

Improving care for diabetic patients on dialysis: can using a new device to identify risk periods of 'high' and 'low' blood sugars in both hospital and home dialysis patients

Submission date 07/09/2016	Recruitment status No longer recruiting	☒ Prospectively registered
Registration date 19/09/2016	Overall study status Completed	☐ Protocol
Last Edited 30/07/2019	Condition category Urological and Genital Diseases	☐ Statistical analysis plan
		☐ Results
		☐ Individual participant data
		☐ Record updated in last year

Plain English summary of protocol

Background and study aims

In a healthy person, the kidneys are responsible for filtering out the waste products and excess water in the blood, and converting them into urine. When the kidneys fail, they stop cleaning the blood, leading to the build-up of harmful waste products. Haemodialysis is one of the most common treatments for kidney failure. It involves diverting the blood into an external machine so that it can be cleaned, before being returned to the body. Diabetes is one of the main causes of kidney failure and the number of people who have diabetes is increasing. This is because blood sugar levels in diabetics swing between high and low, leading to long-term damage to the body. Altogether about 1/3 of people on haemodialysis in the UK have diabetes. Although diabetes tests and treatments are well researched in a person with healthy kidneys, little is understood about what happens when a diabetic person needs haemodialysis. This project aims to use new technology called continuous glucose (blood sugar) monitoring to learn more about the changes in blood sugar in diabetic patients with kidney failure when they are on, and around, their haemodialysis.

Who can participate?

Diabetic adults with kidney failure, who go to a dialysis centre three times per week, undergo shorter but more frequent haemodialysis at home, and those who are going from one to the other.

What does the study involve?

Participants are visited in the dialysis unit or at home to have a glucose sensor fitted. This involves the sensor being placed on the back of the arm. It has a disc (3.5cm x 0.5cm) that will stick to the skin and thin flexible sterile fibre (5mm long) that is inserted just below the skin. The sensor then remains in place for 14 days and measures the glucose level in the tissue under the skin continuously. During this time, participants are also asked to fill in an activity diary and continue as normal.

What are the possible benefits and risks of participating?

Participants benefit from finding out information about their blood sugar control which was previously unknown. The safety of the continuous glucose monitors has been assessed by the manufacturer. Infections when the device is inserted into the skin are rare, but participants are closely monitored for this.

Where is the study run from?

Wessex Kidney Centre (UK)

When is the study starting and how long is it expected to run for?

March 2015 to July 2018

Who is funding the study?

1. Abbott Diabetes Care (UK)
2. Portsmouth Hospitals NHS Trust (UK)

Who is the main contact?

Dr Katey Atkins

Contact information

Type(s)

Public

Contact name

Dr Katey Flowers

Contact details

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Type(s)

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Additional identifiers

Protocol serial number

PHT/2016/83

Study information

Scientific Title

Observational Study of Glucose Variability in insulin-treated diabetic individuals with established renal failure (ERF)

Acronym

DRIVE - HD Study

Study objectives

Using flash glucose monitoring to produce ambulatory glucose profiles in diabetic individuals with established renal failure (ERF) can identify unacceptable (and potentially dangerous) features of glycaemic control, such as large excursions or prolonged hypo- or hyper-glycaemia, that have gone unrecognised by the patient and begin to build a body of data illustrating the relationships between insulin prescription, dialysis and serum glucose to be able to improve individualised care and, in particular, patient safety.

Ethics approval required

Old ethics approval format

Ethics approval(s)

Health Research Authority, 02/03/2017, IRAS number: 212219, REC ref: 17/LO/0131

Primary study design

Observational

Study design

Single-centre cross sectional study

Study type(s)

Diagnostic

Health condition(s) or problem(s) studied

Renal failure

Interventions

Interventions as of 29/12/2016:

Patients who routinely receive either in-centre haemodialysis or home haemodialysis will be enrolled and require a total of 3 visits. The first will be to provide information regarding the study and answer initial question. The second will be to recruit them formally and sign a consent form, baseline data will be collected, a sensor will be applied, their SMBG will be downloaded (via Diasend) and a diary (insulin/food/exercise) will be provided. The sensor will remain in place for 14 day (the observation period); over this time they will be asked to complete the provided diary. The third visits will be remove the sensor, collect the diary and re-download the SMBG data. They will they complete a validated questionnaire on confidence in diabetes self-

management (devised by the Stanford patient education centre). Selected participants (10 in total) will undertake a semi-structured interview to probe the educational process regarding managing their chronic conditions.

Some patients enrolled in the study will be electing to swap from in-centre to home haemodialysis. They will undergo the above process on each dialysis modality; so have the sensor on and observational period over 14 days undertaken twice.

There will be no other direct follow up from this study protocol, however all participants will receive a summary of the finding of the study.

