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Audit of Inpatient Monitoring and Management of Hypoglycemia in Diabetic Patients Compared to National Guidelines

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ABSTRACT

Background: Hypoglycemia is a common and potentially deadly complication of diabetic patients staying in the hospital, especially those who take insulin or insulin secretagogues. Poor monitoring and sluggish treatment may result in severe negative consequences. Compliance with national guidelines is thus necessary to provide patient safety and enhance clinical outcomes. **Aims:** The objective of the study was to assess the practices in management and monitoring of hypoglycemia in diabetic patients at Hayatabad Medical Complex and compare the results with the initial audit cycle that was performed at Lady Reading Hospital. **Methods:** The second-cycle clinical audit was done between January and December 2025. One hundred and sixty-five patients were identified who had recorded hypoglycemic episodes (blood glucose <70mg/dl). A structured proforma that was in line with national hypoglycemia management guidelines was used to collect data. Measures of variables were timing of treatment initiation, frequency of monitoring, reassessment practices, documentation quality, preventive strategies and escalation of care. Analysis of data was done using SPSS version 25. **Results:** There were a recorded 248 hypoglycemic events. There was an increased initiation of treatment in 15 minutes of 57.3% versus 33.5% in the initial cycle. Reassessment of blood glucose 30 minutes later was reached in 86.3 percent. Documentation has risen to 79.8 and preventive measures (48.8) and escalation of care (38.7) were not optimal. **Conclusion:** The second audit cycle showed a substantial progress in the management of inpatient hypoglycemia, especially in the timely intervention and monitoring. Nonetheless, the lack of preventive measures and care intensification continues to suggest the necessity of further training, reinforcement of systems, and periodic re-audits to maintain national guidelines continuity.

INTRODUCTION

Hypoglycemia is a frequent and even life-threatening complication in diabetic patients, especially when the insulin or insulin secretagogues were used during the hospital stay [1,2]. It is typically considered a level of blood glucose that is below 70mg/dL, but more severe forms can be observed at even smaller levels and can also be linked to severe clinical outcomes [3, 4, and 5]. Hypoglycemia is a significant predicament in the inpatient setting because of several predisposing factors that include changes in nutritional consumption, acute illness, polypharmacy, and inconsistency of insulin administration practices [6, 7, 8]. High morbidity and mortality rates related to this condition are thus to be curbed through effective monitoring and timely management [9].

Diabetes mellitus has become a significant health issue at the global level, and its prevalence is growing and causing significant healthcare burden [10, 11, 12]. Hospitalized diabetic patients are especially susceptible to glycemic variations, such as hypoglycemia that has been associated with bad outcome, such as a long stay in hospital, cardiovascular event risk, neurological impairment, and even death. Research has indicated that inpatient hypoglycemia is not merely an indicator of centralization of the disease but also a single predictor of bad prognosis [13, 14]. Thus, the achievement of compliance with evidence-based recommendations in managing it is vital to enhance patient safety and clinical outcomes.

Both national and international guidelines such as American Diabetes Association and Joint British Diabetes Societies have clear instructions on prevention, identification, and treatment of hypoglycemia in

hospitalised patients [15, 16]. These recommendations denote frequent blood glucose levels, identifying hypoglycemia early, administering prompt treatment (less than 10-15 minutes), and retesting (less than 30 minutes) to affirm the treatment [17, 18]. Also, they emphasize the need to find the underlying causes and apply preventative measures to minimize recurrence. Although these guidelines are available, several studies have shown inconsistencies between the recommended practice and its clinical application especially in the resource-restricted environment [19].

High patient numbers and poor resources regularly pose challenges in health care facilities, and diabetes is fast becoming a significant burden in Pakistan [20, 21]. The compliance with the standard procedure of hypoglycemia management can be uneven in these settings. It has been identified that clinical audits are effective in assessing the existing practices, establishing gaps, and providing selective intervention to enhance the quality of care [22, 23]. Audits offer a systematic way of continuous improvement as new practices are compared with the set standards.

