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Glycaemic index dietary education for glucose abnormalities in cystic fibrosis

Submission date	Recruitment status	[X] Prospectively registered
16/07/2018	No longer recruiting	[X] Protocol
Registration date	**Overall study status**	[_] Statistical analysis plan
25/07/2018	Completed	[_] Results
Last Edited	**Condition category**	[_] Individual participant data
12/08/2022	Nutritional, Metabolic, Endocrine	[_] Record updated in last year

Plain English summary of protocol

Background and study aims

Cystic fibrosis (CF) is the most common life-limiting genetic disease in white populations. Thick, sticky mucus causes organ obstruction, mainly affecting the lungs and digestive system. Few people with CF have normal blood glucose control and these glucose abnormalities eventually lead to cystic fibrosis-related diabetes (CFRD), the most common complication of CF. The combination of diabetes and CF leads to increased morbidity (illness) and a six-fold increase in mortality (death). People with CF are encouraged to consume a high calorie diet to maintain weight. This typically means eating food and drinks that are often high in fat and/or sugar. For people with CF who also need to control their blood glucose levels, high sugar intake can make this difficult. There is limited evidence to guide dietary treatment for blood glucose abnormalities in CF. Manipulating the glycaemic index (GI) and glycaemic load (GL) of what is consumed may be a possible area for intervention to improve blood glucose control without compromising energy intake. The GI shows how quickly each food affects blood sugar levels, while the GL also takes into account the amount of carbohydrate in the food. The aim of this study is to assess the feasibility of delivering GI/GL dietary education (GLIDE).

Who can participate?

Young people aged 11-35 with CF and abnormal blood glucose control

What does the study involve?

Participants receive the GLIDE intervention for 12 weeks. The GLIDE intervention focuses on lowering the GI/GL of the participant’s diet whilst maintaining energy intake by increasing consumption of foods and drinks that combine 'simple' high GI carbohydrate with fat and/or protein and use of alternative foods that the individual finds acceptable. Dietary intake and glycaemic control are measured at the start of the study and at 12-week follow-up using an online dietary recording tool and continuous glucose monitoring, respectively. Feasibility is assessed through measurement of recruitment to the study, attendance at research visits and acceptability of GLIDE intervention, determined by in-depth qualitative interviews. Blood sugar control, energy and nutrient intake, body weight and lung function are also measured before the GLIDE intervention and at 12-week follow-up.

What are the possible benefits and risks of participating?
There is the potential that making dietary changes could lead to hypoglycaemia (low blood sugar) in some participants (those using insulin therapy). This risk will be minimised by providing individually tailored dietary advice by trained dietitians with experience in diabetes care provision and all participants have contact details for their local CF care team if they require any medical assistance. In addition all individuals with CFRD who are using insulin are taught to recognise and treat hypoglycaemia as part of their standard care. Making dietary changes could have an adverse effect on a participant's weight. This risk will be minimised by the provision of individually tailored dietary advice by trained dietitians with experience in CF care provision. Participants' weight will be monitored and they will be withdrawn from the study and advised to stop the dietary changes made if there is any negative effect on body weight.

Where is the study run from?
University of Bristol (UK)

When is the study starting and how long is it expected to run for?
June 2017 to May 2020

Who is funding the study?
National Institute for Health Research (NIHR) (UK) and the Cystic Fibrosis Trust (UK)

Who is the main contact?
Ms Laura Birch
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Contact information

Type(s)
Scientific

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Additional identifiers

EudraCT/CTIS number

IRAS number

ClinicalTrials.gov number

Secondary identifying numbers
38288

Study information

Scientific Title
GLycaemic Index Dietary Education for glucose abnormalities in cystic fibrosis (GLIDE) - a feasibility study

Acronym
GLIDE

Study objectives
This study will explore the feasibility of delivering glycaemic index/glycaemic load dietary education (GLIDE) in a sample of 20 young people with CF and abnormal blood glucose control.

