International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Implementing a Standardized Protocol to Mitigate Hypoglycemia Risks and Enhance Patient Safety in Hospital Settings

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Abstract: ***This study explores a quality improvement project targeting hypoglycemia prevention and management in a tertiary care hospital. Hypoglycemia, a condition with potentially severe outcomes, especially among hospitalized patients, was addressed through the implementation of a standardized protocol. The project aimed to assess compliance with blood glucose monitoring, identify risk factors, and reduce hypoglycemic events by training staff and updating protocols. Post-implementation results showed significant improvements in staff compliance and awareness, highlighting the need for systematic monitoring to enhance patient safety. This study underlines the importance of standardized protocols in managing hypoglycemia, aiming to establish a benchmark for patient safety improvements across healthcare facilities. There is an urgent need to assess the burden of hypoglycemia so that healthcare settings can take appropriate preventive measure to promote patient safety and to manage this silent threat.***

Keywords: Hypoglycaemia, Patient Safety, Nursing Protocol, Blood Glucose Monitoring, Quality Improvement.

1. Introduction

Hypoglycaemia is defined by a blood glucose level below 70 mg/dl; however, signs and symptoms may not be presented until blood glucose level drop below 55 mg/dl. Hypoglycemia is classified into Mild hypoglycemia (<70mg/dl), Moderate hypoglycemia (<55mg/dl) and Severe hypoglycemia (<40mg/dl).[1] Patients regardless of diabetes status may experience hypoglycemia and severe hypoglycemia in hospital setting. While hypoglycemia is associated with increased mortality, in many cases it is a marker of underlying disease rather than the cause of fatality. Severe Hypoglycemia is a serious consequence of dysregulated metabolism and/or diabetes treatment, where blood sugar drops below 40 mg/dl, requiring assistance of another person to actively administer carbohydrates, glucagon, or take other corrective actions. [2-3] Hypoglycaemic events may induce inflammation through the stimulation of C-reactive protein (CRP), IL-6, and vascular endothelial growth factor (VEGF). Hypoglycaemia also increases the activation of platelets and neutrophils. Sympathoadrenal response during hypoglycaemia increases adrenaline release and may lead to arrhythmias and increased cardiac workload. Endothelial dysfunction may also contribute to cardiovascular risk.[4]

A study by Kalra identified 6.1 % of women & 7.3% of Male were found to have High Blood Sugar level - high (141-160 mg/dl) while 6.3 % of women & 7.2 % of men were found to have high blood sugar level (>160 mg/dl). Severe hypoglycemia occurred in 35-57.44% of T1 DM patients. Patients with diabetes >15 years, experienced higher rates (46%) of severe hypoglycemia than those with >5 years of diabetes (46% vs. 22%). T2DM patients treated with Insulin reported at least one episode of severe hypoglycemia in 16.5% of patients with an incidence of 44 episodes/100 patient years. Patient with T2DM lose on average three productive days, with an average length of hospital stay between 6.6 and 9.5 days, following severe hypoglycemic attack.[4-5] Several studies with evidence suggests that severe hypoglycaemia occurs in 35-42% of T1DM patients and the rate of severe hypoglycaemia is between 90-130 episodes/100 patient years.[6]

Therefore, the protocol for management and prevention of hypoglycemia should be adopted and implemented by every hospital or hospital system. Hypoglycaemia is a serious patient safety concern as it leads to Mortality & Morbidity. Knowledge on prevention & management of hypoglycaemia among healthcare providers are utmost important. Lack of in-depth knowledge of nurses on Management of hypoglycaemia & various types of Insulin. Nurses face various issues to clinically manage the patient whenever

hypoglycaemia events occur, with this in view, this project objectives were to assess the compliance of blood sugar monitoring in non-critical care setting, identify the events and precipitating factors, develop and implement a standardized Hypoglycemia prevention & management protocol, assess the number of hypoglycemia events post implementation of Hypoglycemia treatment standardized protocol.