Due to the first cycle of this clinical audit, which was done at Lady Reading Hospital, some crucial gaps in the handling of inpatient hypoglycemia were identified. Although other factors, including blood glucose reassessment, demonstrated a good level of compliance, there were evident gaps in the timely treatment initiation, the prevention measures recording, and escalation of care. These results demonstrated the necessity of specific measures such as staff training, strengthening clinical rules, and advanced records.

After the initial audit cycle, a number of corrective actions were applied, such as the training of healthcare personnel, the distribution of the protocols on the management of the phenomenon of hypoglycemia, and the introduction of well-structured monitoring tools. The current research is the second cycle of the audit, which will be held at Hayatabad Medical Complex with the purpose of assessing the success of the following interventions and re-regulating adherence to the national guidelines.

The importance of this study is that it does not only evaluate the existing practice in clinical settings but also evaluates the improvement along the way thus making it part of the process of continually ensuring quality in healthcare provision. The audit offers important lessons to policy-makers and clinicians in order to streamline the care of inpatient diabetes by revealing lingering gaps and room to improve. Finally, management of hypoglycemia should be enhanced to facilitate patient safety, complications decrease, and improve clinical outcomes among hospitalized diabetic patients.

METHODOLOGY

The proposed study will be implemented as a second-cycle clinical audit to observe and enhance the inpatient monitoring and management of hypoglycemia in diabetic patients according to the national guidelines. The audit will be conducted at the Hayatabad Medical Complex in the course of 12 months (January 2025 - December 2025). The second cycle will specifically evaluate the effects of interventions that will be undertaken after the first audit cycle that will be done in Lady Reading Hospital.

The target group will consist of all adult patients with diabetes (age 18 years and older) hospitalized in the medical wards who suffered at least one reported incidence of hypoglycemia, case where blood glucose level is less than 70 mg/dL, during their hospitalization. The patients, whose medical records were not completed, those who are not admitted to the study more than 24 hours, and individuals who were not admitted with diabetes will not become part of the study. To cover all the eligible cases within the timeframe of the study, a non-probability consecutive sampling method will be used, and an estimated sample size of about 150 patients will be used, and as such, it will be similar to the sample size of the first cycle and even more.

The retrospective method will be used to collect data on patient medical records by the filling of a structured audit proforma, developed in line with the national guidelines on how to manage inpatient hypoglycemia. Some of the important variables which will undergo evaluation will cover frequency of blood glucose monitoring, time taken to initiate treatment on detection of hypoglycemia, type of treatment being administered, reassessment of blood glucose within 30 minutes, documentation practices, identifying underlying causes, preventive measures, and escalation of care where necessary. Also, adherence to standards brought in pursuant to the initial audit cycle like employee training, reinforcement of protocols, and enhanced documentation tools will be performed.

The collected data will be entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics will be used to summarize the data, including frequencies, percentages, means, and standard deviations where appropriate. Compliance rates with each audit standard will be calculated and compared with both the predefined national benchmarks and the results of the first audit cycle. Improvement will be assessed by comparing key indicators such as timely intervention, monitoring frequency, and documentation quality between the two cycles.

Ethical approval will be obtained from the Institutional Review Board (IRB) of the respective hospital prior to data collection. Patient confidentiality will be strictly maintained by anonymizing all collected data and using it solely for academic and quality improvement purposes. As this is an audit-based study, no direct patient intervention will be involved.

Finally, the findings of the second audit cycle will be used to determine whether previously identified gaps have been addressed and to recommend further improvements in clinical practice. Continuous quality improvement strategies will be emphasized to ensure sustained adherence to national guidelines and enhancement of patient safety outcomes.

RESULTS

The second audit cycle at Hayatabad Medical Complex involved 165 patients with diabetes who had at least one episode of hypoglycemia. During the study, these patients provided 248 reported hypoglycemic events (blood glucose less than 70 mg/dL). The outcomes indicate that the overall compliance with the national guidelines has

improved compared to the initial audit cycle that has been performed at the Lady Reading Hospital; however, some gaps remain.

