

## Prediction and Prevention of Treatment-Related Inpatient Hypoglycemia

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### Abstract

#### **Background:**

Prolonged severe hypoglycemia (SH) in hospitalized patients is associated with increased morbidity and mortality. This study was undertaken to identify risk factors for SH, to apply that knowledge to the development of a prediction algorithm, and to institute a prevention program at a tertiary medical center.

#### **Methods:**

We analyzed SH events for 172 patients and developed computer algorithms to predict SH that were tested on a population of 3028 inpatients who were found to have blood glucose (BG) <90 mg/dl during their hospital stay. Variables with significant bivariate associations were entered into partition analyses to identify interactions. Logistic regression was performed by calculating parameters related to the odds of hypoglycemia below each cut point. Sensitivity and specificity were determined at various cut points. The cut points resulting in 50% sensitivity for each hypoglycemia level were determined. These algorithms were tested against the initial 172 adjudicated patients.

#### **Results:**

Variables related to the BG <40 mg/dl cut off point were basal and adjustment scale insulin doses, weight, and creatinine clearance, while variables related to the 60 mg/dl and 70 mg/dl cut points were basal, prandial, and adjustment scale insulin doses, weight, creatinine clearance, and sulfonylurea use. The 50% sensitivity cut point developed using the <70 mg/dl algorithm correctly identified 71% of the adjudicated cases, while the <60 mg/dl and <40 mg/dl algorithms identified 70% and 55% respectively.

#### **Conclusions:**

A validated prediction algorithm for SH can aid in the identification of patients at risk for SH and may be useful in the development of prevention strategies.

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**Abbreviations:** (A1C) hemoglobin A1c, (AUC) area under the curve, (BG) blood glucose, (EHR) electronic health record, (LSH) less severe hypoglycemia, (SH) severe hypoglycemia, (TDD) total daily dose

**Keywords:** diabetes, inpatient hypoglycemia, patient safety, prediction, prevention

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