ORIGINAL ARTICLE

Use of an Automated Bolus Calculator Reduces Fear of Hypoglycemia and Improves Confidence in Dosage Accuracy in Patients with Type 1 Diabetes Mellitus Treated with Multiple Daily Insulin Injections

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Abstract

Background:

Many patients do not intensify their insulin regimens. It is believed that lack of adherence may be largely due to fear of hypoglycemia. We hypothesized that utilization of an automated bolus calculator (bolus advisor) might reduce fear of hypoglycemia and encourage patients to achieve improved glycemic control.

Method:

We surveyed 1,412 type 1 diabetes mellitus (T1DM) patients treated with multiple daily insulin injection therapy at 270 hospitals in the United Kingdom and Republic of Ireland to assess their attitudes and behaviors regarding insulin therapy after use of a bolus advisor (Accu-Chek® Aviva Expert blood glucose meter and bolus advisor system, Roche Diagnostics). The device automatically calculates bolus dosages based on current blood glucose values, anticipated meal intake, and other parameters.

Results:

Five hundred eighty-eight T1DM patients responded to the survey. Respondents were predominantly female, age <1 to 70 years, with diabetes duration of <1 to >15 years. Respondents had 4–12 weeks prior experience using the bolus advisor. 76.7% of respondents indicated current bolus advisor use to calculate insulin boluses for meals/snacks always or quite often. 52.0% of respondents indicated that fear of hypoglycemia was reduced (39.0%) or significantly reduced (13.0%). 78.8% indicated that confidence in the insulin dose calculation improved (50.8%) or significantly improved (28.0%). 89.3% indicated that the bolus advisor made bolus calculation easy or very easy compared with manual calculation.

Conclusions:

Most patients felt that using the bolus advisor was easier than manual bolus calculation, improved their confidence in the accuracy of their bolus dosage, and reduced their fear of hypoglycemia. Randomized trials are needed to confirm these perceptions and determine whether bolus advisor use improves clinical outcomes.

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Abbreviations: (ABC) automated bolus calculator, (BG) blood glucose, (CHO) carbohydrate, (HbA1c) hemoglobin A1c, (I:CHO) insulin-to-carbohydrate ratio, (MDI) multiple daily injection, (SMBG) self-monitoring of blood glucose, (T1DM) type 1 diabetes mellitus

Keywords: bolus, bolus calculator, diabetes, insulin, multiple daily injection, type 1 diabetes

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