

Implementation of a Carb-Based Insulin Dosing Calculator

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Background

- UChicago Medicine (UCM) is an 800-bed academic medical center with 1 pediatric and 2 adult hospitals.
- Approximately 25-30% of all UCM inpatients have diabetes mellitus (DM) as a primary or secondary diagnosis. Additionally, insulin resistance is not uncommon in steroid requiring conditions such as the UCM oncology and transplant populations. There are a total of 1500 staff nurses in UCM hospitals.
- Insulin dosing calculators (IDC) have been in use in electronic medical records (EMR) for over a decade in several hospitals across the nation² and permit insulin to be dosed according to pre-prandial point-of-care blood glucose (POC BG) and anticipated carbohydrate intake for more precise mealtime dosing¹.
- The UCM certified diabetes care education and specialist (CDCES) team is a consult service for both adult and pediatric inpatients.
- UCM pediatric nurses had prior knowledge of combined customized insulin correction scales with insulin-to-carb ratio calculations. Adult nurses were familiar with standardized correction scales with fixed meal doses and less frequently insulin-to-carb ratios at mealtime.

Project Goals

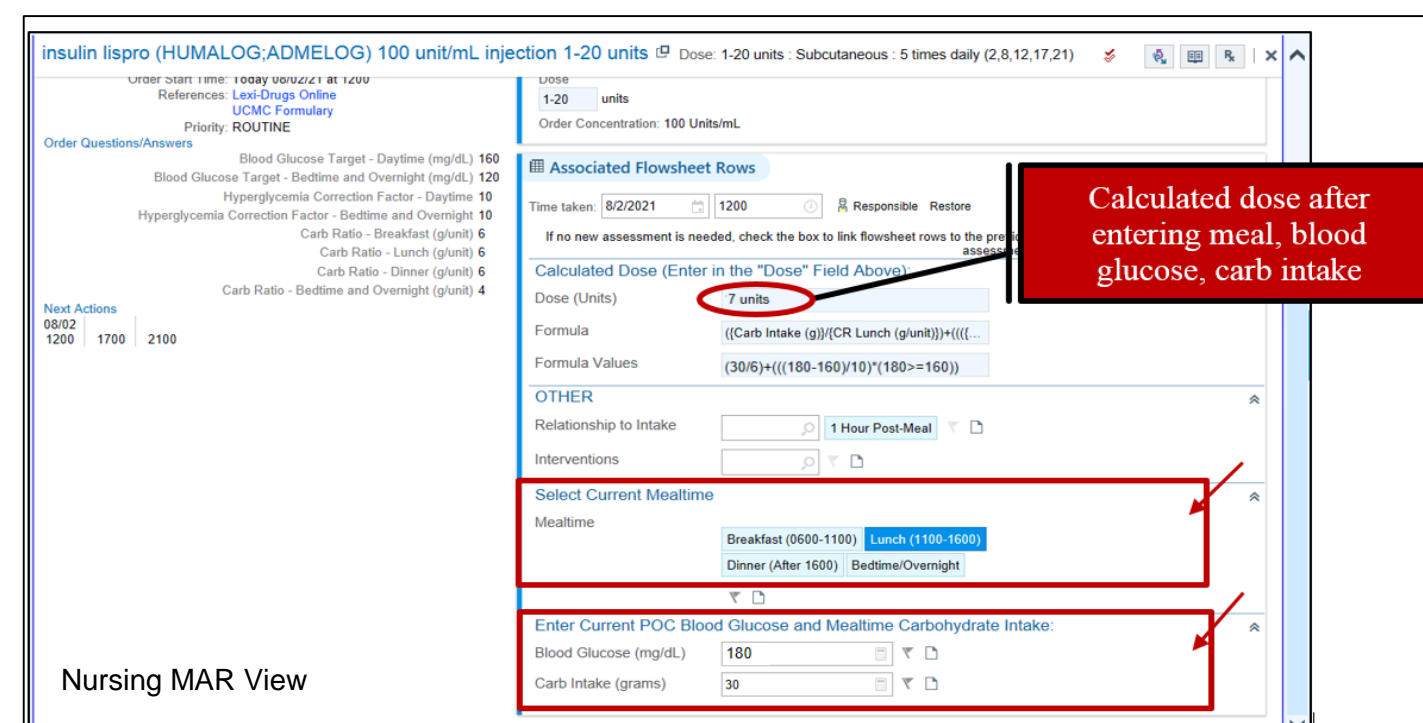
- The objective of this quality improvement project was to increase efficiency and accuracy of rapid-acting insulin dosing thereby reducing hypoglycemia rates and achieving glycemic targets.
- A second aim was to ensure sufficient education to increase staff nurse confidence in use of the IDC.

