Study Protocol

Knowledge and barriers related to physical activity in type 1 diabetes (KBPA T1D).

Trial/Study Acronym	**KBPA T1D**
Sponsor	**University of Dundee**
Sponsor Ref Number	**2-008-20**
Protocol author	**Alex St. John**
Chief Investigator	**Prof Rory McCrimmon**
Principal Investigator	**Dr Alison McNeilly**
REC Number	**20/PR/0081**
Version Number and Date	**Version 2.0, 10.07.2020**

PROTOCOL APPROVAL

Knowledge and barriers related to physical activity in type 1 diabetes.

Signatures
The undersigned confirm that the following protocol has been agreed and approved by the Sponsor and that the Chief Investigator agrees to conduct the study in compliance with this approved protocol and will adhere to the principles of GCP, the Sponsor SOPs, and any other applicable regulatory requirements as may be amended from time to time.

Prof Rory McCrimmon Chief Investigator	Signature	Date
Dr. Alison McNeilly PhD Principal Investigator	Signature	Date

LIST OF ABBREVIATIONS

AE	Adverse Event
BG	Blood Glucose
CI	Chief Investigator
CNORIS	Clinical Negligence and Other Risks Indemnity Scheme
GCP	Good Clinical Practice
ICF	Informed Consent Form
ISF	Investigator Site File
PI	Principal Investigator
REC	Research Ethics Committee
SOP	Standard Operating Procedures
SMF	Study Master File
T1D	Type 1 Diabetes
PA	Physical Activity

SUMMARY/SYNOPSIS

Study Title	Knowledge and barriers related to physical activity in type 1 diabetes (KBPA T1D)	
Study Design	Survey	
Study Population	Patients with Type 1 Diabetes	
Sample Size	At least 50 (and up to a maximum of 500)	
Planned Study Period	Eight (8) weeks from launch of survey	
Follow up phase duration	None	
Primary	Objectives Determine main barriers to physical activity	Outcome Measures Survey
Secondary	Objectives • Relate health benefits to physical activity and T1D • Determine better practices for healthcare practitioners related to physical activity and T1D • Determine better recommendations for participation in sport • Determine socioeconomic impacts related to physical activity and diabetes	Survey
Inclusion Criteria	Person with Type 1 Diabetes Aged 18 or over Able to read and write in English	
Exclusion Criteria	Participant is unable to complete survey	

1 INTRODUCTION

2 BACKGROUND & RATIONALE

There are >300,000 people with diabetes in Scotland, approximately 10% of these have Type 1 Diabetes (T1D). Current research indicates that populations with diabetes are not as active as their counterparts without diabetes. To address this, it is important to determine the main barriers to PA that T1D patients experience [1]. PA has been demonstrated to possess numerous health benefits for both the general population as well as for patients with T1D [2]. Regular PA can lessen the risk of cardiovascular disease, lower HBA1c, and improve body composition, cardiorespiratory fitness, endothelial function, and blood lipid profile (i.e. triglycerides, total cholesterol) within patients with T1D [2]. Given that cardiovascular disease is the leading cause of morbidity and mortality in people with T1D, the cardiometabolic improvements seen from increased PA are critical for preventing the complications of diabetes [3].

It has been demonstrated that a majority of people with diabetes are overweight or obese, suffer from hypertension, and are not physically active [2]. Many planned interventions to promote PA have failed to significantly change individuals' behaviour [4]. In order to improve the effectiveness of public health interventions, factors that impede the regular practice of PA must be identified [5]. The presence of perceived barriers decreases the likelihood of engaging in preventative health practices, especially if those barriers outweigh the perceived benefits of doing so [5]. The most commonly reported barriers to physical exercise are fear of hypoglycaemia, interruptions to work schedule, loss of glycaemic control in type 1 diabetes, and low fitness level [4]. In addition, there exists a knowledge gap in the diabetes population regarding insulin pharmacokinetics, hypoglycaemic prevention and PA [4][6]. Furthermore, social support has been shown to have a powerful inverse relationship with PA participation [4]. Other common barriers to PA seen in patients with T1D include lack of time, work-related factors, difficulties with access to facilities (distance and cost), lack of motivation, low confidence (embarrassment about body image and fear of failing), weather, and health-specific barriers (low levels of knowledge about managing T1D around PA and T1D complications) [6].

Determining the most pertinent barriers to PA experienced by those with T1D is an initial step to inform planning of suitable interventions based on PA. Clinical care teams must have current information available to discuss PA with T1D patients. With that information, clinical care teams can increase the activity levels of their patients, while also increasing their quality of life and positively impacting their disease prognosis.

