

Tight Glucose Control with Minimal Hypoglycemia

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PURPOSE:

This abstract reports over 2 years of tight glucose control (TGC) with insulin dosing software in critical care. The benefits of TGC are well documented, as well as the deleterious effect of hypoglycemia.

METHODS:

In early 2005, Carolinas Medical Center (CMC) set criteria for TGC using EndoTool Glucose Management System to calculate dosing for intravenous insulin (IVI). All patients in critical care receiving constant nutrition with blood glucose (BG) readings above 130 mg/dL were to receive IVI. This FDA-cleared software approach to IVI uses second degree control mathematical principles to control a physiologic insulin dosing relationship based on BG after IVI historical responses. Each patient has an individualized dosing relationship developed based on that individual's unique responses. The database generated provides medical record information (electronic or paper format) as well as Quality Assurance information.

RESULTS:

Over these past 2+ years, 4,016 patients have had 160,748 IVI doses calculated. The data reported is from six critical care units (68 beds). The mean (SD) and median BG of all readings are 119.5 (35.9) and 116 mg/dL. The per reading incidence of hypoglycemia (BG <40 mg/dL) is 0.11% with a per patient rate of 2.9%. The mean BG and the incidence of hypoglycemia have both dropped over time, 2005 to 2007. The clinical outcome of nosocomial infection and LOS have decreased after implementing EndoTool. Over this period, roughly half of the hypoglycemic readings were associated with a BG determination that was more than 30 minutes late or were associated with no IVI prior to the low reading. Correcting the hypoglycemia incidence for these procedural errors, the software induced hypoglycemia is only 0.05% of reading and 1.6% of patient. This control methodology allowed Q2 hour BG determinations 40% of the time while maintaining TGC with extremely low rates of hypoglycemia.

CONCLUSION:

TGC in critical care units can be achieved using current BG determination technology and EndoTool dosing software.

CLINICAL IMPLICATIONS:

The clinical benefits of TGC can be safely achieved in hospitals.