# Investigate the Impact of Pharmacist-Led Diabetes Education and Medication Therapy Management on Glycemic Control in Hospitalized Patients

**Ali S. Aldossari[1], Mohammed S. Aljeaid[2], Abdulrahman A. Bin Mousa[3], Fahad M. Aljuraid[4]**

Health Affairs at the Ministry of National Guard

**Abstract**

**Diabetes mellitus is a prevalent chronic condition with significant morbidity and mortality. This study aimed to evaluate the impact of pharmacist-led diabetes education and medication therapy management (MTM) on glycemic control in hospitalized patients with type 2 diabetes. Conducted at a tertiary hospital over six months, the study involved 150 patients who were randomly assigned to either the intervention group, which received pharmacist-led education and MTM, or the control group, which received standard care. The findings indicated significant improvements in fasting blood glucose (FBG) and HbA1c levels, reduced length of hospital stay, lower incidence of hypoglycemia, and higher patient satisfaction in the intervention group compared to the control group. The results underscore the importance of integrating pharmacists into inpatient diabetes care teams to optimize outcomes.**

**Keywords: Diabetes Mellitus, Pharmacist-Led Interventions, Medication Therapy Management, Glycemic Control, Patient Education, Hospitalized Patients**

## Introduction

Diabetes mellitus is a chronic condition affecting millions worldwide, with significant morbidity and mortality rates due to complications such as cardiovascular diseases, neuropathy, and nephropathy. Effective diabetes management, particularly for hospitalized patients, is crucial to improving clinical outcomes and quality of life. However, managing diabetes can be complex, especially in patients with multiple comorbidities and polypharmacy, which often leads to suboptimal glycemic control (Hayward et al., 2005).

Pharmacists, as integral members of the healthcare team, play a crucial role in diabetes management through medication therapy management (MTM) and patient education. Pharmacist-led interventions, including patient counseling, regular medication reviews, and proactive monitoring, have shown promise in improving glycemic control and reducing diabetes-related complications (Hayward et al., 2005). Several studies have highlighted the impact of pharmacist-driven case management and educational initiatives, demonstrating improved outcomes in diabetes management when pharmacists are actively involved (Hayward et al., 2005; Cranor et al., 2003; Garrett &Bluml, 2005).

Despite the growing evidence on the role of pharmacists in diabetes care, there is limited data specifically focusing on hospitalized patients. The unique challenges of the inpatient environment—including acute illness, medication changes, and variable patient adherence—warrant further investigation into the impact of

pharmacist-led interventions on glycemic control in this setting. The present study aims to explore the effectiveness of pharmacist-led diabetes education and MTM on glycemic control in hospitalized patients, contributing to the understanding of pharmacists' roles in optimizing diabetes care in acute settings.

**Literature Review**

Pharmacist Interventions in Diabetes Management

Pharmacists have emerged as key healthcare professionals in managing chronic conditions such as diabetes, particularly through interventions such as medication therapy management (MTM), patient education, and case management. The involvement of pharmacists in diabetes care has been shown to significantly improve patient outcomes, including glycemic control, adherence to medication, and reduction in diabetes-related complications. Cranor et al. (2003) reported that pharmacist-led interventions, as part of the Asheville Project, demonstrated long-term clinical and economic benefits, including improved glycemic control and reduced healthcare costs. This study underscores the potential of pharmacists to play a proactive role in chronic disease management through structured interventions.

Garrett and Bluml (2005) also highlighted the effectiveness of pharmacist-led patient self-management programs for diabetes. The study found that pharmacist interventions led to significant improvements in clinical, humanistic, and economic outcomes. Patients who participated in pharmacist-led programs experienced better glycemic control, reduced complications, and enhanced quality of life. These findings suggest that pharmacist involvement in diabetes care can address both clinical and economic aspects of diabetes management, emphasizing the importance of pharmacist-driven patient education and individualized care plans.

Hayward et al. (2005) conducted a randomized controlled trial that focused on proactive case management of high-risk patients with type 2 diabetes by clinical pharmacists. The study demonstrated that pharmacist-led case management resulted in improved glycemic control and reduced the risk of diabetes-related complications. This proactive approach, which included individualized care, regular follow-ups, and medication adjustments, highlighted the value of pharmacists as key contributors to diabetes management, particularly for patients with complex health needs.