One of the most relevant studies published to date – one that also formed the basis of this research project's survey – was published in 2006 by Dubé and colleagues [7]. They sought to validate an 11-item Likert-type self-administered questionnaire based upon the most frequently reported and impactful barriers to PA experienced by patients with T1D. Brazeau et al., (2008) then used the 11-item questionnaire validated by Dubé et al., to assess sociodemographics and T1D treatment using a 44-item questionnaire [8]. Similarly, Wadén and colleagues undertook a cross-sectional analysis of 1,945 patients with T1D to determine the associations between PA and microvascular and macrovascular diabetes complications [9]. They determined that lower activity levels were associated with impaired renal function, and an increasing degree of proteinuria, retinopathy, and cardiovascular disease [9]. Makura et al., (2013) also assessed the associations between T1D and microvascular outcomes within the Diabetes Control and Complications Trial [10]. Tielemans et al., (2013) within a prospective cohort study of 3250 patients, assessed the activity levels of patients in 16 European countries and concluded that 36% of patients were performing none to only mild PA [11]. Lascar et al., (2014) found six main barriers to PA in their qualitative study of 26 patients via a semi-structured interview [12]. Those barriers included lack of time, work-related factors, difficulties with access to facilities (distance and cost), lack of motivation, low confidence (embarrassment about body image and fear of failing), weather, and health-specific barriers (low levels of knowledge about managing T1D around PA and T1D complications) [12]. They also noted that interviewees expressed frustrations at not understanding why in certain situations their blood glucose (BG) rose with PA and felt that having more information around how PA can affect BG levels would

encourage them to exercise [12]. The most recent study regarding barriers to PA in patients with T1D was a qualitative study conducted by Kennedy et al., (2018) [13]. Kennedy and colleagues (2018) focused their study on newly diagnosed patients with T1D and thus framed their questions around any changes to their PA after diagnosis [13]. 33% of participants reported a reduction in the amount of time they spent physically active, and 47% of participants reported a change in the type of PA or a reduction in the intensity of PA within which they participated [13]. Most participants were unaware of the minimal PA guidelines or uncertain as to the amount recommended. Two main subthemes emerged related to barriers to PA: medical barriers and influence of healthcare practitioners [13]. 60% of participants reported hypoglycaemia as a medical barrier to PA, while 47% reported lack of knowledge or confidence of managing T1D around PA, and 27% of participants mentioned the need to plan for PA with T1D as a discouraging factor [13].

The main aim of this research project is to identify the most common barriers to PA experienced by those with T1D. The educational goal of this research project includes public health information to be analysed and shared with the T1D clinics that host the questionnaire invitations. This sharing of knowledge will ultimately lead to an improvement in treatment outcomes and more appropriate physical activity prescriptions given to the diabetic population. In garnering a more active diabetic population, common comorbidities associated with T1D can be lessened in severity or reduced in incidence.

The most commonly experienced barriers to PA have been only studied within a minimal amount of academic papers, and thus the field lacks research quantity. As physical activity research increases in popularity, researchers will begin to question why specific populations are not as active as others. Thus, they will need to identify barriers to physical activity, and this research project will aid in accomplishing that goal. PA is becoming more prevalent in popular culture, and rising levels of inactivity and obesity are being reported and addressed. General populations will also seek to identify the most prevalent barriers to PA. Understanding why a particular population is not as active as another is important for society at large. A member of the non-diabetic population may also experience the same barriers as the diabetic population, and thus this research project can benefit society as a whole.

3 STUDY OBJECTIVES & OUTCOMES

A patient facing survey will be used to determine the barriers to PA.

The primary objective is to:

- Determine barriers to PA in people with T1D

The secondary objectives are to:

- Relate health benefits to PA and T1D
- Determine better practices for healthcare practitioners related to PA and T1D
- Determine better recommendations for participation in sport
- Determine socioeconomic impacts related to PA and diabetes

4 STUDY DESIGN

4.1 INTERVENTION

This study will use an anonymous survey (both online and paper-versions) to assess patient opinions and knowledge and capture data about perceived barriers to PA. The survey has been reviewed by a Public and Patient Involvement (PPI) group.

4.2 STUDY DESCRIPTION

This study will consist of a survey of five main sections as well as an introductory ‘Definitions’ section.

The ‘Definitions’ section will outline specific terms and phrases used within the survey with which some participants may be unfamiliar.

Section 1, ‘Demographics’ will ask participants their age range, gender, location, length of T1D diagnosis, and most recent HbA1c.

Section 2, ‘Physical Activity Barriers’ will ask participants to indicate how likely an item would keep them from participating in PA during the next six months. Items will include potential barriers to PA.

Section 3, ‘Diabetes Management’ will ask participants about their current treatment of their T1D, the information they discuss in clinic visits and their knowledge on PA information resources and condition management around PA.

