



Glucose Management in the Renal Transplant Patient Population Utilizing Glucommander

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Introduction

Hyperglycemia is a widely known complication after solid organ transplantation. It can occur in the renal transplant population postoperatively due to stress, and administration of immunosuppression and glucocorticoid medications.

Strict control of blood glucose (BG) has been shown to:

- decrease infectious complications
- decrease length of stay, decrease mortality
- reduce diabetes related complications
- improve wound healing

Objectives

- Define and standardize a “trigger” blood glucose value for initiating an intravenous insulin infusion utilizing Glucommander (G+) for the renal transplant patient population.
- Define and standardize a target blood glucose range of 100-140 or 140-180 for the renal transplant patient population.

Background

Sentara Norfolk General Hospital (SNGH) is a 525-bed tertiary level I trauma center located in Norfolk, Virginia. There are approximately 65 renal transplants performed per year.

The facility’s Glycemic Steering Committee defined both hyper and hypoglycemia targets based on the Industry Standard, defined by the American Diabetes Association, and the American Association of Diabetes Educators.

Hyperglycemia ≥ 180 mg/dl
Hypoglycemia ≤ 70 mg/dl

The renal transplant patients were not meeting the defined goals.

Glucommander: G+ is a computer software program used to resolve hyperglycemia using intravenous insulin. The system utilizes a computer-based program to determine the therapeutic rate of an insulin infusion according to an algorithmic formula based on incremental blood glucose changes from one hour to the next. The goal of using the G+ program is to safely normalize a patient's blood glucose within a target goal while preventing dangerous hypoglycemic events, often common when tightly regulating insulin doses.

Project Description

The goal of using the G+ program is to normalize the patient’s blood glucose within a target goal (140-180 mg/dl) safely while decreasing the risk of hypoglycemic episodes.

A protocol was developed to define and standardize a trigger BG value for initiating an insulin infusion utilizing a computerized software program after transplantation.

- Type 1 diabetics would be started on therapy with one glucose value >180 mg/dl
- Type 2 with two glucose values >180 /mg/dl

A retrospective patient chart review was conducted from January 1, 2013 to June 30, 2014 to examine the incidence of hypoglycemia (<70 mg/dl) events.

Glucose Management	Current Practice	Recommended Practice
Initiation of Insulin drip	Per Physician/Provider Discretion	Physician defines “trigger” blood glucose value. Nurse notifies physician
Glycemic Control	Medical or Surgical IV Insulin Protocol	Per Glucommander recommendations; 20 minutes-2 hour increments
Blood Glucose Monitoring	Every 1-2 hours	Per Glucommander recommendations; 20 minutes -2 hr increments
Transition to Subcutaneous Insulin	Per Physician/Provider Order	Physician may choose to have Glucommander to manage transition process. Glucommander recommends transition to sub Q insulin once patient has been in goal for 4 hours. Nurse notifies physician when in target for 4 hours
Meal Bolus Insulin	Wide variation in glucose	Glucommander recommends a meal bolus dose of IV insulin and correction dose based on the blood glucose
Hypoglycemia Treatment	Per Adult Hypoglycemia Treatment Protocol - oral carbohydrates and D50 IV rescue	Glucommander is prescriptive with D50 dosing for the treatment of hypoglycemia for adult patients

Population and Treatment Times

- Two Groups – Treatment Group & Control Group
- Total Number of Patients: 21
- Treatment Group – 11 patients who were initiated on G+
 - Type I Diabetes: 1 Patient
 - Type II Diabetes: 10 Patients
- Control Group – 10 patients that were not treated with G+
 - All Type II Diabetes