The Role of Pharmacist-Led Education and Medication Therapy Management (MTM)

Pharmacist-led diabetes education has been identified as a crucial component of diabetes management. Through patient counseling and education, pharmacists can empower patients to understand their condition, adhere to their treatment regimens, and make informed decisions about their health. Studies have shown that pharmacist-led education significantly improves patients' knowledge of diabetes and their ability to manage the condition effectively (Cranor et al., 2003; Garrett &Bluml, 2005). Pharmacists are well-positioned to provide tailored education that addresses individual patient needs, which is particularly important in a hospital setting where patients may be dealing with acute illness and changes in medication.

Medication therapy management (MTM) is another key area where pharmacists contribute significantly to diabetes care. MTM involves a comprehensive review of a patient's medications, identification of potential drug-related problems, and optimization of the medication regimen to achieve better outcomes. The effectiveness of MTM in improving glycemic control has been demonstrated in several studies. For instance, Hayward et al. (2005) found that pharmacist-led MTM interventions led to better glycemic control in high-risk patients, highlighting the potential of MTM to address complex medication needs and improve overall diabetes management.

Pharmacist Interventions in the Inpatient Setting

While there is substantial evidence supporting pharmacist interventions in outpatient diabetes management, there is limited research focusing on the inpatient setting. Hospitalized patients with diabetes face unique challenges, such as acute illnesses, frequent changes in medication, and variable adherence. Pharmacist-led interventions in the inpatient setting can help address these challenges by ensuring appropriate medication use, providing education to patients and healthcare providers, and optimizing glycemic control during hospital stays. The involvement of pharmacists in managing diabetes in hospitalized patients can lead to better outcomes, reduced length of hospital stay, and fewer complications.

Hayward et al. (2005) emphasized the importance of proactive case management by pharmacists in managing high-risk patients. This approach is particularly relevant in the inpatient setting, where patients may require frequent monitoring and medication adjustments. Pharmacist interventions, including MTM and patient education, can help ensure that hospitalized patients receive optimal diabetes care, ultimately improving clinical outcomes and quality of life.

**Methodology**

This study was conducted at a tertiary hospital over a six-month period to evaluate the impact of pharmacist-led diabetes education and medication therapy management (MTM) on glycemic control in hospitalized patients with type 2 diabetes mellitus. A total of 150 patients admitted with type 2 diabetes were included in the study. Patients were randomly assigned to either the intervention group, which received pharmacist-led diabetes education and MTM, or the control group, which received standard care without additional pharmacist intervention.

The intervention group received individualized diabetes education sessions conducted by clinical pharmacists. These sessions included information on diabetes pathophysiology, medication adherence, lifestyle modifications, and self-monitoring of blood glucose. Pharmacists also conducted medication reviews to identify and resolve potential drug-related problems, adjusted medication regimens as needed, and provided recommendations to the healthcare team for optimizing patient care. Follow-up visits were conducted every 48 hours during the hospital stay to assess progress, adjust therapy, and provide ongoing support.

Data on glycemic control were collected through fasting blood glucose (FBG) and HbA1c measurements at baseline and at discharge. Additional outcomes, such as length of hospital stay, incidence of hypoglycemia, and patient satisfaction, were also measured. The control group received usual care from the medical team without the added pharmacist interventions.

Data were analyzed using descriptive statistics and inferential analysis. Mean changes in FBG and HbA1c levels were compared between the intervention and control groups using paired t-tests. The incidence of hypoglycemia and length of hospital stay were compared using chi-square tests. Patient satisfaction was assessed using a validated questionnaire administered at discharge, and responses were analyzed to determine the perceived impact of pharmacist-led interventions.

Ethical approval was obtained from the ethics committee, and written informed consent was obtained from all participants prior to their inclusion in the study. Confidentiality and anonymity of the participants were maintained throughout the research process.

**Findings**

The findings of this study demonstrated significant improvements in glycemic control among patients in the intervention group compared to the control group. The mean fasting blood glucose (FBG) levels and HbA1c levels at baseline and at discharge for both groups are summarized in Table 1.

**Table 1: Glycemic Control Outcomes**

| Outcome Measure | Intervention Group (n=75) | Control Group (n=75) |
|---|---|---|
| Baseline FBG (mg/dL) | 198.5 ±32.1 | 195.3 ±30.4 |
| Discharge FBG (mg/dL) | 150.2 ±25.6 | 175.8 ±28.9 |
| Baseline HbA1c (%) | 9.5 ±1.2 | 9.3 ±1.3 |
| Discharge HbA1c (%) | 7.8 ±0.9 | 8.9 ±1.1 |

The intervention group showed a statistically significant reduction in both FBG and HbA1c levels compared to the control group ($p < 0.05$). This indicates that pharmacist-led diabetes education and MTM were effective in improving glycemic control during hospitalization.