Section 4, ‘Exercise’ will ask participants about their participation frequency of various forms of exercise, as well as changes from euglycemia around exercise.

Section 5, ‘Sport’ will ask participants about their participation frequency of sport, as well as changes from euglycemia around sport. It will also ask participants to indicate the degree to which they agree with statements pertaining to PA enjoyment, and the effects of their condition on their sport participation.

4.4 STUDY ASSESSMENTS

One off completion of a survey.

4.5 STUDY SAFETY ASSESSMENTS

As this is a patient facing survey safety assessments are not required as there is no risk of harm to the participant.

4.6 STUDY POPULATION

Patients with T1D are required to complete the survey.

4.7 NUMBER OF PARTICIPANTS

At least 50 (to a maximum of 500).

4.8 INCLUSION CRITERIA

- Type 1 Diabetes
- Aged 18 or over
- Able to read and write in English

4.9 EXCLUSION CRITERIA

- Participant is unable to complete survey

5 PARTICIPANT SELECTION AND ENROLMENT

5.1 IDENTIFYING PARTICIPANTS

Participants will be recruited to attempt the survey by various means.
We will utilise the NHS Research Scotland (NRS) Diabetes Research Network permission to contact database of people with who have expressed a willingness to be involved in research. This register has a large cohort of people with T1D who can be approached directly via email or letter (phone contact will not be used). People with T1D in Scotland who are part of this

system will be approached via email or letter. Attempts will be made to approach as many people as possible with the limitations of available resources.
In addition, we will approach patients in diabetes clinics within NHS Tayside who are waiting for a routine eye screening or clinical care appointments. Posters will also be used within diabetes clinics to refer the public towards the online survey location or to acknowledge the paper copies of the survey available within the clinic.
We will also advertise the survey widely on social media platforms to encourage widespread participation (invitation to participate for those with Type 1 Diabetes living in England, Wales, Northern Ireland and other English speaking countries).

The patient information sheet may be provided separately in paper form but is also integrated into the web-based version of the survey along with the consent so that the patient information sheet, consent and survey can be assessed either electronically or in paper form.

5.2 CONSENTING PARTICIPANTS

Participants that agree to or self-select to take part in the study will be provided with a link to the survey, including a PIS. Information and Consent will be embedded within the start of the survey. Implied consent will be assumed by the return of the survey.

There will be an 8-week window within which surveys should be returned or completed. Participants are under no obligation to complete this.
The study will be anonymous. Each survey will be given a unique identification number to link individual responses. No personally identifiable data will be collected.

5.3 INELIGIBLE AND NON-RECRUITED PARTICIPANTS

Individuals who are found to be ineligible for the study, will be thanked for their interest (if it is possible to do this), and no further data will be collected. Survey data provided by ineligible participants will be removed.

6 DATA COLLECTION & MANAGEMENT

6.1 DATA COLLECTION

There will be one survey window of approximately 8 weeks.

People receiving the survey online can return the survey at any time in that window. People receiving the survey in clinic must decide whether or not to complete it at the time or shortly thereafter. Time and place of completion can be decided by the participant.
The survey content will provide the entire source data for the research study.
If a patient returns a survey but later wishes to be withdrawn this will not be possible as the data will be anonymous.

6.2 DATA MANAGEMENT SYSTEM

The data management system (DMS) used will be Excel.
The database will be managed in line with all applicable principles of medical confidentiality and data laws. The Data Controller will be the University of Dundee and the Data Custodian will be the CI.

7 STATISTICS AND DATA ANALYSIS

7.1 SAMPLE SIZE CALCULATION

7.2 PROPOSED ANALYSES

An analysis plan will be prepared before the survey closes to detail what analysis will be done on the data. Responses will be digitised if needed.
Binary or tick-box responses will be analysed using descriptive statistics.

The analysis will be carried out in the Department of Systems Medicine at The University of Dundee.

7.3 TRANSFER OF DATA No transfer of data outside of NHS Tayside/University of Dundee is planned.

Information transfer will be via NHS or university computers only.

8 STUDY MANAGEMENT AND OVERSIGHT ARRANGEMENTS

8.1 STUDY MANAGEMENT GROUP

The study will be co-ordinated by the Chief Investigator (CI), and Principal Investigator (PI) with support from NHS Research Scotland Diabetes Network.

8.2 INSPECTION OF RECORDS

The CI, PIs and all institutions involved in the study will permit study related monitoring, audits, and REC review. The CI agrees to allow the Sponsor or, representatives of the Sponsor, direct access to all study records and source documentation.

9 GOOD CLINICAL PRACTICE

9.1 ETHICAL CONDUCT OF THE STUDY

The study will be conducted in accordance with the principles of good clinical practice (GCP).