2. Methods

This project was carried out in a selected tertiary care multi-specialty hospital in North Eastern India among patients admitted between October 2023-March 2024.To address the set objectives, the PDCA cycle was adopted as a systematic methodology (Annexure Figure-1). Data collection tool was developed to check the compliance on Blood Sugar Monitoring. Diabetic Certification Course was developed for training the nursing staff.

Plan:

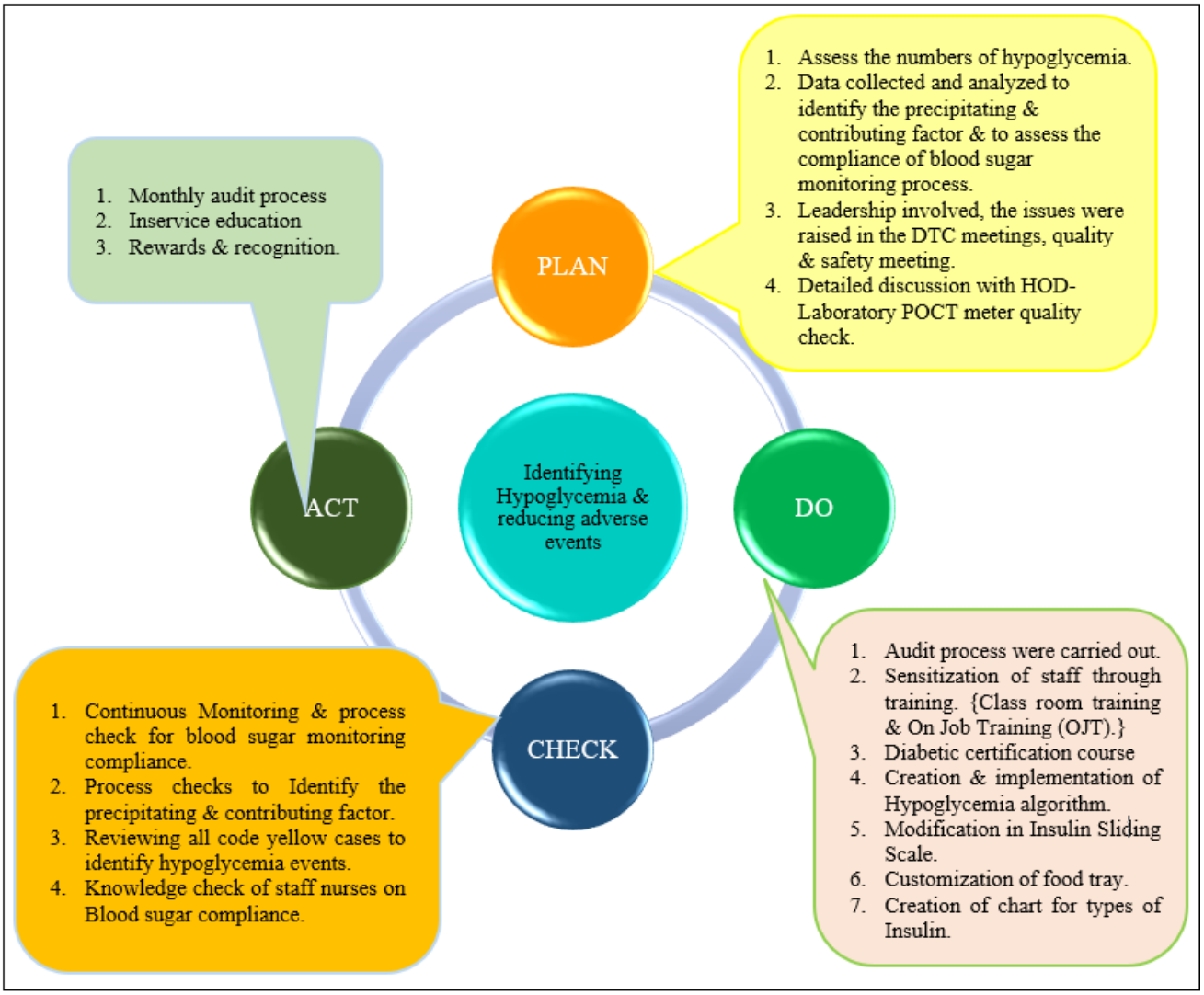
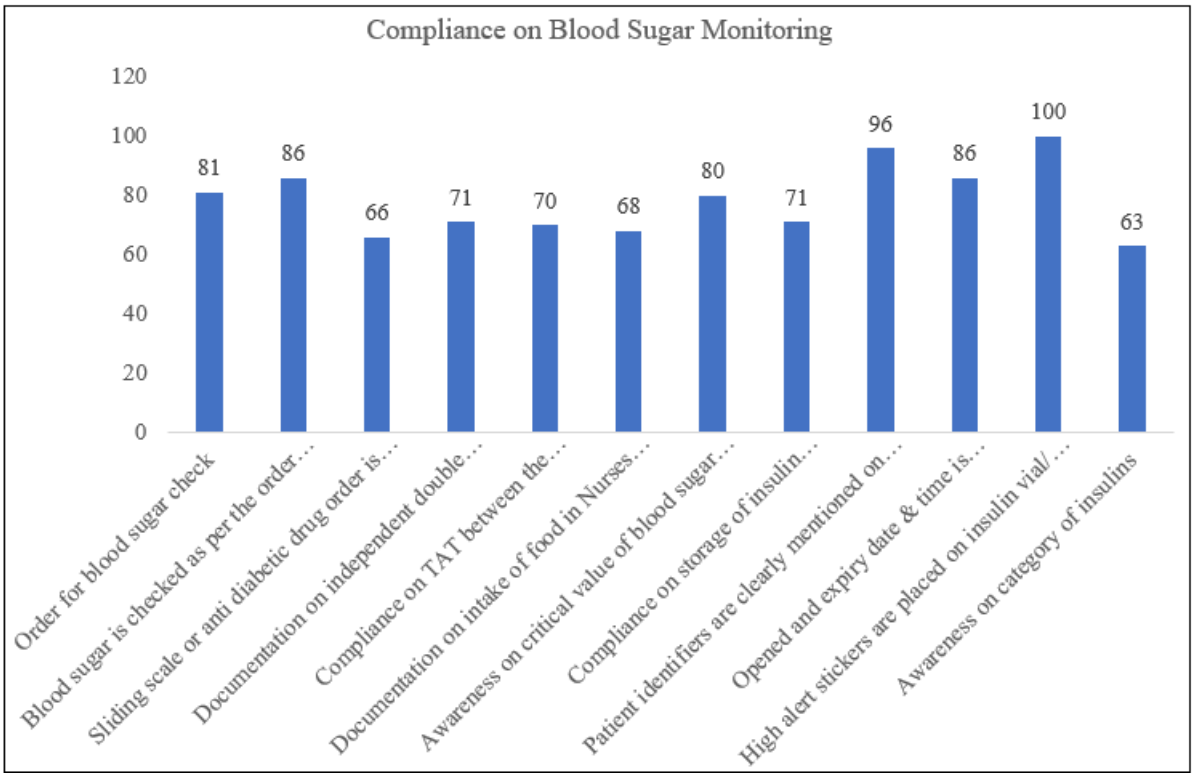


