MINISTRY OF HEALTH
SINGAPORE

APPROPRIATE AND VALUE-BASED CARE CONFERENCE 2025

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16-17 OCTOBER 2025

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Reducing Inappropriate Inpatient Blood Glucose Monitoring

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Introduction

Blood glucose monitoring (BGM) is an essential component of patient care. However, unnecessary BGM can lead to increased healthcare cost, inefficient use of nursing time and potential patient discomfort without significant clinical value. Our project was carried out in a single ward in Alexandra Hospital from December 2023 to July 2024 for General Medicine patients, and aimed to adopt a multipronged approach involving doctors and nurses to reduce inappropriate POCT BGM, while monitoring for adverse effects of hypoglycemia and hyperglycemia.

Methods

We collaborated with the Division of Endocrinology to establish a criteria for suitable patients, and a set of safe clinical guidelines to guide reduction of BGM in this group, guided by the Endocrine Society Clinical Practice Guidelines. We took into consideration the safety and potential side effects of ceasing BGM, varying complexities of patient admissions, concomitant procedures and/or medical/surgical issues which they were admitted for.

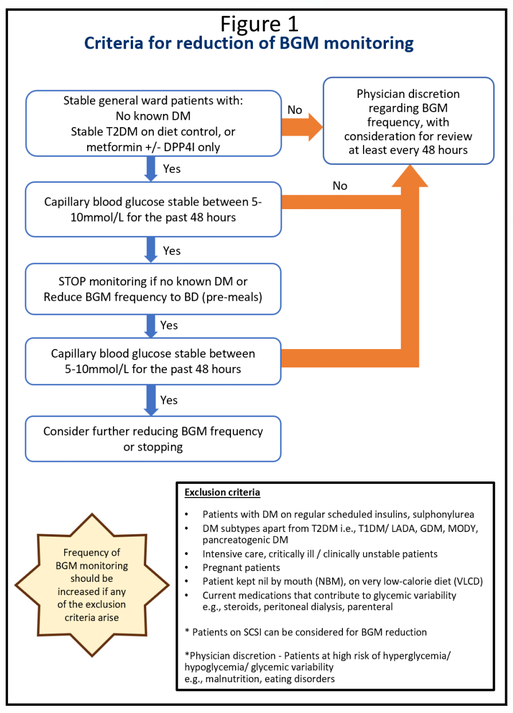
Root cause analysis was performed to identify factors contributing to inappropriate BGM:

1. **Doctor factors:** Variation in clinical practice without clear guidelines on frequency of BGM; "More is better" mindset where maximum monitoring is taken as the default superior option for all patients; high workload and time constraints limiting doctors' abilities to review BGM orders constantly
2. **Nurse factors**: Insufficient knowledge to question doctors' orders; lack of standardised protocol for nurses to advocate to doctors on reducing BGM
3. **Doctor-nurse factors**: Lack of clear communication resulting in discrepancy between documented notes and orders; different timings of nursing shifts and doctor rounds which results in lag time in change of doctor's orders and nursing reminders.

Our targeted interventions were:

1) **Educating doctors**: We educated junior doctors regularly on the guidelines during orientation or teaching sessions to fill existing gaps in knowledge. We raised awareness amongst senior doctors during department meetings to ensure practices are aligned to the guidelines
2) **Educating nurses:** We educated nurses on the guidelines to empower them to take proactive roles in nurse-led care and foster confidence to discuss cases with doctors to reduce inappropriate BGM.
3) **Sticker reminders on Computer On Wheels (COW):** Clinical guidelines were represented in an easy-to-read flowchart format, printed onto stickers and pasted onto COWs in the ward which doctors and nurses utilise daily to see patients, to serve as a physical reminder (Figure 1).
4) **Email reminders:** To ensure our initiatives do not get forgotten over time, regular email reminders were sent regularly to all doctors and nurses rotating through the ward.

Figure 1
Criteria for reduction of BGM monitoring



Results

Our team audited data over three time periods to measure the reduction in the inappropriate BGM over a 7-month duration post-implementation of interventions. BGM was reduced from average 49.5% to 9.2% over 7 months (Figure 2).
There was no significant change in the adverse event rates of hypoglycaemia and hyperglycaemia after the initiation of the project. Adverse event rates remained mainly below 1.0% for both outcomes over the entire period (Figure 3).

