

OPTIMIZING POINT-OF-CARE (POCT) GLUCOSE TESTING FREQUENCY IN THE EMERGENCY DEPARTMENT (ED)

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Define Problem, Set Aim

Problem Statement

The Emergency Department currently performs hourly point-of-care testing (POCT) glucose tests for diabetic* patients. This practice, while intended to ensure close monitoring of blood glucose levels, contributes to:

1. Reduced nursing efficiency, as frequent testing takes time away from other patient care activities.
2. Patient discomfort from repeated finger pricks
3. Unnecessary costs due to overutilization of POCT glucose strips and associated supplies.

*Diabetic patients defined as patients in ED with either of the following primary diagnosis code: E10, E11, E12, E14, E16.2 or R73.

Aim Statement

We aim to reduce the average no. of POCT glucose test performed for DM* patients by at least 15% from 4.6 to 3.9 by December 2025.

Our goal is to optimize the frequency of POCT glucose testing for diabetic patients in the ED without compromising patient safety or the quality of care. This change aims to improve nursing time efficiency and cost-effectiveness while maintaining appropriate glycaemic control for our diabetic patients.

Establish Measures

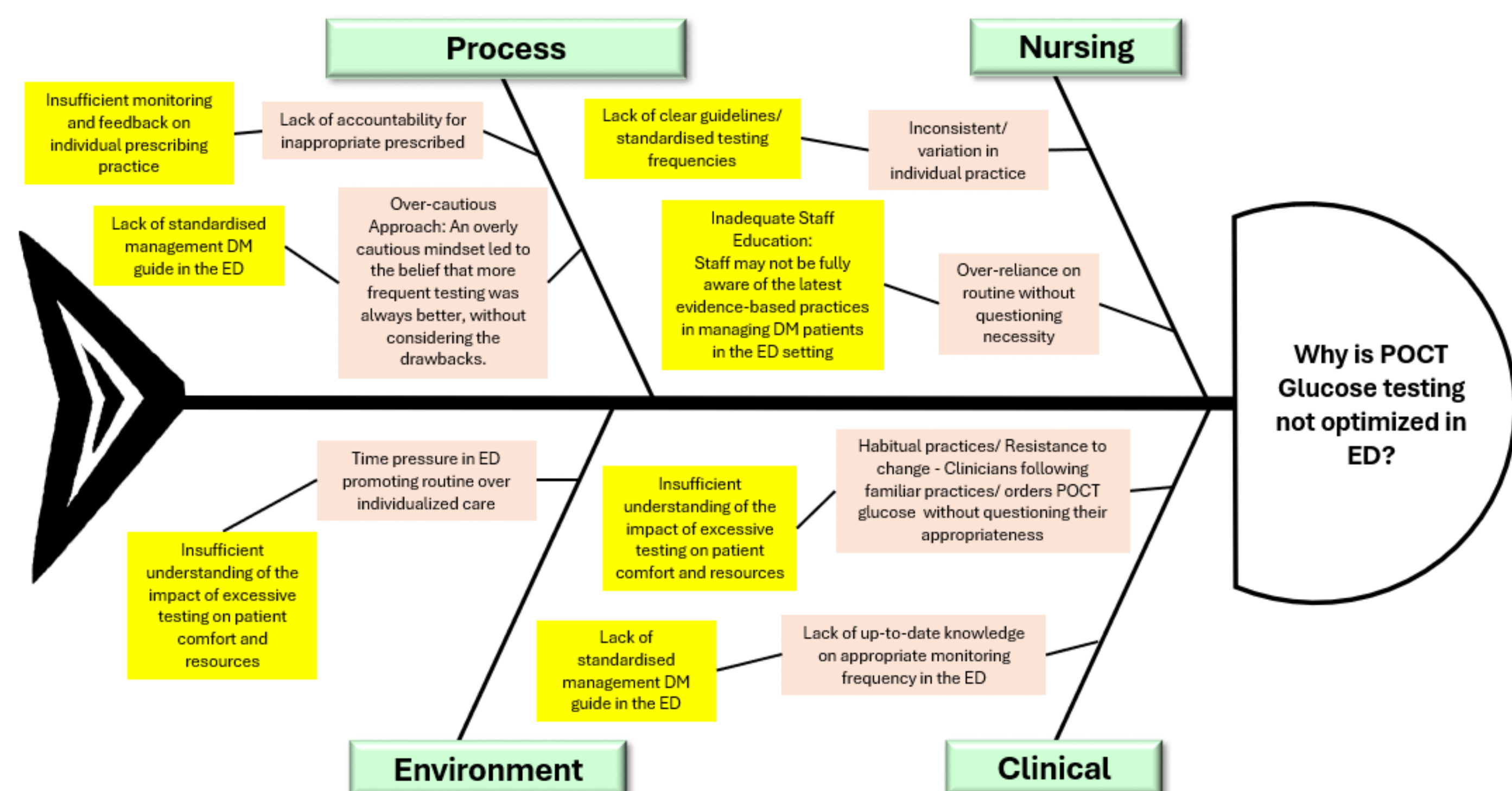
The following measures were defined:

