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An Evaluation of "I, Pancreas" Algorithm Performance *In Silico*

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Abstract

Background:

The objective of this study was to investigate the performance of a newly proposed insulin titrating algorithm to achieve tight glycemic control in the critically ill.

Methods:

A simulation environment with 10 critically ill virtual subjects was employed to evaluate the "I, Pancreas" algorithm proposed by Braithwaite *et al*. and described in an article in this issue of *Journal of Diabetes Science and Technology*. The algorithm was coded in MATLAB® and was "plugged in" to a simulation environment to provide glucose control in a 48-hour-long simulated study.

Results:

Mean blood glucose was 6.5 ± 0.4 mmol/liter (118 ± 7.8 mg/dl), percentage of time spent in the target glucose range was 38% (32–44%), and the hyperglycemic index was 0.6 (0.4 –1.0) mmol/liter [11.1 (7.7–18.1) mg/dl]. A single episode of mild hypoglycemia at 3.8 mmol/liter (69 mg/dl) was observed during 480 hours of glucose control.

Conclusion:

In this initial *in silico* evaluation, the "I, Pancreas" algorithm provided a safe control of glucose in the simulated study and achieved tight glycemic control 38% of the time.

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Abbreviations: (BG) blood glucose, (CLINICIP) Closed Loop Insulin Infusion for Critically Ill Patients, (CV) coefficient of variation, (eMPC) enhanced model predictive control, (HGI) hyperglycemic index, (ICU) intensive care unit, (IR) infusion rate, (IV) intravenous, (MR) maintenance rate, (SD) standard deviation, (TGC) tight glycemic control

Keywords: algorithm, critical illness, glucose control, simulation environment

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