which are particularly common among patients with T2DM who often require multiple medications (Bain et al., 2019). The integration of pharmacists into multidisciplinary care teams ensures that patients receive comprehensive medication management, thereby reducing the likelihood of adverse outcomes and enhancing patient safety (Smith et al., 2016).

### Role of Laboratory Specialists in Diabetes Management

Accurate and timely laboratory testing is crucial for the effective management of T2DM. Laboratory specialists play an essential role in monitoring biomarkers such as HbA1c, fasting glucose, lipid profiles, and renal function, which are critical for evaluating the patient's condition and adjusting treatment as needed (Sacks et al., 2011). Sacks et al. (2011) highlighted that laboratory monitoring helps in assessing the

effectiveness of treatment regimens and detecting early signs of complications, thereby allowing timely interventions.

The contribution of laboratory specialists goes beyond routine testing; they are also instrumental in ensuring the quality and reliability of laboratory results, which directly impacts clinical decision-making. By collaborating with pharmacists and nutritionists, laboratory specialists can help tailor treatment regimens based on real-time data, thus enhancing the overall quality of diabetes care (Bain et al., 2019).

### Role of Clinical Nutritionists in Diabetes Management

Nutritional management is a fundamental component of T2DM treatment. Clinical nutritionists provide individualized dietary plans that are tailored to the specific needs of each patient, helping to improve glycemic control and facilitate weight management (Evert et al., 2019). Nutrition therapy, when combined with pharmacological interventions, has been shown to significantly reduce HbA1c levels and improve other metabolic parameters in patients with T2DM (Evert et al., 2019).

The role of nutritionists extends beyond dietary planning; they provide ongoing support and education, empowering patients to make healthier food choices and adhere to dietary recommendations. Studies have shown that when clinical nutritionists work alongside pharmacists and laboratory specialists, patients are more likely to achieve their glycemic targets and experience fewer complications (Smith et al., 2016). Bain et al. (2019) also noted that nutritionists' involvement in multidisciplinary teams has been associated with improved patient satisfaction and quality of life.

### Benefits of Multidisciplinary Collaboration

The collaborative efforts of pharmacists, laboratory specialists, and nutritionists provide a comprehensive approach to diabetes management that addresses the multifaceted nature of the disease. Bain et al. (2019) found that patients receiving care from a multidisciplinary team were more likely to achieve their target HbA1c levels and had fewer diabetes-related complications compared to those receiving standard care. Smith et al. (2016) also emphasized the importance of coordinated care in managing multimorbidity, particularly in chronic diseases like T2DM.

The integration of these healthcare professionals into a cohesive care team facilitates better communication and ensures that all aspects of the patient's care are addressed. This approach not only improves clinical outcomes but also enhances patient satisfaction and engagement in their own care (American Diabetes Association, 2023). By providing a support network that includes expertise in medication management, laboratory testing, and nutritional counseling, multidisciplinary teams can significantly improve the overall quality of diabetes care.

### Methodology

This study was conducted in a tertiary hospital setting over a 12-month period. The study employed a retrospective cohort design to evaluate the impact of multidisciplinary care on hospitalized patients with type 2 diabetes mellitus (T2DM). The multidisciplinary care team consisted of clinical pharmacists, laboratory specialists, and clinical nutritionists who collaborated on patient management throughout their hospital stay.

## Study Population

The study population included adult patients (aged 18 years and above) who were admitted to the hospital with a primary diagnosis of T2DM. Patients were eligible for inclusion if they received multidisciplinary care from a clinical pharmacist, laboratory specialist, and clinical nutritionist during their hospitalization. A total of 200 patients who met the inclusion criteria were selected for the study using convenience sampling.

## Data Collection

Data were collected retrospectively from patients' electronic medical records (EMRs). Key variables included patients' demographic information (age, gender, duration of diabetes), clinical outcomes (HbA1c levels, fasting blood glucose), medication adherence, nutritional status, and length of hospital stay. Laboratory data, including HbA1c and lipid profiles, were extracted to assess glycemic control and cardiovascular risk factors. Additionally, the number of medication adjustments made by the clinical pharmacist and dietary interventions provided by the nutritionist were recorded.

## Intervention

The multidisciplinary intervention involved three components: (1) medication management by clinical pharmacists, including medication reconciliation, adjustments to diabetes medications, and patient education on medication use; (2) laboratory monitoring by laboratory specialists, including timely testing of HbA1c, lipid profiles, and renal function; and (3) nutritional counseling by clinical nutritionists, which included individualized dietary plans and continuous dietary education. The three healthcare professionals met regularly to discuss patients' progress and adjust care plans as needed.

## Outcome Measures

The primary outcome measures were changes in HbA1c levels and medication adherence rates from admission to discharge. Secondary outcomes included length of hospital stay, incidence of diabetes-related complications during hospitalization, and patient satisfaction with care. Medication adherence was assessed using the Medication Adherence Rating Scale (MARS), while patient satisfaction was measured using a validated patient satisfaction survey.

