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ASSESSMENT OF BLOOD GLUCOSE MANAGEMENT PRACTICES AND THEIR ASSOCIATION WITH CLINICAL OUTCOMES AMONG HOSPITALIZED PATIENTS: A CROSS-SECTIONAL STUDY AT SIR SADIQ ABBASI HOSPITAL, BAHAWALPUR

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ABSTRACT

Background: Dysregulated blood glucose levels in hospitalized patients are linked to increased morbidity, mortality, and length of stay. Despite evidence-based guidelines, management practices often vary, particularly in resource-constrained hospitals.

Objective: To assess current practices of blood glucose management among hospitalized patients and examine their association with selected clinical outcomes at Sir Sadiq Abbasi Hospital, Bahawalpur.

Methods: A descriptive cross-sectional study was conducted among 100 inpatients receiving medical or surgical care. Data were collected through structured observation checklists, patient records, and short interviews. Key variables included glucose monitoring frequency, insulin administration practices, diet compliance, and complications. Statistical analysis involved descriptive measures and chi-square tests for associations.

Results: Of 100 patients (mean age: 54.3 ± 12.8 years; 56% male), 42% had diabetes. Only 35% received glucose monitoring as per guidelines (≥4 times/day). Insulin administration errors were noted in 18% of cases. Clinical complications such as hypoglycemia (11%) and delayed wound healing (19%) were significantly associated with poor glucose monitoring practices ($p < 0.05$).

Conclusion: The study highlights significant gaps in inpatient glucose management, particularly in monitoring and insulin handling. Addressing these gaps could improve patient safety and outcomes. Training of nursing staff, standardized protocols, and routine audits are recommended to ensure safe glucose control in hospital settings.

INTRODUCTION

Diabetes mellitus represents a significant and growing public health challenge in Pakistan, with a reported national prevalence exceeding 26% in the adult population(Taimur et al., 2024)("Worldwide trends in diabetes prevalence and treatment from 1990 to 2022: a pooled analysis of 1108 population-representative studies with 141 million participants," 2024). This high prevalence directly translates to a substantial burden of diabetes-related complications and a frequent need for hospitalization, either due to hyperglycemic emergencies or for the management of intercurrent illnesses where diabetes is a major comorbidity (Taimur et al., 2024). The inpatient setting presents a complex environment for glycemic control, as physiological stress, corticosteroid therapy, variable nutritional intake, and interruptions to usual diabetes regimens can lead to significant glucose fluctuations (Samad et al., 2025).

Optimal management of blood glucose in hospitalized patients is critically important. Substantial evidence links both hyperglycemia and hypoglycemia to adverse clinical outcomes(Młynarska et al., 2025). Poorly controlled hyperglycemia is independently associated with an increased risk of hospital-acquired infections, delayed wound healing, prolonged hospital stays, and higher in-hospital mortality (Araki, 2024; Tegegne et al., 2024). Conversely, iatrogenic hypoglycemia, a common complication of insulin therapy, can cause arrhythmias, neurological damage, and increased mortality risk(Umegaki, 2024). Therefore, the goal of inpatient diabetes care is to maintain blood glucose within a safe target range while minimizing the risk of hypoglycemia.

International guidelines, such as those from the American Diabetes Association (ADA), strongly recommend against the sole use of sliding-scale insulin (SSI) and advocate for structured, physiologic insulin regimens, primarily using basal-bolus correctional insulin protocols (Y. Xu et al., 2024). These proactive regimens have been shown to improve glycemic control and reduce complications compared to reactive SSI in randomized controlled trials (Lee Jia Jia et al., 2024). However, the successful implementation of these evidence-based practices is highly dependent on local protocols, healthcare provider knowledge, and institutional resources.