Figure 2

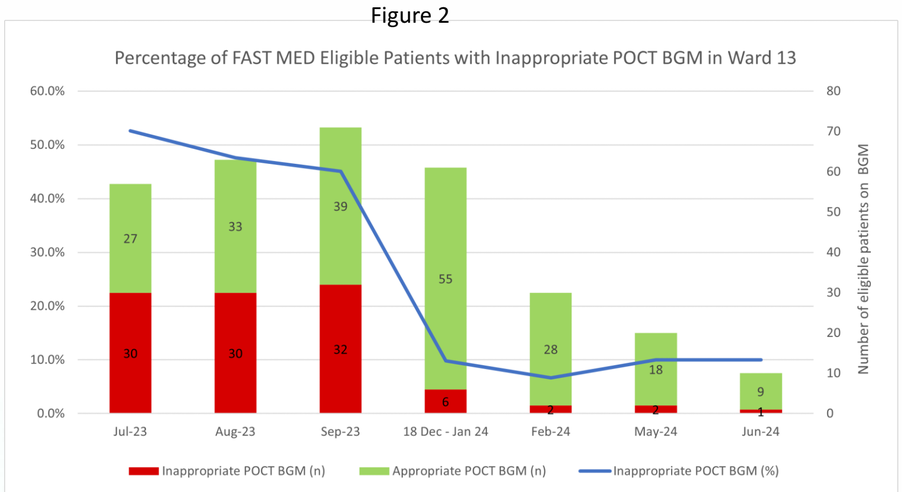
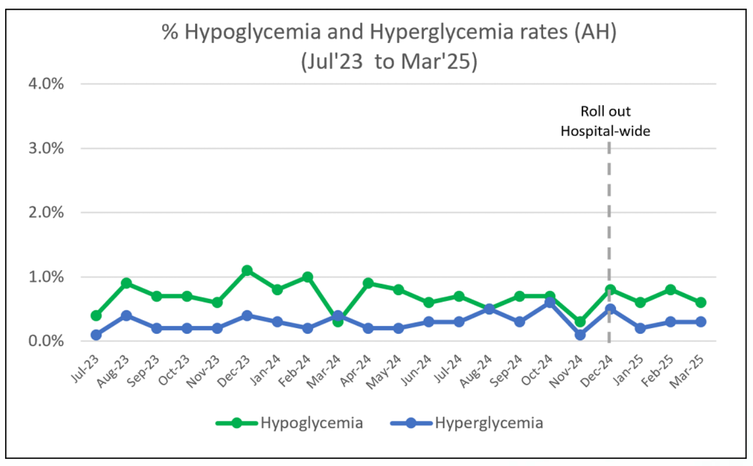


Figure 3



Discussion

The success of our interventions highlights the effectiveness of targeted education and regular reminders for both doctors and nurses in order to bridge knowledge gaps, empower nurses to participate in collaborative decision making, and improve coordination of care across multidisciplinary teams. The adverse events rate emphasises the safety of the clinical guidelines in ensuring a acceptable range of capillary blood glucose level while doing so.

Further projects can be conducted to see if this is replicable in other hospitals with differing structure of education programmes for doctors, and the sustainability of these efforts can be observed over a longer period. Artificial Intelligence (AI) may also be considered to aid in identification of suitable patients for reduction of BGM and suggest appropriate frequencies. Ultimately, physicians need to exercise their own discretion when applying these guidelines to their patients, especially for patients at risk of glycemic variability such as malnourished patients or elderly patients with behavioural problems and erratic intake. Safety of patients must always be prioritised in the maximization of healthcare resources.

Conclusion

This project underscores the significance of interdisciplinary collaboration, structured education, and patient involvement in achieving meaningful quality improvements. By working together, hospitals can deliver safer, more effective and cost-efficient healthcare without compromising quality of care.
Our project has been spread hospital-wide for all eligible patients in all medical and surgical specialties. It has been adopted by the National University Health System cluster as one of the Appropriate Care projects.