Type	Measure	Baseline
Outcome	Average no. of POCT glucose test performed per DM* patients	4.6
Process	Avg monthly no. of POCT glucose test performed for DM* patients	395
Balancing	Median LOS for DM patients in ED	302 mins

Median Length-of- Stay (LOS) is used as balancing measure to ensure that the reduction in POCT glucose testing frequency does not inadvertently lead to delays in patient care, decision-making, or disposition.

Analyse Problem

The team conducted a root-cause analysis using the fishbone diagram for a comprehensive view of the underlying issues related to Nursing, Clinical, Processes and Environment.



From our root cause analysis, it became clear to the team that a lack of standardized protocol can manifest in various ways and contribute to the overall problem of excessive POCT glucose testing in the ED. The team then came up with the some potential solutions illustrated in the PDSA cycle.

Learning Points

1. **Scalability** – Methodologies and strategies developed in this project can be readily adapted to address other types of unnecessary investigations or procedures within ED. This scalable approach creates a usable model that can be potentially applied to multiple areas, potentially leading to significant improvements in ED efficiency and cost-effectiveness hospital wide.
2. **Patient-centered care and operational efficiency** can be mutually reinforcing when thoughtfully aligned. By reducing unnecessary interventions, we can enhance patient comfort and improved satisfaction by allowing more time for essential care activities.
3. **Interdisciplinary collaboration** is critical when implementing new care pathways. Effective cooperation among various stakeholders is instrumental in achieving the desired outcomes. Hence, it is necessary to engage all relevant stakeholders early in the planning process and maintaining clear communication channels throughout the project lifecycle.

Test & Implement Changes

CYCLE	PLAN	DO	STUDY	ACT
1	The team plans to establish a new Appropriate Diabetes Care Protocol with comprehensive guide for managing patients with both hypoglycemia and hyperglycaemia in the ED to standardise criteria for triage POCT glucose, expedite diagnosis while ensuring consistent care and appropriate treatment.	A comprehensive compilation of DM related resources for ED, including newly added guidelines for the diagnosis and initial management of Type 2 Diabetes. This protocolized treatment aims to expedite the diagnostic process and decrease/ standardise the number of POCT glucose tests required per patient at triage.	The protocol was reviewed and agreed with Endocrine, ED senior doctors and Nursing leaders.	Adopt The protocol was subsequently presented during M&M to all ED clinicians and adopted wef 21 Nov 24. Audit and compliance check was subsequently done in the later months
2	For DM* patients managed with subcutaneous insulin, there was no standardized protocol for POCT frequency previously. Hence we plan to implement a new POCT glucose testing frequencies for hyperglycaemia patients to improve consistency of care, reduce unnecessary testing and improve nursing efficiency.	A new guidelines has been established collectively with Nursing at such: if random glucose reading is ≥ 20 mmol/L the next POCT glucose test should be performed only once within a 2-4 hour period before disposition. This allows for appropriate monitoring of DM* patients while reducing excessive testing in those with more stable glucose levels.	Both ED Nursing and Clinical team were informed of the updated POCT test frequency to ensure consistency and adherence to the new/ revised guidelines.	Adopt The new test frequency was updated in the ED & EDTU Clinical management guidelines
3	Similar to PDSA Cycle 2, the team intends to review the POCT glucose testing frequencies for hypoglycemia patients to improve consistency of care, reduce unnecessary testing and improve nursing efficiency.	The protocol has been refined with Nursing to reduce unnecessary frequent monitoring once patient stability has been achieved: Hourly glucose monitoring may be discontinued if the patient meets all of the following criteria: a. Patient is eating well, defined as consuming more than half of their provided meal. b. BSL is >10 mmol/L for 2 consecutive hourly readings.	Our data revealed a progressive reduction in the total number of POCT glucose tests conducted for DM* patients in ED.	Adopt The revised test frequency was updated in the ED & EDTU Clinical management guidelines