In Pakistan, and specifically in the resource-constrained public health sector, data on actual inpatient diabetes management practices are scarce. Studies from similar settings suggest a heavy reliance on SSI and significant gaps in adherence to standard guidelines (Taimur et al., 2024). Sir Sadiq Abbasi Hospital, as a major tertiary care facility in Bahawalpur, serves a large population with a high diabetes burden. A systematic assessment of current glycemic management practices within this hospital is absent. There is a critical need to evaluate the real-world strategies being employed, identify gaps in care, and understand how these practices are associated with patient outcomes.

This study, therefore, aims to fill this knowledge gap by conducting a detailed assessment of blood glucose management practices and their association with clinical outcomes among hospitalized patients with diabetes at Sir Sadiq Abbasi Hospital. The findings will provide a crucial evidence base to inform the development of localized, practical, and effective protocols to improve the quality of care and patient safety in this setting.

Objectives

To assess the frequency and adequacy of blood glucose monitoring among hospitalized patients.

To evaluate insulin administration and dietary compliance practices.

- To determine the association between glucose management practices and clinical outcomes (e.g., hypoglycemia, infections, wound healing).

Methodology

Study Design:

A descriptive cross-sectional study.

Study Setting:

Sir Sadiq Abbasi Hospital, Bahawalpur, is a tertiary care teaching hospital.

Study Population:

Hospitalized adult patients (≥18 years) admitted in medical and surgical wards between April and June 2025.

Sample Size:

100 patients were selected through purposive sampling.

Inclusion Criteria:

- Patients admitted for at least 72 hours.
- Patients with at least one recorded blood glucose value during admission.

Exclusion Criteria:

- Critically ill patients in ICU.
- Patients unwilling to participate.

Data Collection Tools:

- Structured observation checklist (blood glucose monitoring frequency, insulin handling, dietary adherence).
- Patient records (laboratory reports, complications, length of stay).
- Short patient/caregiver interview (diet compliance, awareness).

Variables:

Independent variables: monitoring frequency, insulin administration practices, diet regulation.

Dependent variables: hypoglycemia, wound healing, infection, length of stay.

Data Analysis:

Data were entered into SPSS v26. Descriptive statistics (means, percentages) were used. Chi-square tests determined associations between management practices and outcomes. A p-value ≤0.05 was considered significant.

Ethical Considerations:

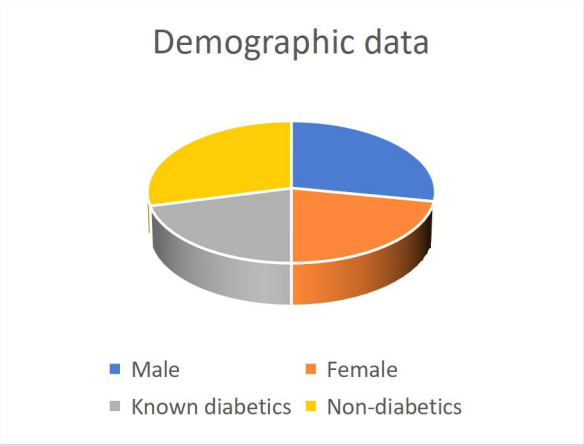
Approval was obtained from the institutional review board of Sir Sadiq Abbasi Hospital. Verbal informed consent was taken. Confidentiality and anonymity were ensured.

Results

Demographic Characteristics (n = 100):

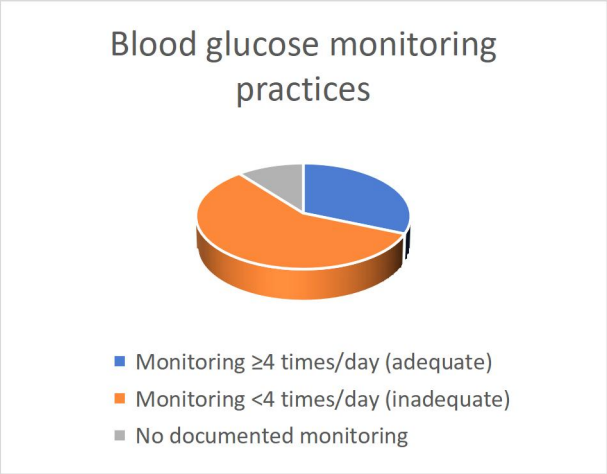
Variable	Frequency (%)
Age (mean ± SD)	54.3 ± 12.8
Male	56
Female	44
Known diabetics	42
Non-diabetics	58

