Evaluation of New Insulin Infusion Protocols in Advocate Aurora Health

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BACKGROUND

AAH developed and implemented 2 new nurse-managed insulin infusion protocols in October 2019

- Endocrine (Endo) inpatient (IP) Insulin Infusion
  - Goal blood glucose: 140-180 mg/dL
  - For most non-OKA patients
- Cardiovascular (CV) Surgery inpatient (IP) Insulin Infusion
  - Goal blood glucose: 110-150 mg/dL
  - Used almost exclusively post cardiac surgery

Hyperglycemia (Any blood glucose [BG] value > 140 mg/dL)

- Common in the inpatient setting, affecting 22-45% of patients
- Occurs in both diabetic and non-diabetic populations
- Correlated with negative outcomes
  - Increased mortality, hospital stay, infection, and impaired wound healing

Hypoglycemia1

- Occurs in 6-7% of hospitalized patients
- ADA definitions
  - Level 1 hypoglycemia: any BG level 54-70 mg/dL
  - Level 2 hypoglycemia: any BG level < 54 mg/dL
- Also linked to multiple adverse clinical outcomes
  - Increased mortality, cardiac arrhythmias, seizures, and coma
- Often preventable with most common cause being insulin treatment

Protocols Align with ADA Glycemic Control Guidelines1,2

- Initiate insulin therapy when BG values > 380 mg/dL
  - Target BG 140-180 mg/dL in MOST patients
  - Tighter control 110-140 mg/dL in select (CV surgical) patients

Insulin Infusions1,2

- Preferred method of achieving blood glucose control
  - Rapidly effective and easily titrated
- High alert medication that carries risk for hypoglycemia
- Require validated protocols to minimize risks while maximizing benefits

Glucometrics3

- Systematic analysis of inpatient blood glucose data
- Method for validating safety and efficacy of insulin infusions
- No national standard exists for measuring inpatient BG control

OBJECTIVE

- Assess the safety and efficacy of the updated insulin infusion protocols
- Create a standardized measure for ongoing evaluation of the insulin infusion protocols
- Monthly glucometrics data report

METHODS

- Retrospective medical record review of blood glucose values for first 4 months after protocol launch
- Data obtained through monthly EPIC® data report—Blood glucose data for all patients while on an insulin infusion
  - MRN, point of care [POC] BG (mg/dL) with date and time stamps, protocol used, hospital, hospital unit
- Safety and efficacy endpoints were chosen in collaboration between pharmacy and endocrine within AAH

RESULTS

ENDO EFFICACY

Goal Blood Glucose 140-180 mg/dL

- 187 values in acceptable range (101-210 mg/dL)
  - Endo: 72.1%
  - CV Surgery: 76.7%
  - Average: 74.0%
- 184 values in acceptable range (71-180 mg/dL)
  - Endo: 72.8%
  - CV Surgery: 74.0%
  - Average: 73.5%

Safety Endpoints

- Percent of patient stays experiencing severe hyperglycemia
  - Any POC blood glucose < 54 mg/dL while on insulin infusion protocol
  - Secondary
  - Percent of patient stays experiencing hypoglycemia
  - Any POC blood glucose 54-70 mg/dL while on insulin infusion protocol

EFFICACY ENDPOINTS

Average blood glucose

- Average BG while on insulin infusion protocol
  - Endo: 190 mg/dL
  - CV Surgery: 110 mg/dL

Patient stays with any BG > 140 mg/dL

- 6.1%
  - Endo: 5.6%
  - CV Surgery: 6.6%

Patient stays with any BG > 180 mg/dL

- 1.8%
  - Endo: 0.6%
  - CV Surgery: 3.2%

Patient stays with any BG < 70 mg/dL

- 5.7%
  - Endo: 3.6%
  - CV Surgery: 7.9%

Patient stays with any BG < 54 mg/dL

- 8%
  - Endo: 7.9%
  - CV Surgery: 9.3%

CONCLUSIONS

Severe hypoglycemia is rare

- 2% patient stay average for Endo IP protocol
- 2.8% patient stay average for CV Surgery protocol

CV surgery protocol is performing well overall

- Average BG of 135 mg/dL (Goal 110-150 mg/dL)
- 92.4% of values in clinically acceptable range (71-180 mg/dL)
- Does see more hypoglycemia at 12.5%

Endo protocol identified as an opportunity for improvement

- Average BG of 185 mg/dL (Goal 140-180 mg/dL)
- 73.9% of values in clinically acceptable range (101-210 mg/dL)

Insulin infusion glucometrics report can be used as a tool to validate and improve insulin infusion protocols within AAH

REFERENCES