

Optimizing Point-of-Care Capillary Blood Glucose Utilization in Hospitalized Patients: A Quality Improvement Initiative

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Define Opportunity

Background:

- Hospitalized adults commonly have routine point-of-care capillary blood glucose testing (CBG) ordered on admission.
- Diabetes affects approximately 22.1% of the Canadian population and is a common diagnosis in General Internal Medicine (GIM) patients [1,2].
- Regular CBG monitoring is not recommended by Choosing Wisely Canada for patients with stable CBG on agents that do not cause hypoglycemia [3].
- Patients with Type 2 Diabetes (T2DM) may need infrequent CBG monitoring during their hospital admission, particularly in patients who are meeting their glycemic targets and/or are on medications not associated with hypoglycemia [4].
- Excessive CBG can strain nursing resources without notable patient benefits [3,4].

The Problem:

Clinically unnecessary CBG monitoring is frequent and poses needless demand on nursing time, as well as worsening the patient experience of care.

Objectives:

- Reduce the frequency of unnecessary CBG in General Internal Medicine (GIM) patients at the University of Alberta Hospital at discharge by 30% over 3 months.
- Develop an algorithm for RN and MD teams to close the knowledge to practice gap with de-escalating CBG checks after 72 hours of admission.
- De-escalate POCT chemstrip usage without causing patient harm. (hypoglycemia episode <3.3 mmol/L or hyperglycemia >18 mmol/L).

Build Understanding

Provider Survey:

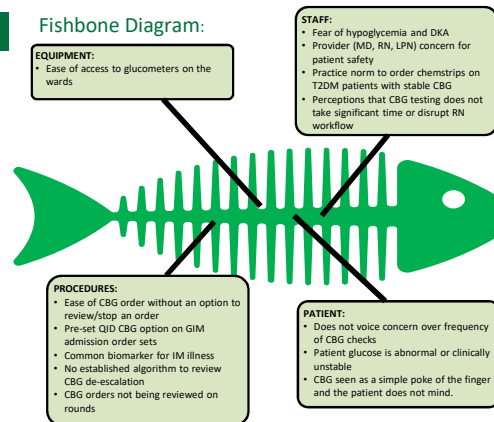
- Surveyed 85 nurses and 21 physicians to gauge their perspectives
- Both groups acknowledged the frequent ordering of CBG tests and unnecessary tests are completed daily.
- While physician re-assessment is needed to change a CBG test frequency, nurses often advocate for change and are often aware of when CBG is no longer needed.

➤ **Suggestions for a reassessment process that supports team-based decision making was proposed to reduce test frequency.**

Pre-Intervention Chart Audit:

- A preliminary retrospective chart audit of 6 GIM units in September 2023 estimated baseline CBG utilization.
- Analyzed patient demographics, length of stay (LOS) to CBG de-escalation
- Utilized a CBG Chemstrip Rationalization Algorithm to identify: CBG orders remaining on de-escalation rates, average LOS of unnecessary CBG use.

Fishbone Diagram:



Measures:

Outcome Measures: Prevalence of patients with unnecessary CBG orders at the time of hospital discharge. Additional outcomes: time to reassessment of CBG orders.

Process measures: Number of posters (21), responses to RN (85) and MD Survey (21).

Balancing measures. Aggregate hypoglycemia (<3.3 mmol/L) and hyperglycemia (>18 mmol/L) episodes.

Interventions:

- Using the Model of Improvement with Plan-Do-Study-Act (PDSA) cycles, an evidence-based CBG rationalization algorithm was established and trialed (started in March 2024) using a person focused educational intervention targeting ordering physicians and nurses.
- Posters with the algorithm were placed at physician workstations and glucometer docking stations.
- The project was presented to GIM Attending Physicians, disseminated via email and at Resident Physician Academic Half Day.
- Informal education was provided to the RN staff by Clinical Nurse Educators.