Among the 100 patients included in the study, the mean age was 54.3 years (SD ± 12.8), indicating that the majority of the participants were middle-aged to elderly, a group more vulnerable to glycemic fluctuations during hospitalization. In terms of gender distribution, 56% were male and 44% were female, reflecting a slightly higher proportion of male admissions during the study period. Regarding diabetic status, 42% of patients were known cases of diabetes mellitus, while 58% were non-diabetic individuals who nevertheless experienced altered blood glucose levels during hospitalization due to stress hyperglycemia, medication use, or surgical and medical conditions. This distribution demonstrates that blood glucose management is a critical concern not only for patients with established diabetes but also for those without a prior diagnosis.



Blood Glucose Monitoring Practices:

Practice	Frequency (%)
Monitoring ≥4 times/day (adequate)	35
Monitoring <4 times/day (inadequate)	65
No documented monitoring	12

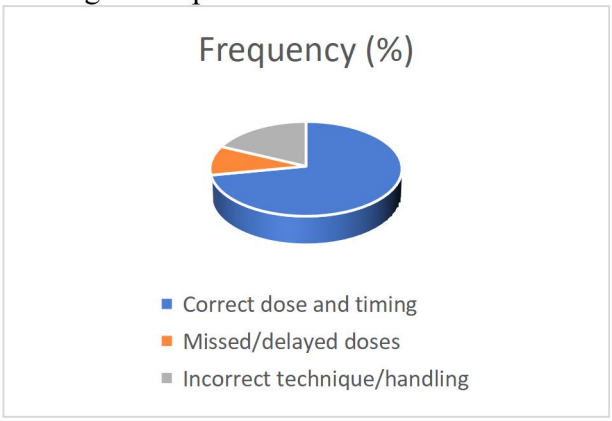


Out of the 100 patients observed, only 35% received adequate blood glucose monitoring (≥4 times per day) in accordance with clinical guidelines. In contrast, the majority (65%) were monitored less frequently than recommended, while 12% had no documented glucose monitoring during their hospital stay, highlighting a significant gap in standard practice.

Insulin Administration Practices:

Parameter	Frequency (%)
Correct dose and timing	72
Missed/delayed doses	10
Incorrect technique/handling	18

In terms of insulin administration practices, the majority of patients (72%) received their insulin at the correct dose and timing, reflecting acceptable adherence to prescribed regimens. However, 10% experienced missed or delayed doses, which could compromise glycemic control, while 18% were administered insulin using incorrect techniques or handling errors, indicating notable safety concerns that require targeted training and supervision.



Dietary Compliance:

Dietary Pattern	Frequency (%)
Compliance with diet	61
Non-compliance	39

With regard to dietary management, 61% of patients complied with the prescribed hospital diet, while 39% were found to be non-compliant. This indicates that although a majority followed nutritional recommendations, a considerable proportion struggled with adherence, which may negatively influence blood glucose stability and overall recovery.

Clinical Outcomes Observed:

Outcome	Frequency (%)
Hypoglycemia episodes	11
Delayed wound healing	19
Hospital-acquired infection	14
Extended length of stay (>7 days)	27

During hospitalization, 11% of patients experienced hypoglycemic episodes, while 19% developed delayed wound healing. In

addition, 14% acquired hospital-related infections, and 27% had an extended hospital stay of more than seven days, reflecting the clinical impact of inadequate blood glucose management.