Strategies

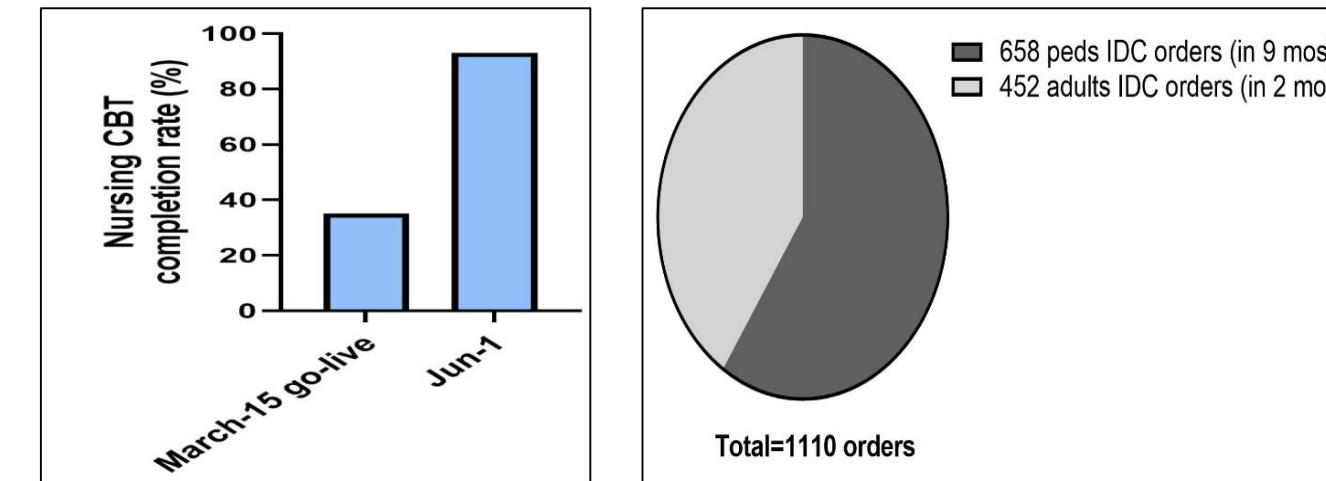
- A multidisciplinary workgroup of EMR informatics specialists, pediatric and adult endocrinologists, pharmacists, nursing leadership, and the CDCES team convened over the course of the year to discuss the build, optimization, and validation of the IDC into the EMR. Currently, the endocrine service orders and follows all IDC patients.
- The pediatric population was selected as the pilot group for initial IDC implementation due to smaller volume of DM patients in the pediatric hospital.
- Provider education was conducted by the endocrinology team, pharmacists received education from the IDC workgroup pharmacist, and nursing education was provided by the CDCES team.
- Nursing education was disseminated by various methods to reach most staff nurses, unit specific clinical nurse educators, and nursing management.

Nursing Interventions

- Lunch and learn sessions for all clinical nurse educators
- Required computer-based training (CBT) for all nursing staff
- Tip sheet on use of IDC posted to intranet
- Recorded session for nursing new hire orientation
- Email reminders to nursing manager regarding CBT completion and staff resources
- Added to weekly nursing email “Need to Know”
- CDCES follows all patients with IDC order
- Event report for deviations to IDC order to track recurring issues and REDcap entry for hypoglycemia



Outcomes to Date



- Nursing leadership mandate led to increased CBT completion rates.
- Daily IDC process adherence monitored by CDCES via EMR pharmacy report of IDC orders, chart audit, and direct communication with nursing staff.
- Hypoglycemia events monitored through REDcap survey and none to date.

Notable issues after adult go-live:

- Interval between initial CBT completion and first-time use of IDC for some nurses
- Lack of adherence to tip sheet steps resulting in inability to open calculator without override
- Omission of meal selection resulting in incomplete documentation on Medication Administration Record (MAR) and EMR view of diabetes management tool
- Transcription error between calculated dose and manually entered dose
- No direction for half-unit dosing
- No half-unit syringes on adult units

Future Considerations

- Reinforce IDC nursing education by CDCES attendance at daily unit huddles which were on hold due to Covid-19 restrictions.
- Refresh IDC nursing education via CDCES team interactions with nursing education department, unit based Magnet councils, patient care managers, and nursing staff on periodic basis.
- Develop hospital wide interdisciplinary education committee to evaluate and prioritize new initiatives affecting change in practice.
- Consider simulation as education approach for projects with steep learning curve to permit hands on learning.
- Pharmacy to add direction to administration instructions on MAR regarding round dose down if half-unit syringe unavailable.
- Request half-unit syringes hospital wide versus only upon request on adult units.
- Survey pediatric nurses at one-year mark on safety, workflow efficiency, and confidence using IDC.
- Survey adult nurses after 6-month post IDC implementation.
- Continue to track events on use of IDC and hypoglycemia episodes.

References

- Epic (2020). Reduce hypoglycemia and hyperglycemia using an insulin protocol calculator.
- Ullal, J., & Aloji, J. A. (2019). Subcutaneous insulin dosing calculators for inpatient glucose control. *Current Diabetes Reports*, 19(11), 1-8.

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