CBG Rationalization Algorithm:

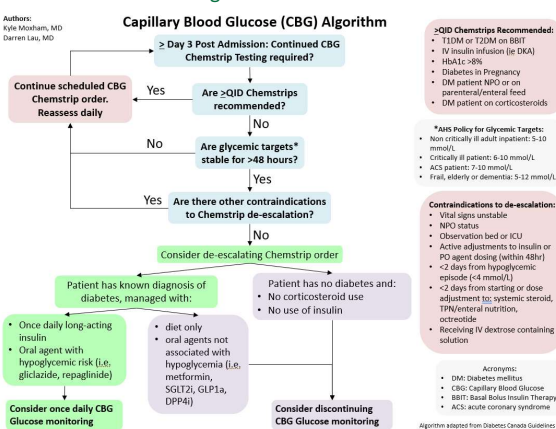


Figure 1 - Capillary Blood Glucose (CBG) Chemstrip Rationalization Algorithm. The algorithm was adapted from Diabetes Canada Clinical Practice Guidelines and AHS Policy for Glycemic Targets. This algorithm was used as a tool to assist with clinical decision making when de-escalating chemstrip orders.

PDSA #1 Post-Intervention Results

Results:

- A total of 590 charts were reviewed pre- and post-intervention, with 84% (n = 494) of patients having CBG ordered on admission.
- The frequency of unnecessary CBG orders at discharge decreased by nearly half, from 28.2% (48/170) to 14.8% (48/324).
- The average length of stay until CBG de-escalation improved from 10.6 days to 6.9 days (difference: -3.7 days).
- Patients who underwent CBG de-escalation at day 3 of admission (if eligible) improved from 20.4% (11/54) to 41.1% (39/95) post-intervention.
- Days of unnecessary CBG use declined from an average of 7.05 days to 4.03 days (March 2024) and 3.07 days (April 2024).

Balancing Measures - Ensuring Patient Safety:

	Pre-Intervention		Post-Intervention	
	Low Critical <3.3	High Critical >18	Low Critical <3.3	High Critical >18
Patient count	23	39	16	50
Test count	71	257	36	267
Test/Patient	3.1	6.6	2.25	5.34

Aggregate CBG data was collected and stratified based on blood glucose result. The amount of low critical results (<3.3 mmol/L) and high critical results (>18 mmol/L) were compared pre and post intervention. Following the intervention, the number of low or high critical results remained similar.

Run Chart:

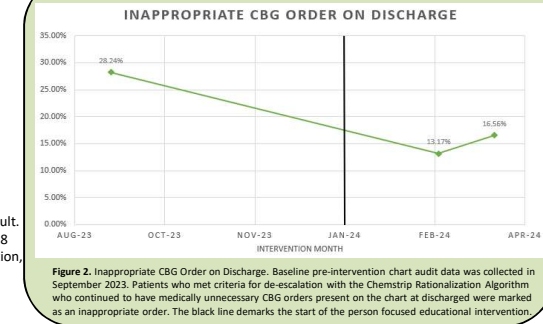


Figure 2. Inappropriate CBG Order on Discharge. Baseline pre-intervention chart audit data was collected in September 2023. Patients who met criteria for de-escalation with the Chemstrip Rationalization Algorithm who continued to have medically unnecessary CBG orders present on the chart at discharged were marked as an inappropriate order. The black line demarks the start of the person focused educational intervention.

Conclusions

Lessons Learned:

- CBG measurements in-hospital are frequently unnecessary resulting in inefficient use of nursing resources.
- The absence of established algorithms for reassessing POCT frequency may perpetuate unnecessary testing during hospitalization.
- The implementation of reducing CBG on GIM wards can be done safely without increased adverse patient events (low or high critical CBG values).
- Continued evaluation of this intervention is underway.

Limitations:

- Chart audits: Time consuming process applying the POCT Glucose Rationalization Algorithm to inpatients.
- Changing ordering behaviour: CBG practice norms are hard to overcome for both MD and RNs.
- Continued education and follow up is required to ensure sustainability of this initiative.
- Lack of a que: Connect Care CBG orders do not automatically flag continuous chemstrip monitoring without an option to review an order.
- Patient perspectives were not included in our analysis. Future surveys should be conducted to include patient experiences as a stakeholder in the project.
- Statistical analysis of PDSA 1 is pending completion of obtaining 3 months of post-intervention data.

Next Steps

Assessing Sustainment:

- Complete follow up chart audits at 3, 6 and 9 months from PDSA 1 to assess sustainment in our intervention.

Planning PDSA 2:

- Exploring a system focused intervention supported within the Connect Care Hyperspace environment. Our plan is to implement a stop date or review date on CBG orders on Connect Care (Day 3 review).
- Further expansion of the scope of the project and POCT algorithm to include other specialty wards at the UAH.

References

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