Effect of Overlapping Insulin Glargine Administration in Decreasing Incidence of Hyperglycemia after Discontinuation of Intravenous Insulin Infusion

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Background

- Diabetes is a prevalent comorbid condition in the United States
  - 34.2 million Americans diagnosed with diabetes
- People with diabetes have an increased risk for hospitalizations
- Substantial economic burden of direct medical costs led to an estimated $237 billion in 2017
- The American Diabetes Association (ADA) currently recommends a target blood glucose of 140 to 180 mg/dL for critically ill patients in the ICU, general medicine or surgery units
- Glycemic control in patients with diabetes is crucial due to the potential for negative outcomes surrounding uncontrolled blood glucose (BG)
  - Inpatient hyperglycemia is associated with an increased risk of complications and mortality
  - Improved glycemic control results in reduced infection rates, shorter hospital stays, lower mortality and reduced medical costs
- Hyper- or hypoglycemia among hospitalized patients is associated with an increased risk for complications, length of hospital stay and mortality
  - Insulin remains the mainstay of treatment for uncontrolled blood glucose with either a continuous IV insulin infusion or SC insulin administration
  - Patients are often transitioned from IV to SC insulin, though loss of glycemic control is common
- Consistent euglycemia requires consistent monitoring and careful titration and transitioning of IV and/or SC insulin
  - Studies have supported the use of overlap therapy with SC insulin while IV insulin is still running to decrease the incidences of hyper- and hypoglycemia

Purpose

- Assess the incidence of hyperglycemia in patients being transitioned from an intravenous (IV) insulin infusion to subcutaneous (SC) insulin glargine
- Determine whether IV and SC overlap therapy decreases the incidence of hyperglycemia when transitioning patients
- Goal: outline the need for a protocol with appropriate transition (timing and dosing) from IV to SC insulin in order to prevent loss of glycemic control

Statistics

- Based on the assumption that there would be a 30% difference in incidences of hyperglycemia between groups, 36 patients would be needed in each group to achieve 85% power
- Primary endpoint, the incidences of hyperglycemia after discontinuation of IV insulin infusion, will be evaluated using a t-test
- Statistical significance will be determined using a p value >0.05

Methods

- Retrospective chart review approved by the Institutional Review Board at Saint Francis Hospital and Medical Center (SFHMC) in Hartford, CT

Data Collection Points

- **Patient age & gender**
  - Total duration of insulin infusion
  - Overlap time (if overlapped)

- **Patient weight & BMI**
  - Total units of IV insulin in 24 hours prior to discontinuation
  - Gap time from stop of IV drip to first dose of SC insulin

- **Diagnosis of type I or II diabetes mellitus**
  - Units of SC insulin administered before IV infusion is stopped
  - Lowest blood glucose

- **Indication for insulin infusion**
  - Total units of SC insulin on day 0 of transition
  - Highest blood glucose

- **A1c on admission**
  - Overlap of IV insulin with SC insulin glargine (Y/N)
  - Documentation of steroid administration

Patient Criteria

- **Inclusion**
  - Admitted patients between March 1, 2020 and December 31, 2021
  - Male and female patients between the ages of 18 and 89 years
  - Continuous insulin infusion for at least 24 hours
  - Diagnosis of type 1 or type 2 diabetes mellitus

- **Exclusion**
  - No administration of subcutaneous insulin glargine
  - Primary admission diagnosis of diabetic ketoacidosis (DKA) or hyperosmolar hyperglycemia syndrome (HHS)

Primary Outcome

- Occurrences of hyperglycemia (BG≥180 mg/dL) post transition from an IV insulin infusion to a SC insulin glargine administration in the 24-hour period after the infusion has stopped

Secondary Outcomes

- Occurrence of hypoglycemia (BG<70 mg/dL) in the 24-hour period after stopping the continuous infusion
- Correction of hypoglycemia using dextrose
- Dose adjustments to the SC insulin glargine
- Need to restart the IV insulin infusion during hospitalization

Application to Practice

- Many hospitals have implemented protocols to assess the appropriate amount of insulin that should be administered titration-specific instructions
- Specific instances where IV and SC insulin would be appropriate includes patients on extended high-dose steroid therapy, DKA patients and patients that are admitted post-cardiac surgery

References


Disclosures

Authors of this project have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this project.