Table 1

Baseline Characteristics of Patients (n = 165)

Variable	Frequency (n)	Percentage (%)
Male	92	55.8%
Female	73	44.2%
Mean Age (years)	57.4 ± 12.6	—
Type 2 Diabetes Mellitus	138	83.6%
Type 1 Diabetes Mellitus	27	16.4%
On Insulin Therapy	121	73.3%
On Oral Hypoglycemic Agents	44	26.7%

Figure 1

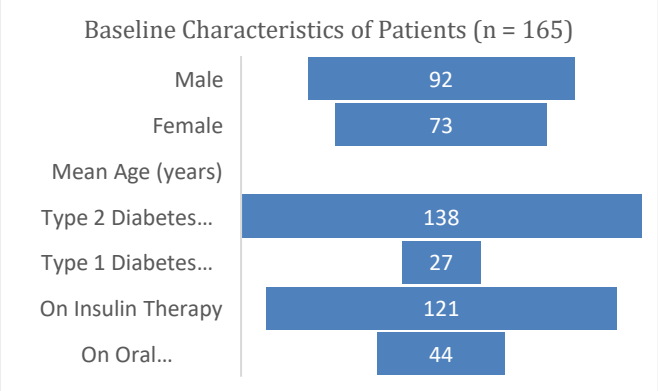


Table 2

Frequency and Monitoring of Hypoglycemic Episodes (n=248)

Parameter	Frequency (n)	Percentage (%)
Blood glucose monitored as per protocol	198	79.8%
Hypoglycemia detected during routine monitoring	172	69.4%
Symptomatic hypoglycemia identified	76	30.6%

Figure 2

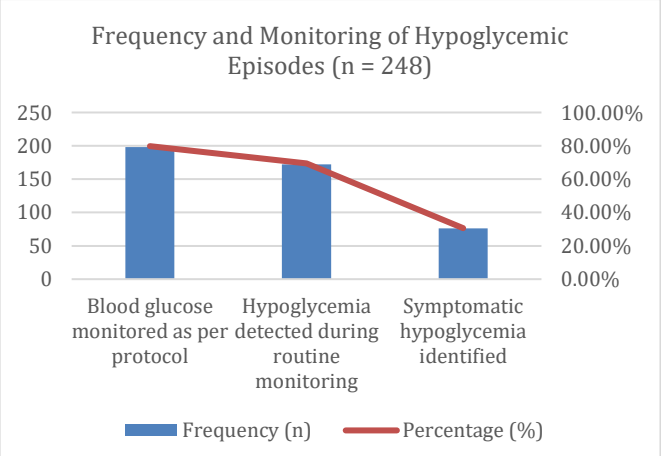


Table 3

Management and Timeliness of Intervention

Parameter	Frequency (n)	Percentage (%)
Treatment initiated within 15 minutes	142	57.3%
Appropriate treatment given (as per guidelines)	210	84.7%
Blood glucose rechecked within 30 minutes	214	86.3%

Figure 3

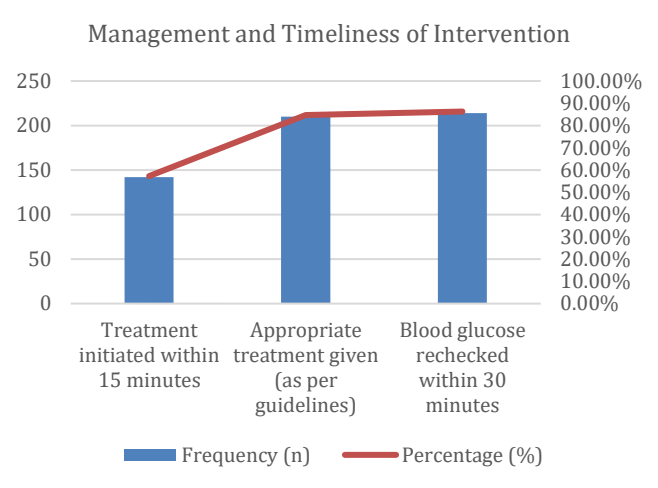


Table 4

Documentation and Preventive Measures

Parameter	Frequency (n)	Percentage (%)
Proper documentation of hypoglycemic episode	198	79.8%
Cause of hypoglycemia identified	136	54.8%
Preventive measures documented	121	48.8%
Escalation of care (if required)	96	38.7%