Acknowledgements

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Findings

Time to Target: 5 Hours

- Minimum: 2 Hours and Maximum: 8 Hours

Average Time on G+: 4 Days

- Minimum: 2 Days and Maximum: 6 Days

- Initiation of G+: 24-48 Hours Post-Op

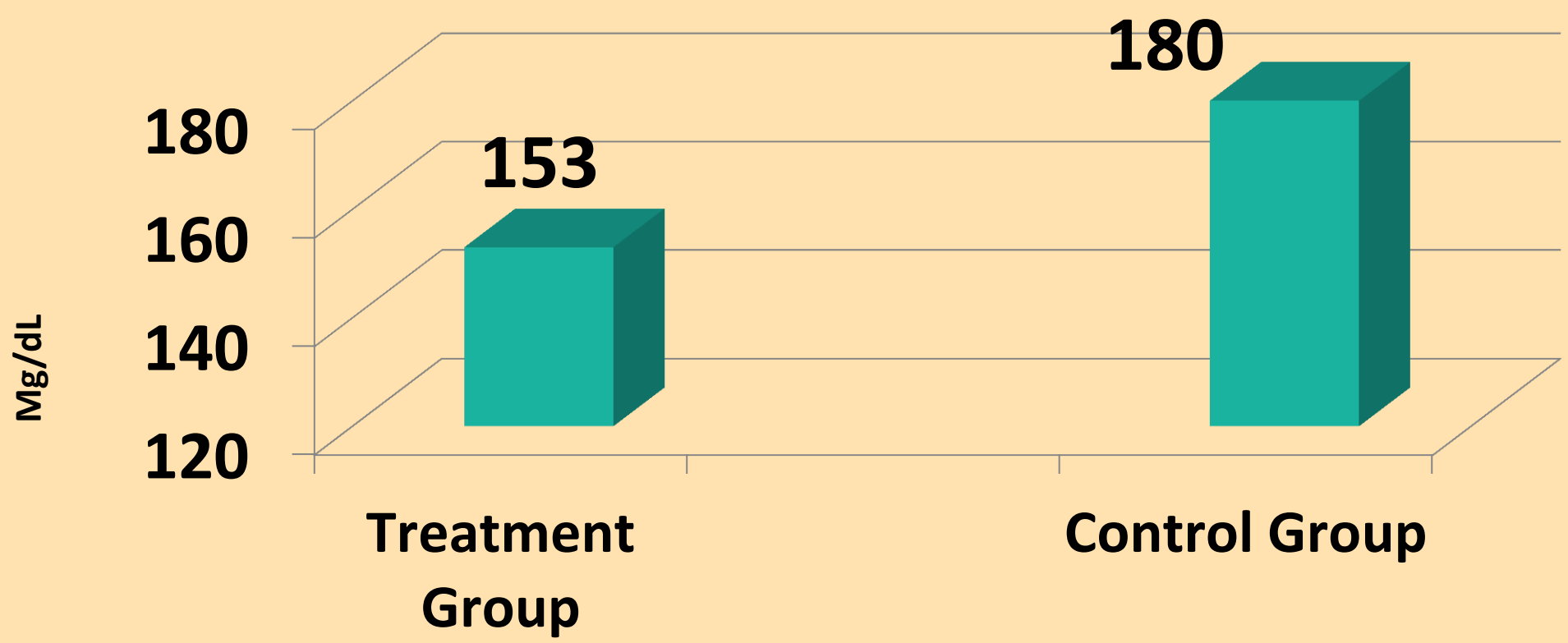
- Type 1 Patient: Immediately

- Return to G+: 2 Patients

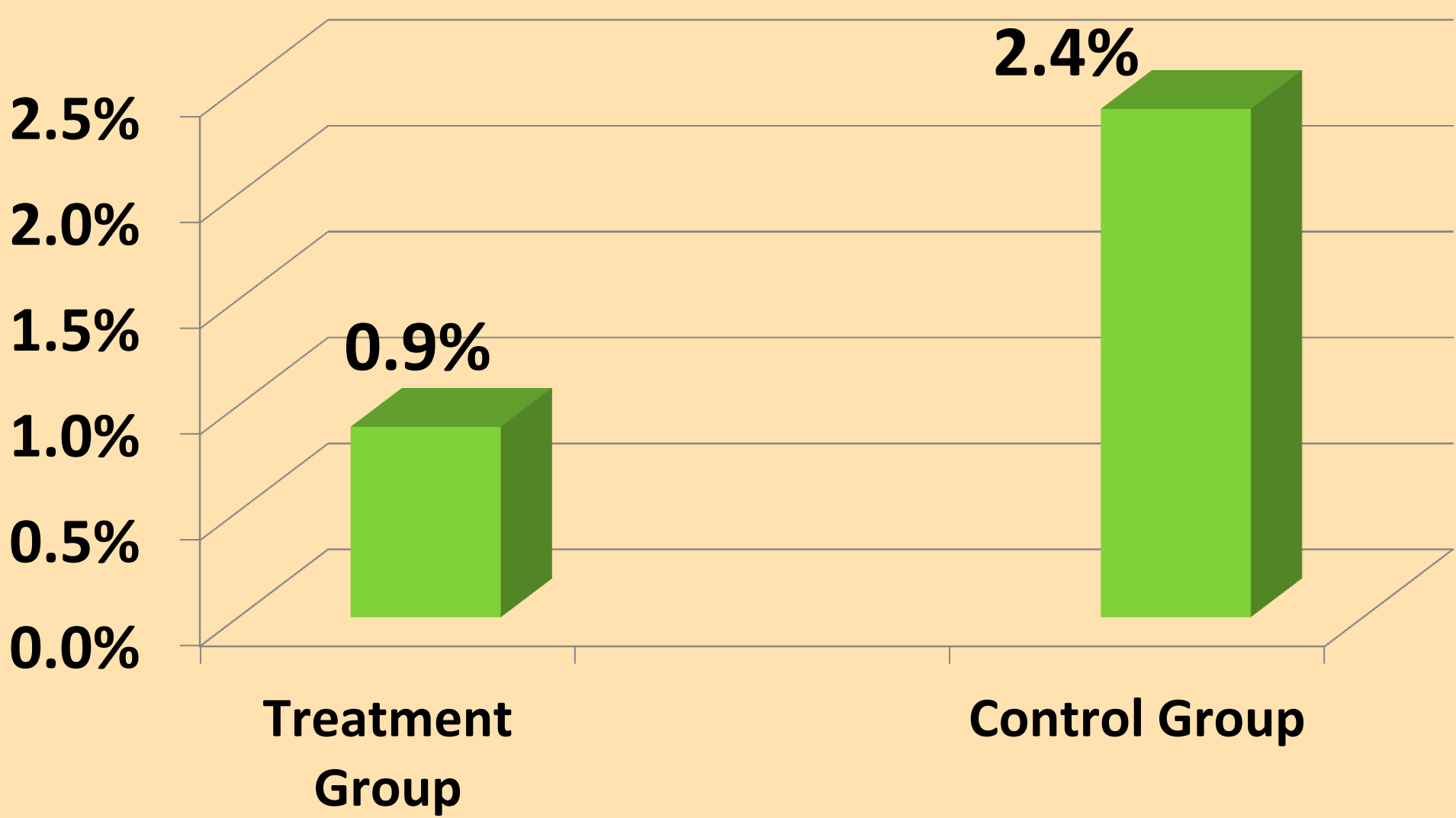
- First Patient: 13 Hours to Target and 2 Days