Original interventions:

Patients who routinely receive either in-centre haemodialysis or home haemodialysis will be enrolled and require a total of 3 visits. The first will be to provide information regarding the study and answer initial question. The second will be to recruit them formally and sign a consent form, baseline data will be collected, a sensor will be applied, their SMBG will be downloaded (via Diasend) and a diary (insulin/food/exercise) will be provided. The sensor will remain in place for 14 day (the observation period); over this time they will be asked to complete the provided diary. The third visits will be remove the sensor, collect the diary and re-download the SMBG data. If the first visit is considered to be week 1, the second is on week 2 and third is on week 4. The sensor will be screened for a set of features deemed unacceptable to leave without intervention. These features have been defined by a consultant diabetologist and the participant will be contacted directly should features warranting an urgent insulin therapy adjustment be identified - this will occur within 5 working days following the removal of the sensor

Some patients enrolled in the study will be electing to swap from in-centre to home haemodialysis. They will undergo the above process on each dialysis modality; so have the sensor on and observational period over 14 days undertaken twice. If after the first planned sensor (on in-centre haemodialysis) unacceptable glucose results are found and a insulin adjustment is required we will ask these participants to have a second sensor while on in-centre prior to the swap of dialysis, therefore these participants will have three sensors and three 14-day observational periods.

There will be no other direct follow up from this study protocol, however all participants will receive a copy of their AGP with an explanation of their results. This will also go to their GP / diabetes hospital consultant.

Intervention Type

Device

Phase

Not Specified

Primary outcome(s)

Primary outcome measure as of 29/12/2016:

Ambulatory glucose profile as generated by 14 days of interstitial glucose monitoring.

Original primary outcome measure:

Overall glycaemic variability is determined using interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period.

Key secondary outcome(s)

Secondary outcome measures as of 30/12/2016:

1. Analysis of the ambulatory glucose profile during day-time hours, night-time hours, pre-meal

period, postprandial period, pre-dialysis (6 hour window), post-dialysis (6 hour window and 12 hour window) and hour by hour across the day

2. Analysis of the area under the curve of the ambulatory glucose profile spent hypoglycaemic (<3.9mmol/l, <3.3mmol/l and <3.0mmol/l), euglycaemic (4-10mmol/l) and hyperglycaemic (>10mmol/l and >15mmol/l)

3. Analysis of discrete episodes of the ambulatory glucose profile hypoglycaemic (<3.9mmol/l, <3.3mmol/l and <3.0mmol/l), euglycaemic (4-10mmol/l) and hyperglycaemic (>10mmol/l and >15mmol/l)

4. Score from Stanford patient education centre questionnaire at sensor removal

5. Relationship between dialysis prescriptions and insulin regimes to the overall glycaemic variability is determined using interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period

6. Relationship between glycaemic variability and demographic data (details of past medical, socioeconomic and educational history) is determined through interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period and participant interviews

Original secondary outcome measures:

The following secondary outcomes are measured during 14 day continuous glucose monitoring

1. Time during 14 day continuous glucose monitoring spent within glucose target range (4-10mmol/L)

2. Time during 14 day continuous glucose monitoring spent above target range > 10mmol/L

3. During 14 day continuous glucose monitoring number of discrete episodes > 10mmol/L

4. Time during 14 day continuous glucose monitoring spent above target range > 15mmol/L

5. During 14 day continuous glucose monitoring number of discrete episodes > 15mmol/L

6. Time during 14 day continuous glucose monitoring spent below target range <3.9mmol/L (70mg/dl)

7. During 14 day continuous glucose monitoring number of discrete episodes <3.9mmol/L

8. Time during 14 day continuous glucose monitoring spent below <3.3mmol/L (60mg/dl)

9. Time during 14 day continuous glucose monitoring spent below <3.0mmol/L

10. During 14 day continuous glucose monitoring number of discrete episodes <3.0mmol/L

Additional clinical outcomes:

1. Glycaemic variability over the day, night, pre-meals, post-prandial, pre-dialysis (the 6 hours before dialysis), post-dialysis (the 6 hours and 12 hours after dialysis) and hourly across the modal day is determined using interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period

2. Relationship between dialysis prescriptions and insulin regimes to the overall glycaemic variability is determined using interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period

3. Relationship between glycaemic variability and demographic data (details of past medical, socioeconomic and educational history) is determined through interstitial glucose measurements collected by a continuous glucose monitor over a 14 day period and participant interviews

Completion date

31/10/2017

Eligibility

Key inclusion criteria

1. Male or Female aged 18 years or above
2. Diagnosis of Diabetes Mellitus requiring insulin therapy
3. On Renal Replacement Therapy for a minimum of 3 months
4. Have downloadable SGBM device already in use

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 Years

Sex

All

Total final enrolment

89

Key exclusion criteria

1. Acute prescription (within 2 weeks) of medication that may increase or decrease serum glucose
2. Planned change of renal replacement modality during study period
3. Co-enrolment in other studies that provided therapies or interventions that may affect glycaemia control
4. Unable to provide informed consent

Added 29/12/2016:

5. Planned x-ray, computed tomography (CT) scan, magnetic resonance imaging (MRI) or high-frequency electrical heat (diathermy) treatment during the study period

Date of first enrolment

02/01/2017

Date of final enrolment

03/07/2017

Locations**Countries of recruitment**

United Kingdom

England

Study participating centre

Wessex Kidney Centre
Queen Alexandra Hospital
Southwick Hill Road
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Sponsor information

Organisation

Portsmouth Hospitals NHS Trust

ROR

<https://ror.org/009fk3b63>

Funder(s)

Funder type

Research organisation

Funder Name

Abbott Diabetes Care

Alternative Name(s)

Funding Body Type

Private sector organisation

Funding Body Subtype

For-profit companies (industry)

Location

United States of America

Funder Name

Portsmouth Hospitals NHS Trust

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from Katey Flowers at Katey.Flowers@porthosp.nhs.uk

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			26/07/2023	No	No