Figure 4

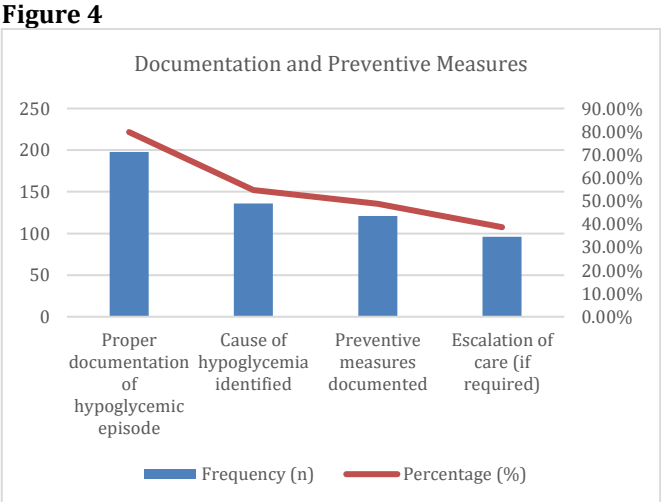
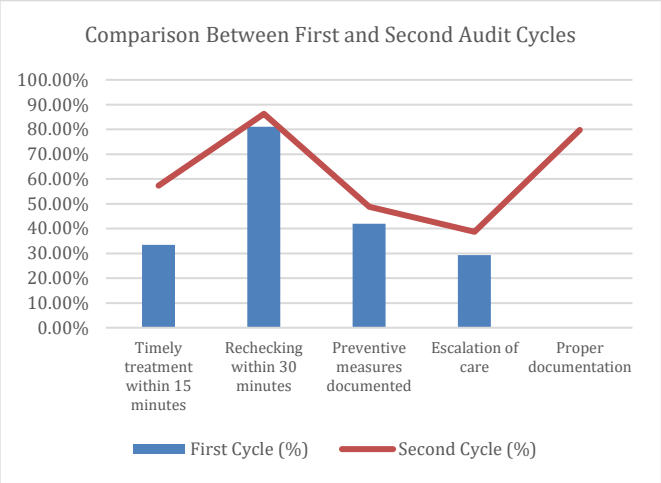


Table 5

Comparison Between First and Second Audit Cycles

Parameter	First Cycle (%)	Second Cycle (%)
Timely treatment within 15 minutes	33.5%	57.3%
Rechecking within 30 minutes	81.1%	86.3%
Preventive measures documented	42.0%	48.8%
Escalation of care	29.3%	38.7%
Proper documentation	65.0% (approx.)	79.8%

Figure 5



Summary of Findings

The second audit cycle has shown a significant improvement in various areas of much concern, especially the timeliness of treatment commencement that improved by 33.5 to 57.3. In the same manner, re-assessment within 30 minutes and documentation practices improved moderately. Nonetheless, the best approaches to preventive measures and escalation of care are still not optimal, and additional specific intervention is required.

All in all, although compliance with national guidelines has been enhanced since the initial audit cycle, it is necessary to further improve compliance and patient safety.

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DISCUSSION

This second-cycle clinical audit concerned the effectiveness of those interventions applied on the basis of the first audit, as well as the evaluation of current practices concerning the monitoring and management of inpatient hypoglycemia at Hayatabad Medical Complex. The results show that a significant change in a range of key performance indicators mainly in timeliness of treatment and documentation practices has occurred compared to the first cycle implemented in Lady Reading Hospital. Nonetheless, there are some crucial gaps, particularly those associated with prevention and care escalation [22, 23].