Ethics approval required
Old ethics approval format

Ethics approval(s)
South West - Central Bristol Research Ethics Committee, 22/05/2018, ref: 18/SW/0105

Study design
Non-randomised; Interventional; Design type: Process of Care, Education or Self-Management, Dietary

Primary study design
Interventional

Secondary study design
Non randomised study

Study setting(s)
Hospital

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use the contact details to request a patient information sheet

Health condition(s) or problem(s) studied
Cystic fibrosis-related diabetes

Interventions

This is a mixed-methods study to evaluate the feasibility of glycaemic index/glycaemic load dietary education (GLIDE) intervention in young people with cystic fibrosis and glucose abnormalities.

Data collection:
The study comprises four participant research contact sessions utilising both quantitative and qualitative data collection and analysis. Data will be collected on a purpose-designed case record form (CRF). All participants will be allocated and identified by a unique study number.

Research Contact 1 - Baseline measurements
Research Contact 1 will take approximately 1-1.5 hours and will be conducted at the participants usual CF care centre.

Glycaemia will be measured for 5 days (including a weekend) using a continuous glucose monitoring (CGM) system (Ipro2®, Medtronic). CGM monitoring will be conducted when participants are clinically stable; clinical status will be assessed via telephone using the modified criteria of Fuchs et al prior to Research Contact 1 to identify any exacerbations/steroid use. If any change in usual clinical status has occurred, the time to Research Contact 1 will be extended to allow recovery of the participant's usual clinical status.

CGM measures and records interstitial glucose levels every 5 minutes whilst in situ. It has been validated in CF and is increasingly being used to monitor glycaemia in clinical practice, identifying growing numbers of CF patients with altered glucose handling. The CGM sensor will be inserted by the CF Clinical Nurse Specialist/research dietitian at Research Contact 1. Three calibration finger prick blood tests are required each day the CGM sensor is in situ. Participants will receive training and a glucose monitor to facilitate this.

Dietary intake will be recorded over the same 5-day period using an on-line, 24-hour dietary recall tool; INTAKE24. INTAKE24 is a validated, self-completed computerised dietary recall system based on multiple-pass 24-hour recall. Data collection has been demonstrated to be of similar quality to interviewer-led recalls at a significantly lower cost. Unlike the traditional paper-based methods of dietary assessment, this technology-based method has benefits such as pre-programmed completeness checks and food photographs to enhance food recognition and portion size estimation. Evidence has demonstrated newer methods of dietary assessment to be preferred over traditional methods by an array of population groups, including adolescents and adults. An interactive tutorial on how to use the tool will be provided by the research dietitian at Research Contact 1. Each participant will be issued with an individualised log-in code and will be asked to access the tool once a day for the duration of the measurement period, commencing on the day of Research Contact 1. It takes approximately 15 minutes to record one day's dietary intake.

If participants are unable to access the internet to use INTAKE24, a paper food diary will be provided, and the research dietitian will provide training on how to complete this. The participant's paper food diary will then be inputted into INTAKE24 by the research dietitian at the end of the data collection period. This may involve a telephone call to the participant to clarify/obtain any missing data.

The following clinical measures will also be performed:
Blood sample for baseline Glycated Haemoglobin (standard measure of glycaemia in previous three months) - details provided below
Weight
Height

Lung function (FEV1, FVC)
CF- Quality of Life (CF-QoL) questionnaire

Blood sample:
Blood will be sampled by a trained Doctor/Phlebotomist/Clinical Nurse Specialist in the participants CF centre. Blood samples will be stored locally in hospital freezers designated for storage of samples or similarly secure storage arrangement at -80°c until collected for analysis. Local storage is temporary, and samples will be regularly transferred to central storage at the co-ordinating centre (UHBristol) in accordance with appropriate health and safety guidance and study procedures. At the co-ordinating centre, samples will be placed in designated freezers located at the Bristol Royal Infirmary. These freezers will remain locked when not in use to ensure no other parties can gain unauthorised access. Access to the building is strictly controlled by use of an ID card and PIN number.
Aliquots of the samples will be sent in batches from the co-ordinating centre to the analytical and collaborating laboratories. Once the samples have been tested, the remainder of the aliquot will be destroyed by the commercial testing laboratory. Once the study is complete, any remaining samples at the co-ordinating centre will be disposed of in accordance with the Human Tissue Authority's Code of Practice.

