

Use of Continuous Glucose Monitoring systems in the Early Detection and Management of Cystic Fibrosis Related Diabetes in Children.

Akinsola Ogundiya¹, Marion Martin¹, Nancy Katkat¹, Laura Thomas¹, Joanne Russell¹, Kandasamy Sudhakar¹, Ng Sze¹

¹ Department of Paediatrics, Southport and Ormskirk NHS Trust, United Kingdom

Southport & Ormskirk Hospital 
NHS Trust

INTRODUCTION:

Cystic fibrosis related diabetes (CFRD) affects about 2% of children with cystic fibrosis (CF) and about 35% of patients will develop CFRD by adulthood (1). CFRD can be clinically silent and several guidelines advocate routine screening from 12 years old. Development of CFRD is associated with worse pulmonary function, poorer nutritional status, more chest infections and increased mortality. In cystic fibrosis patients, abnormality of the 1-hour glucose during Glucose Tolerance test (GTT) is reported to be a better predictor of early CFRD and is associated with decline in pulmonary function compared to the 2-hour glucose level (2). We report a case series of 5 patients and their early detection and management of CFRD using Continuous Glucose Monitoring (CGM).

PATIENTS

Our local practice since 2017 was to commence 2-weeks of CGM in children with CF who showed a 1-hour glucose abnormality on the annual GTT screen. Depending on the CGM data, we initiated bolus prandial insulin initially as postprandial hyperglycaemia was usually the primary abnormality on the CGM data. We would then add basal insulin when overnight blood glucose becomes abnormal or insulin bolus requirements become significantly high. CGM is continued every month until blood glucose and insulin dosing is stable.

Results: 5 patients with CF ages 6-17 years were included. CGM was commenced in all 5 patients with targeted MDT approach. In 4 patients, sustained postprandial glucose abnormalities were detected. One patient showed frequent elevated overnight, fasting and postprandial glucose levels. CGM data guided the decision to start insulin and insulin dosing. 2 patients commenced on multiple daily insulin (MDI) injections and later had basal bolus insulin-Lantus. 2 patients were commenced on prandial bolus insulin while one patient had regular intensive dietary advice with regular capillary blood glucose monitoring. Nutritional status and FEV1 lung function improved in all 4 patients three months following targeted interventions. One patient just learning to do spirometry had a negative FEV1 change (highlighted in red). No side effects of hypoglycaemia were reported in the 3 patients who were commenced on insulin.

	Sex	Age(yrs)	GTT(mins)			CGM?	Insulin rx?	Insulin Regime	Duration of CF diagnosis	Improvement on treatment	
			0	60	120					Weight(%)	FEV1(%)
1	F	6	4.4	10.9	7.0	Yes	Yes	MDI	5	+2.6	-11.0
2	F	12	4.9	13.0	9.0	Yes	Yes	MDI then Basal	12	+6.0	+12
3	F	15	4.9	10.8	7.3	Yes	Yes	MDI then Basal	15	+7.1	+10
4	F	17	4.9	N/A	13.4	Yes	Yes	MDI	16	+0.8	+7.0
5	F	13	5.4	N/A	10.8	Yes	No	N/A	12	N/A	N/A

DISCUSSION

The aim of screening for CFRD is early detection to reduce morbidity and improve lung function. It will therefore stand to reason that early institution of insulin therapy in the early stages of CFRD will lead to reduced morbidity. Our small cohort have demonstrated some improvement in both weight and FEV1 on starting treatment and the hope is to replicate this in larger prospective studies. This trend agrees with similar reported case series (3). This may help reduce the overall burden of CFRD on these patients who have compromised pulmonary and gastrointestinal function.

CONCLUSION

Use of CGM has helped diagnose the CFRD patients earlier by unmasking marked post-prandial hyperglycaemia. Daily finger prick monitoring or routine annual GTT may delay diagnosis. Early insulin therapy in CFRD has also shown positive impact in weight and pulmonary function. CGM should become an integral part of assessment of CF patients with abnormal 1-2 hour GTT tests. Our study shows that early detection of glucose abnormalities using CGM and early MDT targeted intervention improves lung function and nutritional status. We recommend a pragmatic approach with insulin use to target initially postprandial glucose excursions and regular use of CGM to guide insulin dosing. Further studies are warranted on optimum timing of insulin initiation and the use of CGM in early detection and management of CFRD.

REFERENCES

- Whitehouse J AA, Haworth C. The prevalence of cystic fibrosis-related diabetes in a large screened adult CF population. . *Pediatr Pulmonol.* (. *Pediatr Pulmonol* 2007; Suppl. 30):395-6.
- Waugh N RP, Craigie I, Ho V, Pandit L, et al. Screening for cystic fibrosis-related diabetes: a systematic review. *Health Technology Assessment* 2012; Volume: 16(24)
- Dobson L, Hattersley AT, Tiley S, et al Clinical improvement in cystic fibrosis with early insulin treatment *Archives of Disease in Childhood* 2002;87:430-431

* All authors of this poster disclose no conflict of interest.