Association Between Monitoring and Outcomes:

Outcome	Adequate Monitoring	Inadequate Monitoring	p-value
Hypoglycemia	3 (8.6%)	8 (12.3%)	0.04*
Delayed wound healing	2 (5.7%)	17 (26.1%)	0.02*
Infection	3 (8.6%)	11 (16.9%)	0.08
Extended stay	5 (14.3%)	22 (33.8%)	0.03*

*Significant at $p < 0.05$

The analysis revealed significant associations between blood glucose monitoring practices and clinical outcomes. Patients with inadequate monitoring experienced higher rates of hypoglycemia (12.3% vs. 8.6%, $p = 0.04$), delayed wound healing (26.1% vs. 5.7%, $p = 0.02$), and extended hospital stay (33.8% vs. 14.3%, $p = 0.03$) compared to those with adequate monitoring. Although hospital-acquired infections were more frequent among inadequately monitored patients (16.9% vs. 8.6%), the association did not reach statistical significance ($p = 0.08$).

Discussion

This study highlights critical gaps in inpatient glucose management at Sir Sadiq Abbasi Hospital. Despite clinical guidelines recommending frequent monitoring, only one-third of patients received adequate glucose checks. This aligns with findings from other regional studies, which indicate that resource limitations and staff shortages contribute to poor monitoring.

Insulin administration errors (18%) represent a preventable patient safety concern(H. Xu et al., 2024). These may stem from inadequate staff training or absence of double-check systems(Astudillo et al., 2024). In comparison, international benchmarks report <5% insulin errors in structured hospital protocols(Tsatsaris et al., 2024).

Dietary compliance was moderate (61%), reflecting challenges of patient education and limited hospital dietetic services(Kwiendacz et al., 2025).Importantly, poor monitoring was significantly associated with worse outcomes, including hypoglycemia, delayed wound healing, and prolonged hospitalization(Bu et al., 2025). This supports the clinical evidence that structured glucose control can improve recovery and reduce costs.

Conclusion

The present study conducted at Sir Sadiq Abbasi Hospital, Bahawalpur, underscores the pressing need to strengthen inpatient blood glucose management practices. The findings revealed that a substantial proportion of patients did not receive adequate monitoring, and errors in insulin administration were not uncommon. Dietary non-compliance further compounded the problem, contributing to unfavorable outcomes such as hypoglycemia, delayed wound healing, hospital-acquired infections, and prolonged hospital stays. These results highlight gaps in translating evidence-based guidelines into routine clinical practice within hospital settings.

The associations identified between inadequate monitoring and adverse outcomes reinforce the importance of structured and frequent glucose assessment as a cornerstone of inpatient care. Patients who received appropriate monitoring and timely insulin administration demonstrated comparatively better recovery profiles, underscoring the role of consistent clinical practices in preventing complications. These findings align with global evidence advocating for multidisciplinary, protocol-driven approaches to inpatient glycemic control, yet they also reflect the unique contextual challenges faced in resource-limited hospitals in Pakistan.

In conclusion, this study demonstrates that blood glucose management is not solely a technical task but a comprehensive patient safety priority requiring institutional commitment. Enhancing staff training, ensuring the availability of monitoring equipment, standardizing insulin administration protocols, and improving patient dietary counseling are essential steps toward improving outcomes. By addressing these gaps, Sir Sadiq Abbasi Hospital can move closer to delivering safer, evidence-based, and patient-centered care, ultimately reducing preventable complications and optimizing resource utilization.

Recommendations

- Develop and implement standardized hospital protocols for glucose monitoring and insulin use.
- Provide regular training for nurses and junior doctors on safe insulin handling.
- Strengthen dietary counseling services for inpatients.
- Introduce audit and feedback mechanisms to ensure protocol adherence.
- Allocate dedicated resources (glucometers, strips, staff) for glucose monitoring.

Limitations

- Single-center study with small sample size (n=100), limiting generalizability.
- Cross-sectional design limits causal inference.
- Self-reported dietary compliance may introduce recall bias.
- Only short-term clinical outcomes assessed; long-term effects were not evaluated.

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