CGM sensor removal:
After the 5-day measurement period the CGM sensor will be removed. CGM sensor removal is quick, easy and painless; the research dietitian/member of the clinical CF team can do this, or the participant can remove the sensor at their preference. If removing the sensor themselves, participants will be provided with pre-paid postage to return the sensor to the chief investigator. If the participant prefers a member of the research team to remove the sensor, a home visit can be arranged to facilitate this. Following sensor removal, the data generated will be downloaded by the chief investigator for analysis. Dietary intake and glycaemia data will be reviewed concurrently to examine the effects of usual diet on glycaemic control.

Research Contact 2 - GLIDE intervention
Research Contact 2 will be conducted approximately 2 weeks after Research Contact 1. Clinical status will be assessed via telephone prior to Research Contact 2 to identify any exacerbations that may have occurred. If any change in clinical status has occurred, the time to Research Contact 2 will be extended to allow recovery of 'usual' clinical status.

Research Contact 2 will take approximately 1 hour. Research Contact 2 can be conducted either as a home visit or at the participants usual CF centre at their preference.

Tailored GLIDE intervention will be delivered using the participants baseline diet and glycaemia data. GLIDE intervention will focus on manipulation of the GI/GL of dietary intake. This will be designed to lower the GI/GL of the participants diet whilst maintaining energy intake through increasing consumption of foods and drinks that combine 'simple' high GI carbohydrate with fat and/or protein and use of alternative foodstuffs that the individual finds acceptable. For example, where high GI carbohydrates such as sugar-sweetened beverages are regularly consumed, substitution with a milkshake will combine both fat and protein with the refined carbohydrate and will lower the GI, slowing glucose absorption, whilst still providing the necessary energy contribution required for CF management.

In-depth dietary planning will be conducted, in addition to the provision of behaviour change advice and practical advice to address any challenges that implementing dietary change may

provoke. Implementing dietary changes may impact participants pancreatic enzymes regimes and this will be evaluated. Education and advice in relation to any necessary changes to pancreatic enzyme doses will be provided.

Following Research Contact 2 agreed GLIDE dietary changes will be implemented for 12 weeks. Participants will be provided with written advice to guide their dietary modification and they will be contacted by the research dietitian after week 1 of the implementation period via phone /email at their preference.

Research Contact 3 - Follow-up
Research Contact 3 will take place at the participants CF centre and will take approximately 45 minutes.
All measurements conducted in Research Contact 1 will be repeated during the final week of the 12-week GLIDE implementation period, or as close to this time as possible. Dietary intake and glycaemia will be re-measured for a consecutive 5-day period. A blood sample for glycated haemoglobin will be taken as previously described. Weight, height (participants aged 11-18yrs) and FEV1 & FVC will be recorded. The same methods as described in Research Contact 1 will be used for all procedures.
Research Contact 4 - Feasibility assessment of GLIDE intervention: Qualitative interview
Research Contact 4 can be conducted at the participants CF centre, as a home visit or via internet video calling tool (Skype/Facetime). It will last up to 1 hour.
Research Contact 4 will involve removal of the CGM sensor, completion of the CF-Quality of Life questionnaire and an in-depth qualitative interview to explore a) acceptability of the dietary intervention (GLIDE) and the study processes and b) experiences of managing diet for CF and glucose abnormalities.

