

A Prospective Evaluation of Insulin Dosing Recommendations in Patients with Type 1 Diabetes at Near Normal Glucose Control: Bolus Dosing

Allen B. King, M.D.¹; Dana U. Armstrong, R.D.¹

Abstract

Background:

Current bolus insulin dosing recommendations are based on retrospective studies of patients with Type 1 diabetes in whom the glucose control was not intensely established. Using continuous glucose monitoring (CGM), we prospectively studied these recommendations in patients treated with continuous subcutaneous insulin infusion.

Methods:

Thirty subjects were studied over a mean of two weeks of continuous glucose monitoring with near daily insulin adjustments. First a basal glucose goal was achieved of <5% of values <70 mg/dL and <20%>, 170mg/dL. Then bolus dosing factors; Insulin to Carbohydrate Ratio (g of meal carbohydrates/unit of insulin, ICR) and Correction Factor (mg/dL fall in blood glucose/unit of insulin, CF); were established for each meal time to a goal of $\pm 20\%$ of premeal glucose (ICR) or 80-120 mg/dL (CF) by the fourth post bolus hour.

Results:

All treatment goals were achieved in each subject. Modification of formulas from $ICR = 450 / \text{Total Daily Dose (TDD)}$ to $ICR = (217 / \text{TDD}) + 3$ and from $CF = 1700 / \text{TDD}$ to $CF = (1076 / \text{TDD}) + 12$ more closely matched observed results than published formulas. There was no significant difference in each factor with time of day. There was a highly significant relationship between ICR and CF, $ICR * 4.44 = CF$ ($r = 0.9$, $p < 0.0005$), total basal dose (TBD) and TDD.

Conclusions:

Current formulas need to be modified to provide higher insulin bolus doses. The interrelationships between ICR, CF, TBD and TDD suggest that any change in one may require a change in the others.

J Diabetes Sci Technol 2007; 1:42-46