

Nurse Practitioner—led Project to Achieve Euglycemia in Cardiac Surgery Patients

Linda Kerr, DNP, FNP-BC, Peggy Kalowes, PhD, CNS, and
Melissa Dyo, PhD, AGNP-C

ABSTRACT

Hyperglycemia is an independent predictor of mortality for cardiac surgery patients with or without diabetes; thus, a team approach for glycemic control is needed. This article describes an effective nurse practitioner—led quality improvement project to reduce postoperative hyperglycemia for cardiac surgery patients without an increased risk of hypoglycemia. A comparative analysis was performed between existing clinical processes for managing postoperative patients and the nurse practitioner intervention for insulin titration and nutrition management. Glycemic improvement from the preintervention group to the postintervention group was statistically significant ($P < .001$) and without increased hypoglycemia.

Keywords: cardiac surgery, hyperglycemia, hypoglycemia, inpatient, nurse practitioners

© 2016 Elsevier Inc. All rights reserved.

A diagnosis of diabetes, glucose intolerance, and insulin resistance significantly increases the prevalence of hyperglycemia.¹ Impaired glucose regulation and insulin resistance are further complicated by obesity, with insulin resistance generally rising with increased body fat, specifically a body mass index of greater than or equal to 30 kg/m².² With or without diabetes, as many as 30% to 40% of all hospitalized patients develop hyperglycemia and experience average hospital stays that are up to 3 days longer than for patients without hyperglycemia.³ For cardiac surgery patients, hyperglycemia is an independent predictor of mortality.⁴ At the same time, hypoglycemia related to intensive insulin use can result in complications and increased mortality.⁴⁻⁶ Supplemental strategies to ensure reasonable levels of glycemic control include the provision of ongoing staff education on key topics such as the basic principles of insulin administration and the relevance of carbohydrate-controlled nutrition.⁶

The Society of Thoracic Surgeons recommends early postoperative glycemic control, with blood glucose results in the intensive care unit of less than or equal to 180 mg/dL.^{4,7} Inpatient glycemic targets have been reinforced by the Centers for Medicare and Medicaid Services and the Joint Commission through alignment with the Surgical Care Improvement

Project (SCIP).⁸ The 2014 SCIP-Inf-4 measure defined postoperative cardiac euglycemia as the maintenance of blood glucose results of less than or equal to 180 mg/dL for the period of 18 to 24 hours after anesthesia end time.⁸ Numerous organizations, including the American College of Endocrinology, the American Diabetes Association, the American Association of Clinical Endocrinologists, the Society of Thoracic Surgeons, and the Joint Commission, have called for inpatient management of hyperglycemia and implementation of expert glycemic management teams.⁹

The purpose of this quality improvement (QI) project was to evaluate whether a nurse practitioner (NP)-led clinical initiative could reduce early postoperative hyperglycemia in cardiac surgical patients without increasing the incidence of hypoglycemia. These goals would be demonstrated through achievement of the 2014 SCIP-Inf-4 benchmark. The QI project was designed as a comparison between existing clinical processes for managing postoperative cardiac patients and newly introduced NP-led clinical, nutrition, and education processes.

Before 2014, the hospital had consistently achieved the SCIP-Inf-4 measure at 98%. Following the 2014 measure recommendations by the Centers for Medicare and Medicaid Services, glycemic achievement on postoperative day 1 fell into the 80th

percentile. A gap analysis by the NP team revealed opportunities for clinical process improvement for postoperative cardiac surgery patients. First, the provision of carbohydrate-containing snacks leading up to the 18th hour combined with meal carbohydrates fixed at 60 g resulted in sustained hyperglycemia during the critical 18- to 24-hour period. Second, increased postoperative insulin resistance required an NP plan for individualized insulin infusion and subcutaneous insulin therapy on postoperative day 1. Third, clinical bedside nurse compliance with standardized glycemic processes declined and was found to be related to environmental stressors such as increased patient acuity and competing regulatory requirements. Based on these findings, the NP team identified a need to implement clinical changes for both insulin and nutrition management on postoperative day 1 and intensify staff education.

METHODS

Institutional review board approval was obtained for this QI initiative, which was performed at a 569-bed hospital in Long Beach, CA. Long Beach is the 7th largest city in California with an incidence of diabetes reaching as high as 24.3%.¹⁰ Approximately 30% of patients admitted to the study hospital had a diagnosis of diabetes, and 30% to 40% of cardiac surgery patients had a diagnosis of diabetes. Study parameters defined euglycemia as blood glucose results of 140 to 180 mg/dL, aligning with the American Diabetes Association guidelines.¹ Hyperglycemia was defined as blood glucose results of greater than 180 mg/dL. Hypoglycemia was defined as blood glucose results of less than 70 mg/dL, and critically low blood glucose was defined as results of less than 40 mg/dL. Participants included in the project were ≥ 18 years old who underwent a coronary artery bypass graft, a mitral valve repair/replacement, an aortic valve repair/replacement, and/or a transcatheter aortic valve replacement.

The management of postoperative hyperglycemia was 2-fold. Standardized insulin infusion order sets were available for the clinical bedside nurse to adjust according to blood sugar(s), whereas the individualized subcutaneous insulin therapy was prescribed by the NP team. Individualization of insulin therapy took place at the time of transition from insulin

infusion to subcutaneous insulin therapy on postoperative day 2. The preintervention group received individualized therapy only for patients meeting specified criteria for hemoglobin A1c, body mass index, and diagnosis of diabetes. The post-intervention group received individualized insulin therapy using an evidence-based algorithm for all patients undergoing cardiac surgery. In addition, meal carbohydrates were reduced to mitigate insulin resistance and hyperglycemia.

Key NP-led strategies to promote euglycemia included the development of new insulin management processes for postoperative day 1, the reduction of meal carbohydrates from 60 g to 30 g and the provision of sugar-free snacks for the first 24 hours after surgery, and the development of education tools and clinical decision aids for nursing staff (Figure 1). Nurse adherence to project protocol requirements was continuously monitored, and education was provided by the NP team when standards of glycemic care were not followed. Likewise, when provider response to deterioration in glycemic control was delayed by varying levels of interest, knowledge, or fear of hypoglycemia, the NP team facilitated provider engagement through the use of interprofessional communication, either individually or via committee discussion. In addition, new standardized insulin and glycemic processes were embedded within the cardiac surgery insulin infusion order set and were administered by the clinical bedside nurse.

RESULTS

Patients meeting the study inclusion criteria were evenly distributed between the preintervention group ($n = 89$) and the postintervention group ($n = 85$) for a total of 174 participants (Table). Achievement of the SCIP-Inf-4 benchmark was used to assess the reduction of hyperglycemia in post-cardiac surgery patients. Achievement of the measure for patients before the intervention in comparison with patients after the intervention was statistically significant ($P < .001$), thus meeting the primary project aim (Figure 2). The incidences of hypoglycemia were reduced for the postintervention group (Figure 3). Neither study group experienced critically low blood glucose results (blood glucose less

Download English Version:

<https://daneshyari.com/en/article/5569696>

Download Persian Version:

<https://daneshyari.com/article/5569696>

[Daneshyari.com](https://daneshyari.com)