Qualitative interviews
Semi-structured interviews will be held with all participants in order to explore a) acceptability of GLIDE intervention and the study processes and b) experiences of managing diet for CF and glucose abnormalities. Semi-structured interviews allow in-depth reporting of views and experiences according to an individual's priorities, understanding and interpretations. They ensure key areas are covered whilst allowing the participant to raise issues that are salient to them but not predicted by the researchers.
A topic guide will be used to ensure consistency across the interviews. The topic guide has been developed using previous literature and qualitative expertise within the research team and will cover areas including any previous dietary management, experience of the study dietary intervention and the study processes. It will be used in an open and flexible manner to allow participants to raise issues that are salient to them. It is anticipated that interviews will last approximately 30-45 minutes. All participants will have given consent to be interviewed when consenting to take part in the study.
A sample (n≈8) of participants' carers (parents/guardians and/or partners) will also be interviewed to capture their perspectives on managing diet for glucose abnormalities on CF, as differing priorities of diet between young people with CF and their parents/carers have been identified. The final number of interviews will depend on when data saturation is researched. Interviews will be conducted in private, either face-to-face or via Internet video calling tools (e.g. Skype/Facetime), according to the participants preference, and will be audio-recorded. Young people will be interviewed independently to facilitate open and honest discussion. However, if younger participants (<16 years) want to be interviewed with a parent/carer present this preference will be respected. Interviews with carers will take place immediately after interviews with participants.

Focus groups – CF Clinical Team members
Focus groups will be conducted with healthcare professionals from the CF clinical teams participating in this study at the end of the participant recruitment period. These focus groups will be used to explore their views and experiences of the dietary intervention and the study processes. The clinical teams have advised that scheduling these focus groups during protected time for clinical/research updates in team meetings would be appropriate and will provide opportunity for group discussion. A topic guide for these focus groups will be developed, informed by the findings from the qualitative interviews with participants.

Discontinuation/withdrawal of participants
Each participant will have the right to withdraw from the study at any time. The study design aims to minimise attrition by not overburdening participants but if there is significant attrition (loss of more than five individuals) over the study period then additional individuals with similar characteristics to those lost will be recruited.
If a participant wishes to withdraw, data collected up until this point will be included in the analyses, unless the participant expresses a wish for their data to be destroyed. If a reason for withdrawal is given this will be documented in the participants CRF.
Participants will be withdrawn from the study if their CF clinical team feel that their participation is in any way negatively affecting their clinical status.

Expenses
Participants will be reimbursed for any travel expenses/parking costs they incur as a result of participating in the study.

Data Analyses

Qualitative data
Interviews will be audio recorded and fully transcribed. NVivo data management software will be used to facilitate electronic coding and retrieval of data. Data will be analysed thematically using an approach based on Framework. Using this method, data pertaining to each code will be summarised in tables, allowing comparisons to be made within and across interviews to identify thematic patterns and deviant cases and to highlight participants' views of specific issues. The chief investigator will receive full qualitative support throughout data collection and analysis by her supervisor, Dr Katrina Turner, a senior qualitative methodologist and joint head of the Centre of Academic Primary Health Care, University of Bristol.

Quantitative data
Descriptive analyses of recruitment to the study and attendance at Research Contact sessions will be presented. Participants' baseline characteristics and CGM and dietary data recorded at baseline and at 12-week follow-up will be tabulated using means and standard deviations for normally distributed data, medians and interquartile ranges for non-normally distributed data, and percentages and counts for categorical data. Area under the curve (AUC) for glucose levels above the upper limit of the normal range (7.8mmol/l) and energy content and nutrient composition of dietary intake pre-GLIDE intervention (baseline) and at 12-week follow-up will be calculated. Paired tests will be used to assess whether there has been any change in glycaemic control and energy and nutrient intake between baseline and the 12-week follow-up time point. Changes in glycaemia will also be examined in relation to changes from baseline of glycated haemoglobin (HbA1c). Statistical advice and input will be provided by the NIHR Bristol Biomedical Research Centre's statistician.