## Data Analysis

Data analysis was conducted using SPSS version 27. Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Paired t-tests were used to compare pre- and post-intervention HbA1c levels. Logistic regression analysis was performed to assess the association between multidisciplinary care and medication adherence. Statistical significance was set at  $p < 0.05$ .

## Ethical Considerations

The study was approved by the ethics committee. Patient confidentiality was maintained throughout the study by de-identifying patient records, and data access was restricted to authorized personnel only.

## Findings

The study findings demonstrated significant improvements in glycemic control, medication adherence, and patient satisfaction among the participants who received multidisciplinary care. A summary of the key findings is provided below.

### Glycemic Control

The mean HbA1c level at admission was 9.2% (SD = 1.5), which decreased to 7.8% (SD = 1.2) at discharge ( $p < 0.001$ ), indicating significant improvement in glycemic control after multidisciplinary care (Table 1).

Variable	Admission (Mean $\pm$ SD)	Discharge (Mean $\pm$ SD)	p-value
HbA1c (%)	9.2 $\pm$ 1.5	7.8 $\pm$ 1.2	< 0.001
Fasting Blood Glucose (mg/dL)	210 $\pm$ 50	160 $\pm$ 45	< 0.001

### Medication Adherence

Medication adherence rates improved significantly, with 60% of patients demonstrating high adherence at admission, compared to 85% at discharge ( $p < 0.01$ ) (Table 2).

Variable	Admission (%)	Discharge (%)	p-value
High Medication Adherence	60	85	< 0.01

### Length of Hospital Stay and Complications

The average length of hospital stay was 10 days (SD = 3) for patients receiving multidisciplinary care, compared to 14 days (SD = 4) for a comparable cohort receiving standard care ( $p < 0.05$ ) (Table 3). Additionally, the incidence of diabetes-related complications during hospitalization was significantly lower in the multidisciplinary care group (10%) compared to the standard care group (25%) ( $p < 0.01$ ).

Variable	Multidisciplinary Care (Mean $\pm$ SD)	Standard Care (Mean $\pm$ SD)	p-value
Length of Hospital Stay (days)	10 $\pm$ 3	14 $\pm$ 4	< 0.05
Incidence of Complications (%)	10	25	< 0.01

### Patient Satisfaction

Patient satisfaction scores were significantly higher among patients receiving multidisciplinary care, with 92% of patients reporting high satisfaction compared to 70% in the standard care group ( $p < 0.01$ ) (Table 4).

Variable	Multidisciplinary Care (%)	Standard Care (%)	p-value
High Patient Satisfaction	92	70	< 0.01

## Discussion

The findings from this study indicate that multidisciplinary care involving clinical pharmacists, laboratory specialists, and clinical nutritionists significantly improves glycemic control, medication adherence, and patient satisfaction in hospitalized patients with T2DM. The reduction in HbA1c levels and fasting blood glucose suggests that collaborative care effectively addresses the multifaceted needs of patients with T2DM. Furthermore, improved medication adherence rates and shorter hospital stays reflect the positive impact of multidisciplinary interventions on patient outcomes. These findings are consistent with previous studies that emphasize the importance of integrated care in managing chronic diseases such as diabetes (Bain et al., 2019; Smith et al., 2016).

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#### خلاصة

يتزايد انتشار مرض السكري من النوع 2 (T2DM) على مستوى العالم، مما يمثل تحديًا كبيرًا للصحة العامة. تهدف هذه الدراسة إلى تقييم تأثير الرعاية متعددة التخصصات التي تشمل الصيادلة السريريين، وأخصائيي المختبرات، وأخصائيي التغذية السريرية على التحكم في نسبة السكر في الدم، والالتزام بالأدوية، ورضا المرضى لدى مرضى T2DM في المستشفى. تم إجراء دراسة أترابية بأثر رجعي على مدى 12 شهرًا في مستشفى ثالثي، شملت 200 مريض يتلقون رعاية متعددة التخصصات. أظهرت النتائج تحسينات كبيرة في مستويات HbA1c، والالتزام بتناول الأدوية، ورضا المرضى مقارنة بالرعاية القياسية. وارتبطت الرعاية متعددة التخصصات بانخفاض مدة الإقامة في المستشفى وتقليل المضاعفات المرتبطة بمرض السكري، مما يؤكد فوائد نهج الرعاية المتكاملة في إدارة مرض السكري من النوع الثاني.

الكلمات المفتاحية: داء السكري من النوع الثاني، رعاية متعددة التخصصات، الصيادلة السريريين، أخصائيي المختبرات، أخصائيي التغذية السريرية، مراقبة نسبة السكر في الدم، الالتزام بالأدوية، رضا المرضى.