Impact of Late Glucose Checks on Hypoglycemia Incidence

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Purpose

The purpose of this retrospective study is to determine the impact of blood glucose (BG) check timing on hypoglycemia incidence for intravenous insulin therapy.

Background

Hypoglycemia is frequently associated with blood glucose readings that are made after the scheduled next check, i.e. late readings. However, there are few reports describing the quantitative effect of untimely blood glucose (BG) readings. This work focused on the quantitative evaluation of BG timing related to hypoglycemic events from a large electronic database of patients receiving insulin infusion therapy while admitted in an acute-care facility.

Method

This study is a retrospective, quantitative analysis of incidence of hypoglycemia, defined as < 70 mg/dL, as a function to the timing of the BG determination relative to the scheduled next BG. The dataset includes 3.55 million de-identified BG readings and time of reading from five unaffiliated systems using the same electronic glucose management system (eGMS) for intravenous insulin infusion therapy between 2007-2017. The timing of all BG readings scheduled (for 1- and 2-hour next BG checks) were calculated from the dataset without restrictions or exclusions. Incidence of hypoglycemia events occurring from BG readings 5 minutes (min) late or less was used as a baseline to calculate the relative risk of later, low BG readings in 10 min increments. The relative risk of late BGs was further stratified by hospital, year, and goal range.

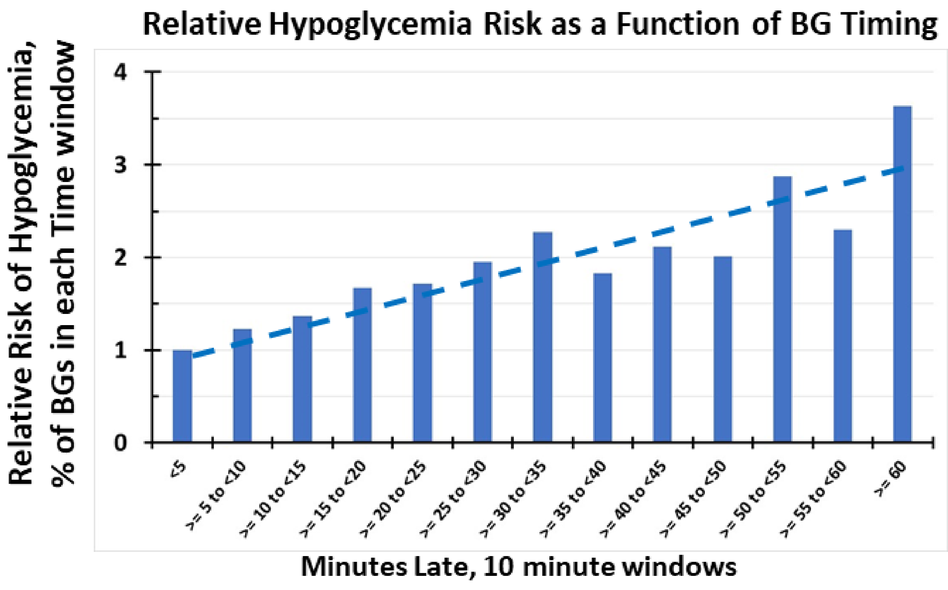
Discussion

The timing of the next BG has a profound effect on the incidence of hypoglycemia. The relationship of increased risk of hypoglycemia with lateness of BG readings remains irrespective of the goal range, year, hospital, or overall incidence of hypoglycemia in that hospital. All data within this study is from the same eGMS with accurate time data. Future research efforts can compare different insulin dosing applications for the purpose of analyzing late BG checks and the incidence of hypo events.

Results

For all hospitals, goal ranges, and for each hospital database stratified by year, the relative risk of hypoglycemia appeared to have the same relationship as a function of minutes late.

The results reveal that for BG obtained less than or equal to 5 minutes late, the incidence of a BG < 70 mg/dl was 0.233% of those readings. Between 15-25 min late, the risk of a hypoglycemia event was 50% higher, and for more than 60 min late, that risk was 200% higher (3-fold increase) when compared to the baseline.



Conclusion

Late BG readings contribute significantly to the incidence of hypoglycemia. These observations should be an important mainstay of bedside care education. The findings also strongly endorse the use of alerts to maintain proper timing of BG readings.

Disclosures

At time of study, all authors were employed(1). W. Patrick Burgess invented the eGMS utilized in study. Data analyzed was obtained by contractual agreement and did not contain patient identification information.

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