Intervention Type
Other

Primary outcome measure
The feasibility of glycaemic index/glycaemic load dietary education (GLIDE) intervention in young people
with CF and abnormal blood glucose control, assessed through measurement of:
1. Recruitment to the study: recorded as the number of eligible participants who consent to participate in the study by 18 months
2. Attendance at research visits: recorded as the number of research visits attended at the end of the study period (approx. 14 weeks from baseline)
3. Acceptability of GLIDE intervention: assessed through qualitative interviews following the 12-week intervention period (approx. 14 weeks from baseline)

Secondary outcome measures
1. Glycaemic control using Continuous Glucose Monitoring (CGM) and HbA1c at baseline and at 12-week follow-up
2. Energy and nutrient intake using a web-based 24-hour dietary recall system at baseline and at 12-week follow-up
3. Body weight using clinic weighing scales and lung function using spirometry at baseline and at 12-week follow-up

Overall study start date
01/06/2017

Completion date
31/05/2020

Eligibility

Key inclusion criteria
Current inclusion criteria as of 12/08/2022:
1. Aged 11-35 years
2. CF diagnosis based on either genotype and/or phenotypic presentation
3. Established CFRD or at risk of developing CFRD as defined by:
3.1. HbA1c ≥ 6.5%
3.2. Previously recorded abnormal oral glucose tolerance test (OGTT), defined as a 120-minute plasma venous sample ≥7.8mmol/l
3.3. Previous abnormal continuous glucose monitoring (CGM) result, defined as CGM time above 7.8 mmol/l ≥4.5%

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Previous inclusion criteria:
1. Aged 11-30 years
2. CF diagnosis based on either genotype and/or phenotypic presentation
3. Established CFRD or at risk of developing CFRD as defined by:
3.1. HbA1c ≥ 6.5%
3.2. Previously recorded abnormal oral glucose tolerance test (OGTT), defined as a 120-minute plasma venous sample ≥7.8mmol/l
3.3. Previous abnormal continuous glucose monitoring (CGM) result, defined as CGM time above 7.8 mmol/l ≥4.5%

Participant type(s)

Patient

Age group
Adult

Sex
Both

Target number of participants
Planned Sample Size: 20; UK Sample Size: 20

Total final enrolment
24

Key exclusion criteria
1. Pregnant/planning pregnancy
2. Understanding/command of English not of a sufficient standard to ensure informed consent and full participation in the research

Date of first enrolment
01/09/2018

Date of final enrolment
31/12/2019

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
Bristol Royal Infirmary
Upper Maudlin St
Bristol
United Kingdom
BS2 8HW

Study participating centre
Bristol Royal Hospital for Children
Paul O'Gorman Building
Upper Maudlin St
Bristol
United Kingdom
BS2 8BJ

Study participating centre
Birmingham Heartlands Hospital
Bordesley Green East
Birmingham
United Kingdom
B9 5SS

Study participating centre
Royal Devon & Exeter Hospital
Barrack Road
Exeter
United Kingdom
EX2 5DW

Sponsor information

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Sponsor type
Hospital/treatment centre

ROR
https://ror.org/0524sp257

Funder(s)

Funder type
Government

Funder Name
NIHR Trainees Co-ordinating Centre (TCC); Grant Codes: ICA-CDRF-2016-02-014

Funder Name
Cystic Fibrosis Trust

Alternative Name(s)
Cystic Fibrosis, CF

Funding Body Type
Private sector organisation

Funding Body Subtype
Other non-profit organizations

Location
United Kingdom

Results and Publications

Publication and dissemination plan
Summaries of preliminary findings will be produced for study participants, the NIHR and the clinical CF services participating in this study. Manuscripts reporting the findings will be produced for publication in high-impact, peer-reviewed journals (e.g. paediatric, respiratory and diabetes journals).

Intention to publish date
31/05/2023

Individual participant data (IPD) sharing plan
The datasets generated and/or analysed during the current study during this study will be included in the subsequent results publication.

IPD sharing plan summary
Other

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol file	version v1.6	11/06/2018	25/07/2018	No	No
HRA research summary			28/06/2023	No	No