

Practical Approach to Management of CGM and Flash Glucose (Libre) Systems for Children and Young People with T1DM

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Self-monitoring of blood glucose (SMBG) is an important part of diabetes management but only provides a snapshot view of the blood sugar at that point in time. From a one off reading it is impossible to see what the trend in the blood sugar is and therefore serial readings are required. Freestyle Libre and Continuous Glucose Monitoring (CGM) provides blood glucose readings and trends whilst omitting the more traditional method of multiple daily finger pricking, and they have been reported in clinical trials to reduce hypoglycaemia, and improve blood sugar management day to day. This is a life changing technology to improve their quality of life and improve management of their blood sugar levels.

The advantage of both technology is the availability of information about glucose levels which helps to predict hyper and hypoglycaemia and to adjust the insulin doses accordingly. NICE guidelines NG18, 2015 recommend that children and young people with T1DM and persistent problems with hypoglycaemia unawareness or repeated hyper or hypoglycaemia should be offered CGM. A recent Cochrane meta-analysis showed that CGM technology can reduce HbA1C level without increase in the risk of hypoglycaemia.

There is evidence to suggest dysglycaemia (hypo and hyperglycaemia) in the developing brain can lead to alteration in white matter structure and that long-term outcomes are not only determined by HbA1c, but also the quality of metabolic. The risk of recurrent and severe hypoglycaemia causes significant anxiety and emotional morbidity for patients and families and is one of the main limiting factors in achieving optimal glycaemic control. The majority of patients, particularly children, fail to achieve recommended glycaemic targets in part because of the fear of hypoglycaemic events. CGM has been shown to reduce hypoglycaemia in motivated patients with good metabolic control, and who are compliant with sensor wear.

Aspects of CGM technology may impact upon its accuracy such as MARD (Mean Absolute Relative Difference), accuracy of glucose trend, sensitivity & specificity, measuring stability, calibration and the lag time of the CGM measurement. Studies of longer-term CGM use (>6 months) have found that despite a reduction in HbA1c, children and adolescents may not be willing to wear a device as often, or for prolonged periods of time as is required to result in consistently achieving improved glucose metabolism. Barriers of CGM usage should be addressed and education of CGM usage is vital. This presentation will focus on the following:

- Understanding use of CGM and its limitations
- Effects of CGM on metabolic control, fear and frequency of hypoglycaemic episodes
- Use a systematic approach to interpretation of CGM analyses using case examples

References

- NICE NG18. 2015, Diabetes (type 1 and type 2) in children and young people: diagnosis and management. <https://www.nice.org.uk/guidance/ng18?unlid=669994494201662585045>

- Langendam M, Luijf YM, Hooft L, et al. Continuous glucose monitoring systems for type 1 diabetes mellitus. *Cochrane Database Syst Rev* 2012; 1:CD008101.
- Davis EA, Keating B, Byrne GC, et al. Impact of improved glycaemic control on rates of hypoglycaemia in insulin dependent diabetes mellitus. *Arch Dis Child* 1998; 78: 111–115.
- Holl RW, Swift PG, Mortensen HB et al. Insulin injection regimens and metabolic control in an international survey of adolescents with type 1 diabetes over 3 years: results from the Hvidovre study group. *Eur J Pediatr* 2003; 162: 22–29.
- Perantie DC et al. 2007. Regional Brain Volume Differences Associated with Hyperglycaemia and Severe Hypoglycaemia in Youth with Type 1 Diabetes. *Diabetes care* 2007, 30:9
- Halford J, Harris C. Determining clinical and psychological benefits and barriers with continuous glucose monitoring therapy. *Diabetes Technol Ther.* 2010;12(3):201-5.