MAR Based Subcutaneous Insulin Calculator

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Background

- Insulin is a high-risk medication that can lead to significant morbidity and mortality, especially in young children who require smaller, weight-based dosing
- Insulin is a common medication associated with inpatient medication errors due to:
  - Manual calculations by nurses
  - Order entry errors by prescribers

Purpose

- The aim of this project is to evaluate whether implementation of a medication administration record (MAR)-based insulin calculator reduces rapid-acting subcutaneous insulin errors in an inpatient pediatric setting by 25%

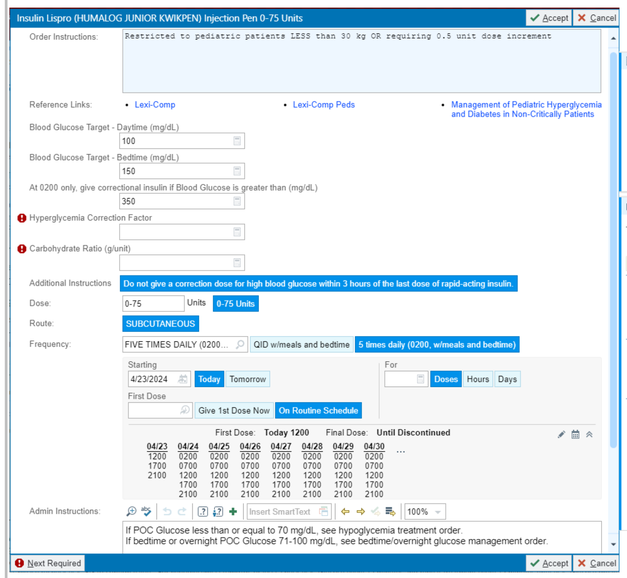
Methods

- The project occurred from January 2023 to April 2024 and is divided into four PDSA cycles-
  - Cycle 1 (January-November 2023): MAR based inpatient subcutaneous insulin calculator built and configured into Epic Hyperspace, order set/panel developed, and education with inpatient providers and nurses
  - Cycle 2 (February 2024): Customization of calculator to include an ICR of 0
  - Cycle 3 (March 2024): Inpatient hyperglycemia guideline developed with calculator guidance and continued education with inpatient staff
  - Cycle 4 (April 2024): Implementation of dosage guardrails for ICR and ISF for higher insulin doses
- Rapid acting insulin errors were tracked monthly from January 2020 to May 2025 and categorized as either order or administration errors across three time periods-
  - Pre-PDSA (January 2020-December 2021)
  - During PDSA (November 2023-April 2024)
  - Post-PDSA (May 2024-May 2025) implementation

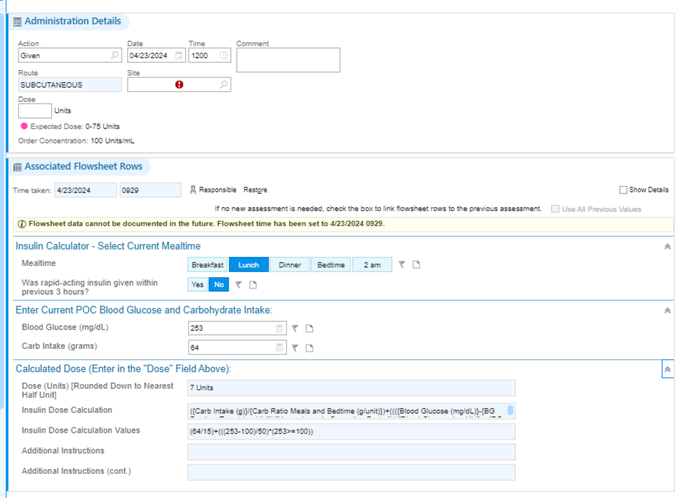
Implementation

Cycle 1

Ordering View

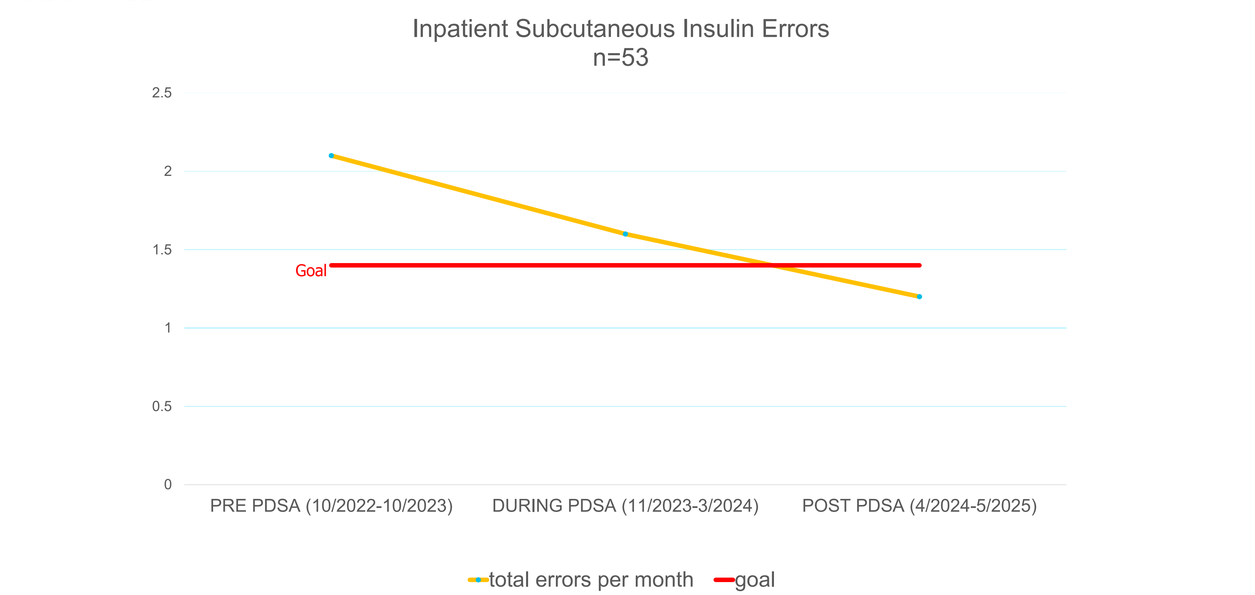


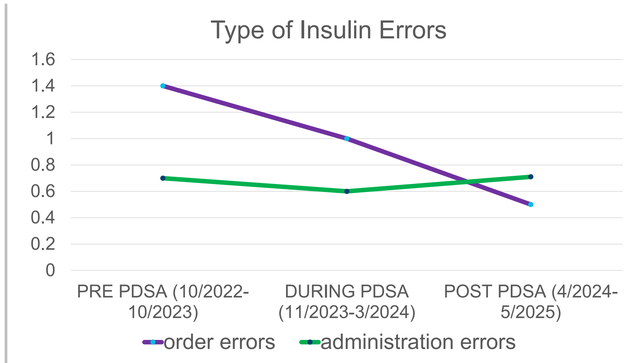
Administration View



Cycle 4

Results





- Following implementation of the MAR-based calculator and PDSA cycles, total subcutaneous insulin errors decreased by 50%

Conclusion

- Use of a MAR-integrated insulin dosing calculator significantly reduces insulin errors in hospitalized pediatric patients with diabetes
- While order errors trended down throughout the PDSA cycles, administration errors increased post PDSA cycles
  - More investigative work is required to explain this uptrend
- Next steps include root cause analysis of administration errors and evaluation if reduced inpatient insulin errors was associated with reductions in inpatient length of stay

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