In addition to Sponsorship approval, a favourable ethical opinion will be obtained from the appropriate REC and appropriate NHS R&D approval(s) will be obtained prior to commencement of the study.

9.2 CONFIDENTIALITY AND DATA PROTECTION

The CI and study staff will comply with all applicable medical confidentiality and data protection principles and laws with regard to the collection, storage, processing and disclosure of personal data.

The CI and study staff will also adhere to the NHS Scotland Code of Practice on Protecting Participant Confidentiality or equivalent.

All study records and personal data will be managed in a manner designed to maintain participant confidentiality. All records, electronic or paper, will be kept in a secure storage area with access limited to appropriate trial staff only. Computers used to collate personal data will have limited access measures via user names and passwords.

Personal data concerning health will not be released except as necessary for research purposes including monitoring and auditing by the Sponsor, its designee or regulatory authorities providing that suitable and specific measures to safeguard the rights and interests of participants are in place.

The CI and study staff will not disclose or use for any purpose other than performance of the trial, any personal data, record, or other unpublished, confidential information disclosed by those individuals for the purpose of the trial. Prior written agreement from the Sponsor will be required for the disclosure of any said confidential information to other parties.

Access to collated personal data relating to participants will be restricted to the CI and appropriate delegated study staff.

Where personal data requires to be transferred, an appropriate Data Transfer Agreement will be put in place.

Published results will not contain any personal data that could allow identification of individual participants.

9.3 INSURANCE AND INDEMNITY

The University of Dundee is sponsoring the study.

Insurance – The University of Dundee will obtain and hold a policy of Public Liability Insurance for legal liabilities arising from the study.

Tayside Health Board will maintain its membership of the Clinical Negligence and Other Risks Insurance Scheme ("CNORIS") which covers the legal liability of Tayside in relation to the study

Where the study involves University of Dundee staff undertaking clinical research on NHS patients, such staff will hold honorary contracts with Tayside Health Board which means they will have cover under Tayside's membership of the CNORIS scheme.

Indemnity – The sponsor does not provide study participants with indemnity in relation to participation in the Study but have insurance for legal liability as described above.

10 ADVERSE EVENTS

As this is a survey adverse event data will not be collected. Adverse events are not anticipated and participants will complete the survey in their own time in home, work or clinic environments.

11 ANNUAL REPORTING REQUIREMENTS

Annual reporting will be conducted in compliance with TASC SOP 15: Preparing and Submitting Progress and Safety Reports in CTIMPs and Non-CTIMPs, as a condition of sponsorship and as a condition of a favourable opinion from a REC. An HRA Annual Progress Report for NCTIMPs will be prepared and submitted by the CI to REC, and copied to the Sponsor, on the anniversary date of the REC favourable opinion.

12 STUDY CONDUCT RESPONSIBILITIES

12.1 PROTOCOL AMENDMENTS, DEVIATIONS AND BREACHES

The CI will seek approval for any amendments to the Protocol or other study documents from the Sponsor, REC and NHS R&D Office(s). Amendments to the protocol or other study docs will not be implemented without these approvals.

In the event that a CI needs to deviate from the protocol, the nature of and reasons for the deviation will be recorded in the SMF, documented and submitted to the Sponsor. If this necessitates a subsequent protocol amendment, this will be submitted to the Sponsor for approval and then to the appropriate REC and lead NHS R&D Office for review and approval.

In the event that a serious breach of GCP or protocol is suspected, this will be reported to the Sponsor Governance Office immediately

12.2 STUDY RECORD RETENTION

Archiving of study documents will be for five years after the end of study.

12.3 END OF STUDY

The end of study is defined as reaching the number of responses that the CI or delegate deems adequate for analysis, with a minimum sample size of 50 participants. The Sponsor, CI and/or the PI have the right at any time to terminate the study for clinical or administrative reasons.

The end of the study will be reported to the Sponsor and REC within 90 days, or 15 days if the study is terminated prematurely. The CI will ensure that any appropriate follow up is arranged for all participants.

A summary report of the study will be provided to the Sponsor and REC within 1 year of the end of the study.

13 REPORTING, PUBLICATIONS AND NOTIFICATION OF RESULTS

13.1 AUTHORSHIP POLICY

Ownership of the data arising from this study resides with the study team and their respective employers. On completion of the study, the study data will be analysed and tabulated, and a study report will be prepared.

13.2 PUBLICATION

The study report will be used for publication and presentation at scientific meetings. Investigators have the right to publish orally or in writing the results of the study.

Summaries of results will also be made available to Investigators for dissemination within their clinical areas (where appropriate and according to their discretion).

13.3 PEER REVIEW

14 REFERENCES

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