- Second Patient: 4 Hours to Target and 2 Days

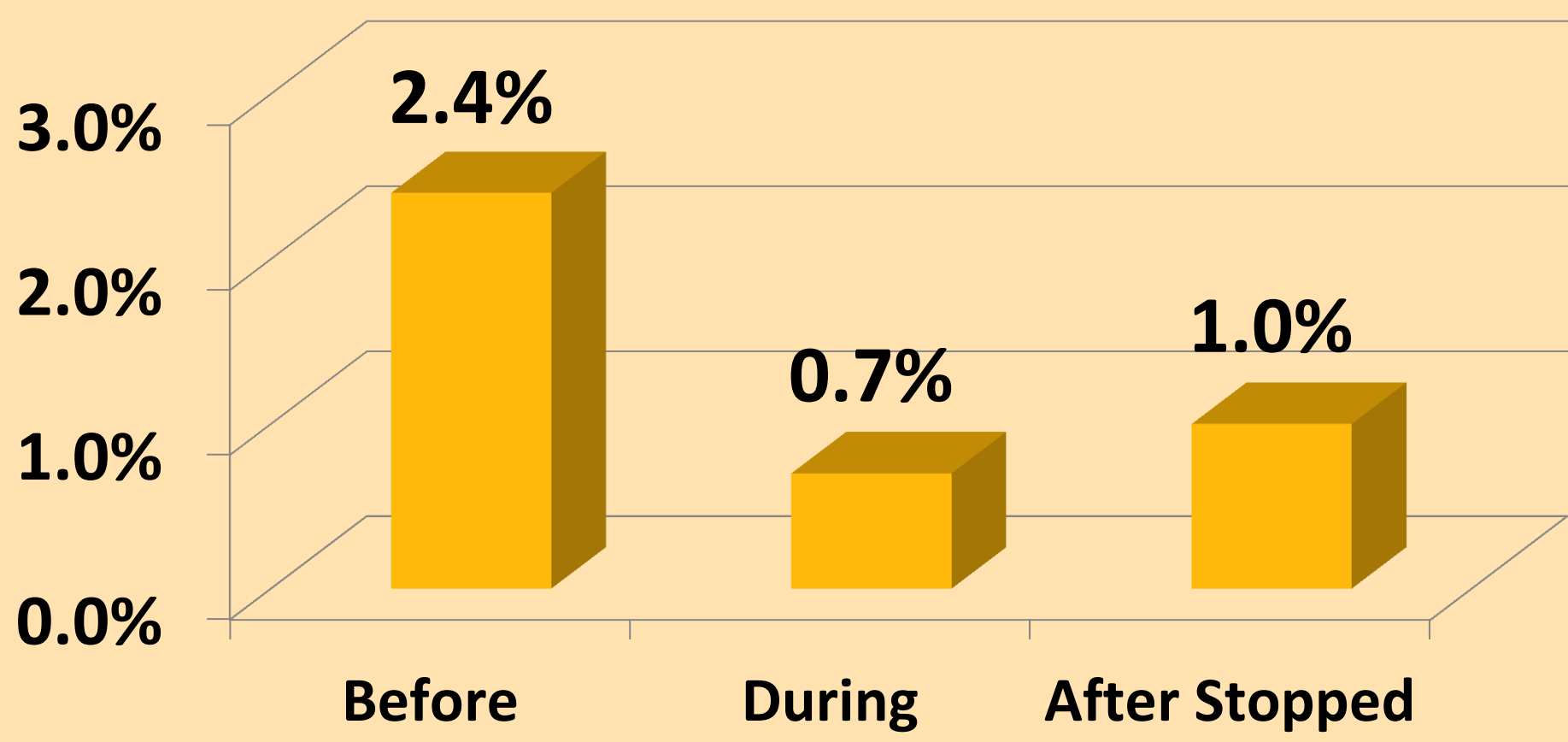
Average Blood Glucose at Discharge



Incidence of Hypoglycemia



Incidence of Hypoglycemia Treatment Group



Lessons Learned

- Challenges existed in reaching consensus in favor of initiating an insulin infusion
- Recommend building in additional time to allow physicians, nurses, pharmacists and other disciplinary team members to learn a new process
- Process resulted in increased nursing time for monitoring
- Recommend hardwiring new process until orders are incorporated or linked in order sets