

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

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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.

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Abbreviations: (CF) Correction Factor, (CGM) continuous glucose monitoring, (CSII) continuous subcutaneous insulin infusion, (ICR) Insulin to Carbohydrate Ratio, (RAI) Rapid Acting Insulin, (SD) standard deviation, (TBD) total basal dose, (TDD) total daily dose

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