

# The evidence for using a weight based method for treating hypoglycaemia

L. McTavish<sup>1</sup>, B. Corley<sup>1,2</sup>, M. Weatherall<sup>2</sup>, E. Wiltshire<sup>3,4</sup> and J. D. Krebs<sup>1,2</sup>

<sup>1</sup>Endocrine, Diabetes and Research Centre, <sup>4</sup>Paediatrics and Child Health, Capital and Coast District Health Board, <sup>2</sup>Department of Medicine, University of Otago, and <sup>3</sup>Department of Paediatrics and Child Health, University of Otago Wellington, Wellington, New Zealand

- **Purpose**

We aimed to demonstrate that using a weight-based method of treating hypoglycemia was more effective for treating hypoglycemia in both children and adults with diabetes compared to the standard international recommendations.

Current international recommendations state that children should be given 10 grams of glucose and adults 15 grams to treat a hypoglycemia event – no matter their size. These recommendations are based on ‘expert opinion’ rather than empirical evidence. We chose to challenge these international guidelines with a series of 4 small-randomised clinical controlled trials.

- **What they entailed and how they went**

The first trial was conducted in children (8-12 years) at a children’s diabetes camp in Otaki, comparing 4 different treatment types – glucose gel, orange juice, mentos and glucose tablets. The study was published in Pediatric Diabetes[1]. It was found that glucose best resolved the hypoglycemic events within 12 minutes, moving glucose levels up between 2-2.5 mmol/L over 10 minutes.

Following this the adult Type 1 diabetes trial [2] which used a similar method comparing 12 grams glucose with our weight-based method. Patients would mail in their records for data analysis. The Weight-based treatment was found to be significantly better – increasing mean blood glucose by an average of 1.5mmol/L.

Our third study [3] investigated weight-based treatment to international recommended in children and adults using insulin pumps. We were able to determine that the weight-based treatment resulted in the need for less re-treatments and discovered that blood glucose levels less than 3.0mmol/L required double the recommended quantity of glucose to resolve a hypoglycaemia event .

Our last study [4] was directed towards Type 2 diabetes, comparing the Diabetes NZ recommendations (12 grams) with the weight-based and 30 grams which Capital & Coast DHB (CCDHB) currently use as the hospital protocol. We determined that CCDHB protocol worked best with no significant difference to using weight-based treatment method and that blood glucose shifted 1.5mmol/l on average. More retreatments were observed in the control (DNZ) group.

- **Learnings**

We now know that weight-based protocol for treating hypoglycemia is the most effective and efficient way of managing a hypoglycemia event, with rebound hyperglycemia or need for retreatment.

We know that it takes approximately 10 – 12 minutes for the symptoms for hypoglycemia to be resolved IF treated correctly/efficiently.

We now know that larger people require more glucose to resolve an event rather than the international recommendations.

In each of the studies, most people recognized a hypo at 3.1mmol/L.

We believe that blood glucose levels below 3.0mmol/L required twice the amount of glucose to resolve an event.

- **Why they were important**

If these studies are reviewed as evidence based practice internationally and adopted, then this could change how patients manage hypoglycemia episodes with better outcomes. For example, quicker resolution of symptoms and less weight gain because episodes are managed appropriately.

- **What they mean for clinicians and patients**

We feel that patients are currently undertreating hypoglycemia and using a weight-based treatment protocol gives a clearer direction for patients with better outcomes.

- **Where they've been published (references)**

These studies were peer reviewed by expert reviewers for the respective journals.

[1]. (Ethic study) - McTavish L, Wiltshire E.

Effective treatment of hypoglycemia in children with Type 1 diabetes: a randomized controlled clinical trial. *Pediatr Diabetes*. 2011;12:381-387.

[2]. (Sept study) - McTavish L, Krebs JD, Weatherall M, Wiltshire E. Weight-based hypoglycaemia treatment protocol for adults with Type 1 diabetes: a randomized crossover clinical trial. *Diabet Med*. 2015;32:1143-1148.

[3]. (Whip study) -McTavish L, Corley B, Weatherall M, Wiltshire E, Krebs JD.

Weight-based carbohydrate treatment of hypoglycaemia in people with Type 1 diabetes using insulin pump therapy: a randomized crossover clinical trial. *Diabet Med*. 2017. <https://doi.org/10.1111/dme.13576> [Epub ahead of print].

[4]. (Sept2 study) - Krebs JD, Weatherall M, Corley B, Wiltshire E, McTavish L.

Optimizing the management of hypoglycaemia in individuals with type 2 diabetes: A randomized crossover comparison of a weight-based protocol compared with two fixed-dose glucose regimens. *Diabetes Obes Metab*. 2018;1–6.

<https://doi.org/10.1111/dom.13231>

**Anything else you think is important**

Weight-based treatment of hypoglycemia is a new concept that requires more publicity. The ETHIC study was recently been referenced in the British Medical Journal included in a meta-analysis:

Carlson JN, et al. Dietary sugars versus glucose tablets for first-aid treatment of symptomatic hypoglycaemia in awake patients with diabetes: a systematic review and meta-analysis. *Emerg Med J* 2017;**34**:100–106. doi:10.1136/emmermed-2015-20563