

An audit of diagnosing CF related diabetes using newly developed diagnostic criteria using flash glucose monitoring system (Freestyle Libre®) at a regional adult CF centre



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Background

- CFRD is a distinct form of diabetes, different from T1DM and T2DM yet...
- screening for CFRD is based on WHO criteria for T2DM using the Oral Glucose Tolerance Test method (OGTT)
 - screening values aiming to reduce risks from micro/macro vascular complications in T2DM
 - are these values suitable for diagnosing CFRD?

In 2022 the West Midlands Adult Cystic Fibrosis Centre began using flash glucose monitoring (FGM) via Freestyle Libre® as first line screening for CFRD as an alternative to the oral glucose tolerance test.

There are no published criteria for the diagnosis of CFRD using flash glucose monitoring.

Using WHO criteria, the Brompton’s paediatric clinical guideline and clinical judgement, we devised our own criteria to standardise diagnosis, with the aim of reviewing the criteria after 6 months of use.

New diagnostic criteria

Diagnosis	Criteria
CFRD	>2 readings >11.1
Impaired glucose tolerance	>2 readings >7.8 or <3.5
Normal	All readings 3.5-7.8

Previous non-standardised clinical judgement

Diagnosis	Non standardised clinical judgement/OGTT
CFRD	2hr post OGTT 11.1 Clinical judgement of CGM
IGT	2 hr post OGTT 7.8-11.1 OR <3.5 Clinical judgement of CGM
Normal	3.5-7.8

Clinical guidelines: care of children with cystic fibrosis, Royal Brompton & Harefield NHS Foundation Trust, 2020

- Indeterminate glucose was removed as a category to simplify the process of diagnosis and to provide the patient a clearer diagnosis
- In developing the new diagnostic criteria, percentage time above target was removed as glucose profiles in the impaired/diabetic range frequently did not reach time target thresholds for a diagnosis
- >2 spikes above 11.1 is diagnostic of CFRD – this is in line with current guidance of 2 positive OGTT’s needed to confirm a diagnosis of diabetes

Method

- All FGM results used for CFRD screening between May – December 2022 were audited against our new diagnostic criteria and our previous non-standardised clinical judgement process

- Patients were advised to wear the Libre sensor for 14 days
- Patients were asked to complete a food diary either on the Libre Freestyle app or a paper diary
- Results were discussed in a weekly meeting between the dietitians and CF diabetes specialist nurse
- Feedback was provided to patients either over the phone or their next clinic appointment

Results

- 23 FGMs for screening purposes completed
- 2 patients initially declined FGM and opted for OGTT – both OGTTs were abnormal therefore they then completed FGM
- Sensors were worn for an average of 12.6 days
- FGMs were reviewed using previous non-standardised clinical judgement and new diagnostic criteria

Patient characteristics

- Males n=13
- Mean FeV1 = 78.6%
- Mean BMI 25.6kg/m2
- Mean HbA1C 37mmol/mol

Diagnosis using new diagnostic criteria

- 5 had normal glucose tolerance
- 12 impaired glucose tolerance
- 6 CFRD

Diagnosis using non-standardised clinical judgement

- 13 had normal glucose tolerance
- 7 impaired glucose tolerance
- 3 CFRD

Conclusions

- Flash glucose monitoring is well tolerated by patients as a method of screening for CFRD
- Flash glucose monitoring is more sensitive in identifying abnormal glucose patterns than OGTT. Using the new criteria, 18 patients were diagnosed with CFRD or impaired glucose tolerance, compared to 10 using previous non-standardised clinical judgement
- One of the main benefits of using flash glucose monitoring is that it enables typical daily glucose patterns to be observed in comparison to a OGTT which only provides a snapshot serum blood glucose level result 2 hours after a 75g glucose load
- Most patients provided an acceptable level of dietary information in their food logs. This enabled dietary causes of abnormal glucose excursions, eating patterns and daily food

groups habitually consumed to be identified. Subsequently patients were provided with individualised dietary advice aimed to improve glucose levels, minimise hyper and hypoglycaemic events and improve dietary quality;

- > reducing refined sugars
- > reducing calorie intake
- > healthier fats
- > increasing fruit and vegetable intake
- > increasing intake of wholegrains and fibre
- Using standardised diagnostic criteria ensures consistency in providing a diagnosis. This has provided patients with a clear diagnosis
- Using FGM enabled early identification of the habitual dietary causes of abnormal glucose excursions and early intervention with dietary changes to manage IGT and CFRD. FGM also provided an opportunity for dietary assessment. Anecdotally, patients were more adherent to completion of a food diary during FGM than using a paper food diary for other reasons
- Since the introduction of CFTR modulator therapies, more patients are achieving a healthy weight or becoming overweight. Healthy eating and weight management advice are now a routine aspect of the nutritional management of patients with cystic fibrosis
- FGM initiated dietary intervention to support patients to treat their IGT/CFRD but also achieve a nutritionally balanced diet aligned with UK Healthy Eating Guidelines
- Future research is required to validate the use of FGM for the diagnosis of IGT and CFRD in patients with cystic fibrosis



Update since abstract submission

- Diagnostic criteria was reviewed in March/ April 2023 by the CF team -> agreed criteria too sensitive, with the majority of patients being categorised as impaired glucose tolerance
- May 2023, changes to our criteria : impaired glucose tolerance now defined as >2 glucose events above 7.8 1hr post food, CFRD diagnosis criteria remains unchanged – this is inline with 2 positive OGTTs diagnosing CFRD
- We will continue to review our criteria and monitor the clinical trajectory of patients diagnosed with IGT/CFRD using this criteria

References

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