Table 2 presents the comparison of additional outcomes, including length of hospital stay and incidence of hypoglycemia, between the two groups.

**Table 2: Additional Outcomes**

| Outcome Measure | Intervention Group (n=75) | Control Group (n=75) |
|---|---|---|
| Length of Hospital Stay (days) | 6.4 ±1.7 | 8.1 ±2.0 |
| Incidence of Hypoglycemia (%) | 8% | 15% |

Patients in the intervention group had a shorter length of hospital stay and a lower incidence of hypoglycemia compared to those in the control group. These differences were statistically significant ($p < 0.05$), suggesting that pharmacist interventions contributed to better clinical outcomes and reduced complications.

Table 3 summarizes the patient satisfaction scores for both groups.

**Table 3: Patient Satisfaction Scores**

| Satisfaction Measure | Intervention Group (n=75) | Control Group (n=75) |
|---|---|---|
| Overall Satisfaction (%) | 92% | 78% |

Patients in the intervention group reported higher levels of satisfaction with their care compared to the control group, indicating a positive impact of pharmacist-led education and support on the patient experience.

**Discussion**

The findings of this study provide compelling evidence of the positive impact of pharmacist-led diabetes education and medication therapy management (MTM) on glycemic control in hospitalized patients with

type 2 diabetes. The intervention group demonstrated significant reductions in fasting blood glucose (FBG) and HbA1c levels compared to the control group, indicating that pharmacist interventions were effective in achieving better glycemic outcomes during hospitalization. These results align with previous studies that have highlighted the effectiveness of pharmacist-led interventions in diabetes management (Cranor et al., 2003; Garrett &Bluml, 2005; Hayward et al., 2005).

One notable finding of this study was the significant reduction in the length of hospital stay for patients in the intervention group compared to the control group. By providing individualized education, addressing medication-related issues, and ensuring optimal glycemic control, pharmacists were able to contribute to faster recovery and discharge. This finding is consistent with previous research suggesting that pharmacist interventions can lead to improved clinical outcomes and reduced healthcare utilization (Garrett &Bluml, 2005).

The incidence of hypoglycemia was also lower in the intervention group, which can be attributed to the proactive monitoring and medication adjustments made by pharmacists. Hypoglycemia is a common concern in hospitalized patients with diabetes, and reducing its incidence is crucial for patient safety. The findings of this study emphasize the importance of pharmacist-led monitoring and medication optimization in minimizing hypoglycemia risk.

In addition to clinical outcomes, patient satisfaction was significantly higher in the intervention group. Patients who received pharmacist-led education and support reported greater satisfaction with their care, which is an important indicator of the quality of healthcare services. The positive impact on patient satisfaction highlights the value of involving pharmacists in patient education and support, particularly in the inpatient setting where patients may feel overwhelmed by their condition and treatment.

This study contributes to the growing body of evidence supporting the integration of pharmacists into the multidisciplinary healthcare team for diabetes management. Pharmacists, with their expertise in medication management and patient education, are well-positioned to address the complex needs of hospitalized patients with diabetes. The findings suggest that pharmacist-led interventions can lead to improved glycemic control, reduced complications, shorter hospital stays, and enhanced patient satisfaction.

However, there are some limitations to this study. The sample size was relatively small, and the study was conducted at a single tertiary hospital, which may limit the generalizability of the findings. Future studies with larger sample sizes and conducted across multiple healthcare settings are needed to confirm these results and provide a more comprehensive understanding of the impact of pharmacist interventions on diabetes management in hospitalized patients.

In conclusion, the findings of this study demonstrate the significant benefits of pharmacist-led diabetes education and MTM in improving glycemic control, reducing complications, and enhancing patient satisfaction in hospitalized patients with type 2 diabetes. These results underscore the importance of integrating pharmacists into the care team to optimize diabetes management in the inpatient setting. Further research is warranted to explore the long-term impact of pharmacist interventions on diabetes outcomes and to expand the role of pharmacists in the care of hospitalized patients with chronic conditions.

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