Among the most considerable gains that were seen in this research was the timely conduct in the opening of treatment within the 15mins which has gone up to 57.3% in the second cycle compared to 33.5% in the first cycle. This strength could be explained by the specific interventions including employee education, strengthening of clinical guidelines, and awareness-raising that are known to increase compliance with hypoglycemia management guidelines [6]. It is essential to start treatment as early as possible, since delay may cause severe complications such as neurological damage and more patients may die [1, 13].

The percentage of patients who retested their blood glucose within 30 minutes also increased (81.1-86.3) indicating an increase in adherence to prescribed monitoring guidelines. This can be compared to the previous research, which has indicated that immediate reassessment is paramount to guarantee treatment efficiency and avoid frequent cases of hypoglycemia. With this positive outcome, the desired goal of 100% compliance has not been reached so far, which means that the system level should also be reinforced.

There was also a significant increase in documentation practices, with 79.8% of the hypoglycemic episodes appropriately documented during the second cycle. Continuity of care, clinical and medico-legal require accurate documentation. These gains could be due to an increase in the use of structured proformas and audit feedback. Nevertheless, recording of precautionary measures (48.8), and diagnosis of causes (54.8) is still below the mark. This falls in line with other studies that inquire a tendency by the healthcare providers to concentrate on the acute management and neglect preventive measures.

The preventive treatments, which include adapting the dosage of insulin, assessing the composition of the dietary intake, and changing the treatment regimen are essential in minimizing recurrence. The compliance in this area is not very high; this may indicate that further detailed training of clinics and the inclusion of preventive measures into the regular treatment plan are necessary. In the same fashion, the escalation of care, used to be at 29.3% but has already improved to 38.7 percent, is not sufficient. It could be the result of the absence of clear pathways of escalation, or workload pressures, or the absence of multidisciplinary alignment. Past research indicates that the establishment of the structured escalation procedures and the implication of the senior clinicians are highly effective in promoting better patient outcome [17].

The positive trend that is seen in this second audit cycle indicates the effectiveness of clinical audit process as a quality improvement tool [23]. Clinical audits can help healthcare organizations to diagnose gaps in healthcare, apply specific interventions, and track improvements over time. Nevertheless, the fact that some of the shortcomings exist shows that audit is inadequate and should be accompanied by continuous education, policy reinforcement and changes at the system level [22].

There are certain limitations to this study. Being a retrospective audit it is based on the accuracy and completeness of the medical records, which can create bias in the information. Also, the research occurred in one hospital of tertiary care, and therefore the results might not be transferable to other environments [20]. In spite of these drawbacks, the research yields useful information about the landscape of clinical practice in the real world, and points to the areas in which the practice can be improved further [8].

To sum up, despite the important advances in the area of managing inpatient hypoglycemia, especially timely intervention and monitoring, more can be done to promote preventative care and escalation. Long-term quality enhancement efforts, periodic re-audits, and conformity to evidence-based rules are required to facilitate the best patient outcomes.

CONCLUSION

The second cycle clinical audit at the Hayatabad Medical Complex reveals significant improvement on inpatient monitoring and care of hypoglycemia among diabetic

patients, as compared to the first cycle at the Lady Reading Hospital. There was a positive change in the timely treatment start, restoration of blood glucose, and a general increase in documentation practices, which demonstrates the effectiveness of the introduced measures including staff education and a reaffirmation of protocols. Nonetheless, loopholes still exist in critical sectors, especially on record keeping related to preventive interventions, finding of root causes, and proper upgrading of care. These gaps point to the importance of the long-term quality improvement program, the regular education of staff members, and the more disadvantaged adherence to the national guidelines. Routine re-audits, along with system level support are necessary to facilitate consistency, safety and effectiveness in the management of hypoglycemia among hospital patients.

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