Figure 1: Project Methodology-PDCA Cycle.

3. Results

As per the project objectives the data were collected and analysed. The results were presented as-

Section 1: Findings related to Compliance on Blood Sugar Monitoring.



Graph 1: Compliance on Blood Sugar Monitoring

In the project, it was revealed that in the pre-implementation phase 63% of participants were aware on Category of Insulin. Sliding scale or anti diabetic drug order is followed (If the anti-diabetic drug is prescribed as a standing order) for 66% of patients. TAT between the administration of hypoglycaemic agents and the meal timings was followed by 70% of staff. 80% of the staff were aware on critical value of blood sugar & the management. Only 68% staff have documented food intake in Nurses Notes. Although patient identification is one of the very important standard 100% samples were not identified with accurate patient identifier, in 96% sample it was noted that patient identifiers were mentioned in the insulin. High alert sticker was placed on Insulin for 100% samples (Graph 1).

Section 2: Implementation of Standardised Protocol:

After analysing the data from pre-implementation phase, various steps were carried out to develop and implement the protocol.

1) In depth training on "Management of Diabetes & Blood Sugar Monitoring Process" was carried out for the nursing staff. Staff were selected from specific units for "Diabetic Certification Course", two batch were selected, each batch was comprising of 15 staff. Two trainers were selected as a coordinator as well as trainer along with doctors from selected speciality. The content was created for diabetic certification course.
2) In this phase the medication inventory was also re-evaluated and as approved from Drug and therapeutic Committee (DTC) Glucon-D was added in the inventory of all the units of the hospital.
3) Audit on Compliance on Blood sugar monitoring was added in the "High Risk Process Initiatives".
4) Sliding Scales of Insulin was evaluated & modified by DTC committee chairperson.
5) Insulin chart was created and displayed in all the patient care areas above the fridge.
6) Hypoglycaemia algorithm was developed and displayed in all the in-patient areas.
7) Customization of Food Tray (Colour change of food tray) was done with collaboration of Food & Beverage department.
8) Glucometer quality check process was created after discussion with HOD, Laboratory.

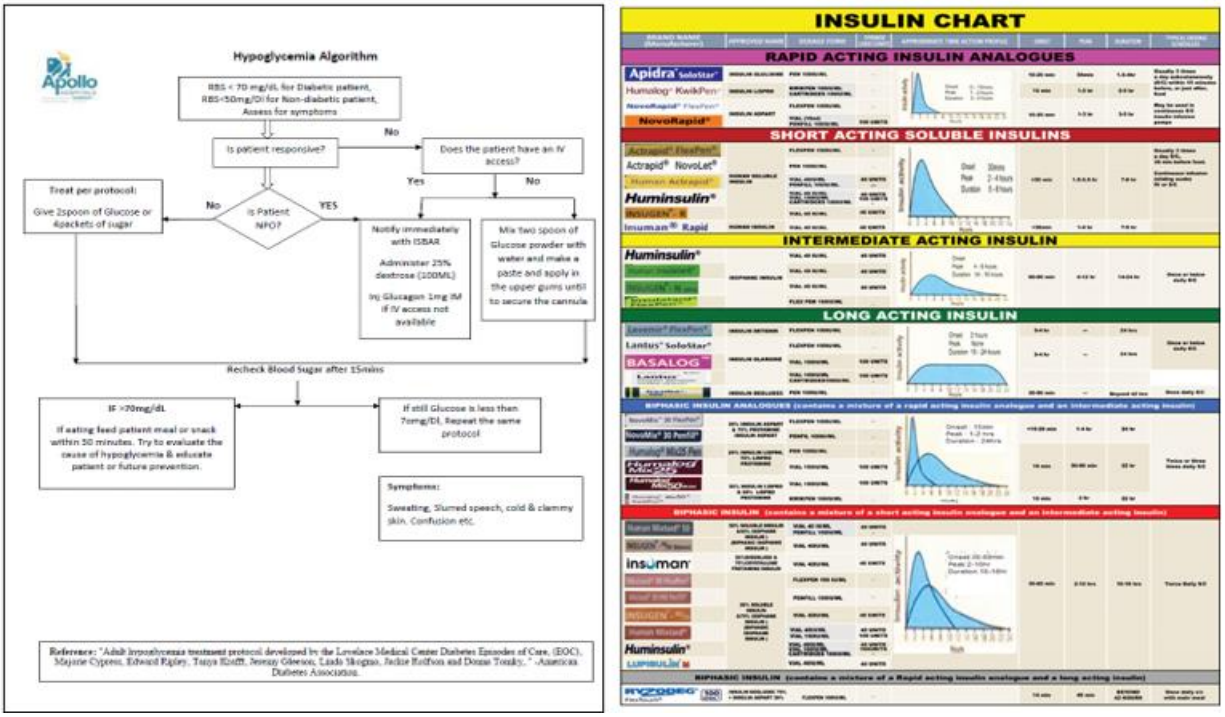
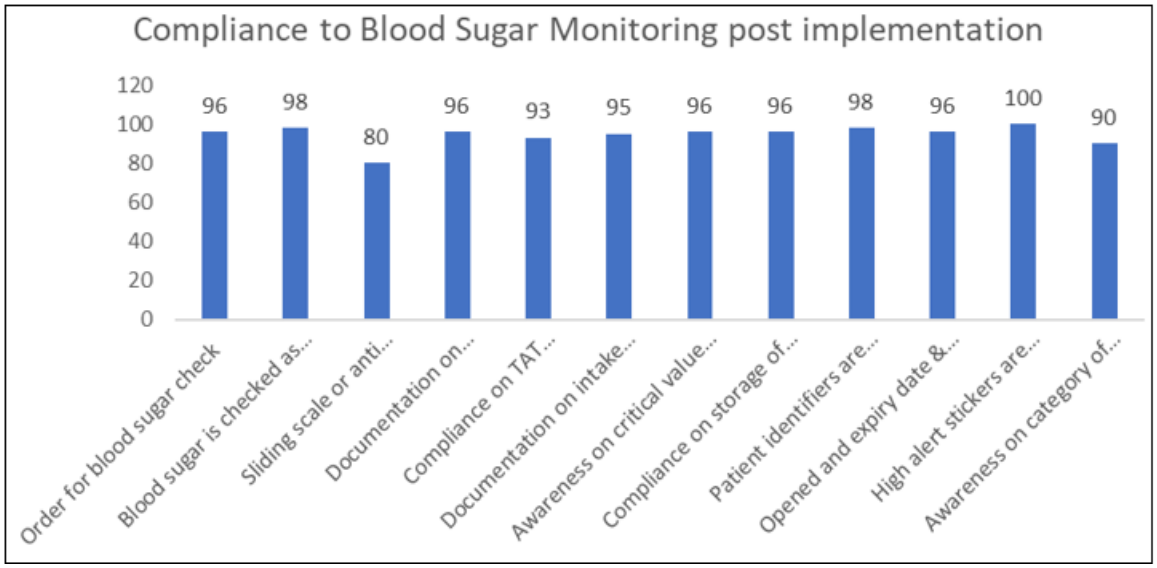