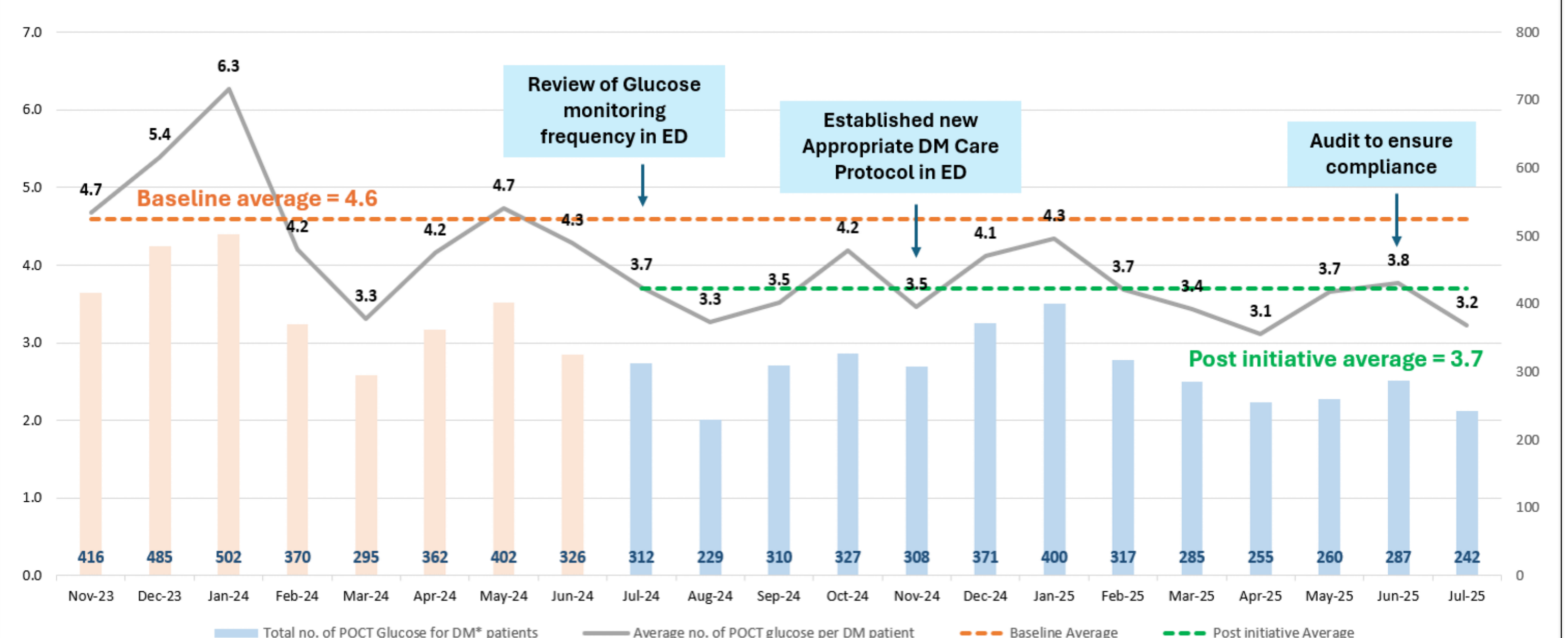
Results

Process Measure (bar chart):

Average monthly no. of POCT glucose test performed for DM* patients reduced by **24%** from **395 (baseline)** to **300 (post-initiative)**.

Outcome Measure (line graph):

Average no. of POCT glucose test performed per DM* patients reduced by **20%** from **4.6 (baseline)** to **3.7 (post-initiative)**.



Balancing Measure:

Median LOS has reduced by **2 mins** from **302 mins** to **300 mins**

Month	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25
Median LOS /DM patient	283	320	298	288	320	291	320	291	284	320	288	320	291	320	298	288	320	291	320	291	284

Conclusion:

Our project have several benefits:

- **Improved Nursing Efficiency:** The project saved approximately **16 hours per month** of nursing time (~10mins per test including preparation & wipe down of equipment etc) previously spent on performing POCT glucose tests, allowing staff to focus on other patient care activities.
- **Enhanced Patient Experience:** Fewer finger pricks (**95 less POCT glucose tests per month**) can reduce patient discomfort, contributing to a more positive ED experience for DM patients.
- **Cost Reduction:** Though POCT glucose test is free for patients, decrease in utilization reduces operational cost for the department - Fewer test strips used and potentially extend the lifespan of test machines.
- **Maintained Quality of Care:** The slight reduction in median LOS demonstrates that these improvements have not negatively impacted patient flow or care quality.

The team will continue to monitor and adjust our processes with the goal of maintaining and possibly exceeding these positive outcomes in the long term.

Acknowledgement: Additional credits to [Reducing Blood Glucose Monitoring for IPDC patients] project team led by Dr Esther Tan (ED) whose initiatives has also positively influenced our project outcomes.