ORIGINAL ARTICLE

Insulin Bolusing Software: The Potential to Optimize Health Outcomes in Type 1 Diabetes Mellitus

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Abstract

Background:

Insulin bolusing calculators alleviate the burden of having to calculate insulin bolus doses for patients with type 1 diabetes mellitus (T1DM). Three important pieces of information are needed: a blood glucose monitoring (BGM) result, carbohydrates to be consumed, and the amount of insulin bolus delivered. The purpose of this study was to describe insulin pump adherence behaviors associated with the use of bolus calculators in youth who use Medtronic insulin pumps.

Methods:

Data were downloaded from the MiniMed Paradigm insulin pumps (Medtronic) of 31 youth with T1DM. Areas of adherence that were evaluated included fundamental insulin pump adherence behaviors (e.g., BGM, carbohydrate entry, and insulin bolusing), decisions about Wizard® recommendations, and three Wizard steps: BGM result–carbohydrate input–insulin bolus.

Results:

On average, patients conducted BGM ≥4 times/day on 69% of days, inputted carbohydrates ≥3 times/day on 63% of days, and insulin bolused ≥3 times/day on 85% of days. Participants generally followed Wizard recommendations. Finally, participants completed all three Wizard steps (BGM, carbohydrate input, insulin bolus) within 30 min for an average of 29% of boluses. Almost 3% of boluses that were preceded by Wizard use were delivered without conducting BGM or inputting carbohydrates.

Conclusion:

There was substantial variability in insulin pump adherence behaviors (e.g., days when no BGM occurred, reliance on basal insulin). Interventions targeting insulin pump adherence behaviors have the potential to optimize diabetes health outcomes and glycemic control. Improving insulin pump software reports is one promising avenue for improving adherence.

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