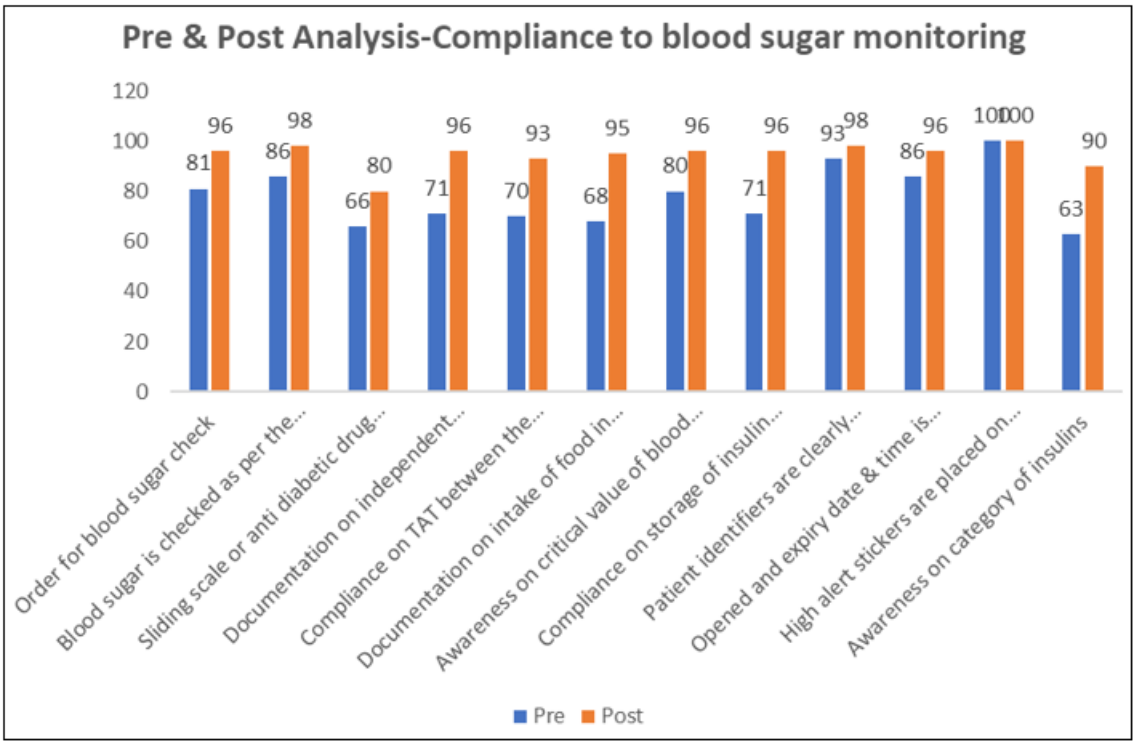
Figure 2: Hypoglycaemia algorithm & Insulin Chart

