

Use of a Computerized Intravenous Insulin Algorithm within a Nurse-Directed Protocol for Patients Undergoing Cardiovascular Surgery

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Abstract

Background:

Several studies have shown the benefits of tight glycemic control in the intensive care unit. A large hospital became concerned about certain deficiencies in the management of glucose control in conjunction with cardiovascular surgery. A multidisciplinary steering committee was formed, which implemented a glycemic protocol, the subject of this study.

Methods:

The glycemic protocol is a perioperative, nurse-directed program that incorporates the computerized intravenous (IV) insulin algorithm, Glucommander. Upon admission, hemoglobin A1c and blood glucose (BG) were tested, and patients were screened for previously diagnosed diabetes. This information was used to determine if preoperative insulin will be used, if the patient will be transitioned post-IV to subcutaneous (SC) basal-bolus insulin, and if insulin will be prescribed on discharge. IV insulin was initiated perioperatively in known diabetes cases or if one BG value >140 mg/dl or two BG values >110 mg/dl within 24 hours before or during surgery. The target range was 90 to 120 mg/dl.

Results:

In the 9 months after protocol implementation, 93% of the patients had no BG value >200 mg/dl during the first 48 hours postoperatively. In the 6 months of study data, there were 457 patients. The mean time to target range was 3.0 hours. The mean IV insulin run time was 37 hours. The mean BG value was 107 mg/dl. Only 2% of patients had transient BG <50 mg/dl, and no BG values were <40 mg/dl. Of the patients, 52% were transitioned to SC basal-bolus, and 26% were discharged on insulin.

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Abbreviations: (AACE) American Association of Clinical Endocrinologists, (ADA) American Diabetes Association, (BG) blood glucose, (CF) correction factor [insulin sensitivity factor], (CIR) carbohydrate-to-insulin ratio, (CVS) cardiovascular surgery, (DM) diabetes mellitus, (ICU) intensive care unit, (IHI) Institute for Healthcare Improvement, (IV) intravenous, (POD) postoperative day, (RAI) rapid-acting insulin, (SC) subcutaneous insulin, (TDD) total daily dose of insulin

Keywords: basal-bolus, blood glucose, cardiovascular, cardiovascular surgery, diabetes, glycemic protocol, insulin, intravenous

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Abstract cont.**Conclusions:**

The Glucommander earned high respect from the nurses for the way it scheduled BG tests and eliminated the calculation time and calculation errors associated with manual methods. The protocol was highly effective in normalizing glucose without hypoglycemia. The multidisciplinary steering committee proved to be a good approach to implementing a glycemic protocol.

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