Section 3: Post Implementation Phase:

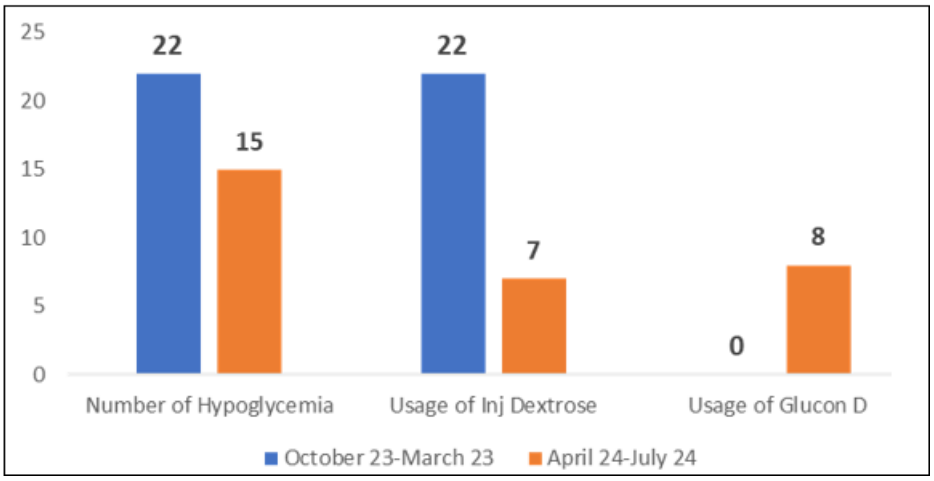
In post implementation phase, it was revealed that 90% of participants became aware on Category of Insulin. Sliding scale or anti diabetic drug order is followed (If the anti-diabetic drug is prescribed as a standing order) for 80% of patients. TAT between the administration of hypoglycaemic agents and the meal timings was followed by 93% of staff. 96% of the staff were aware on critical value of blood sugar & the management. Documentation of food intake in Nurses Notes improved to 96%. (Graph 2)



Graph 2: Compliance on Blood Sugar Monitoring post implementation.



Graph 3: Pre-post comparison for Compliance on Blood Sugar Monitoring



Graph 4: Hypoglycaemia events & management of events pre & post implementation of standardised protocol.

4. Discussion

The current project was carried out in order to identify incidences of hypoglycaemia events along with its precipitating factors however the results cannot be generalised because of the small sample size. This project was covering the population of adult, neonates & paediatric patients vulnerable to this silent threat as a study carried out by Pillai and Fhausiya (2022) highlighted the incidence of hypoglycaemia as maximum in the first hour of life, highlighting the need to start early feeds and to do meticulous monitoring in high-risk babies like pre-term babies, low birth weight babies, macrosomia and babies of diabetic mothers. It is important to carry out more researches in this field to understand the impact on nursing policy, practices and education.

5. Conclusion

Hypoglycaemia occurrence in tertiary care hospital is a common life-threatening health issue and it should be considered as a medical emergency. Protocolised approach towards managing such silent threat shall save many lives. To deal with this complex situation, the bedside nurses need to be adequately trained and competent in the subject. The project team also recommended to conduct similar type of projects and researches in larger scale which shall be helpful to develop guidelines to cover wider population to enhance patient safety which is a need of hour.

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