Type 1 diabetes and physical activity: An assessment of knowledge and needs in healthcare practitioners

Camilla J Knight, Rob Lowe, Michelle Edwards, Jane E Yardley, Stephen C Bain, Richard M Bracken

This study examined healthcare practitioners' knowledge and confidence in providing physical activity guidance to people with type 1 diabetes. Data collection occurred in the form of a 23-question, open-ended survey and semi-structured interviews exploring practitioners' knowledge regarding exercise and type 1 diabetes. Participants had rarely received formal training regarding physical activity for people with type 1 diabetes. They indicated limited knowledge of specific physical activity guidelines, either for the general population or for people with type 1 diabetes. However, participants reported feeling relatively confident in their ability to advise people with type 1 diabetes regarding physical activity. The disparity between practitioners' knowledge and confidence in advising people with type 1 diabetes about physical activity raises concerns regarding the accuracy of the information being provided to individuals with the condition.

As exercise makes glucose control more difficult in people with type 1 diabetes, exercise avoidance and physical inactivity are common in this population (Plotnikoff et al, 2006). In spite of this, few studies have explored healthcare practitioners' knowledge regarding physical activity and type 1 diabetes. Similarly, little is known about practitioners' confidence in prescribing or advising physical activity, exercise and sport to people with the condition. Addressing such limitations is important to ensure that practitioners have a positive influence in the lives of individuals with type 1 diabetes.

The purpose of this study was to examine practitioners' knowledge of physical activity in people with type 1 diabetes. Specifically, the study asked the following questions:

1. What training do practitioners receive regarding physical activity and type 1 diabetes?
2. How confident are practitioners in providing guidance on physical activity to people with this condition?

Method

Participants

In total, 51 healthcare practitioners (16 female and 35 male) were recruited and completed a questionnaire. Of the 51 participants, 23 were consultants, 10 were specialist registrars, five were GPs, three were CT2 doctors and 10 were health practitioner researchers and clinical fellows. Participants ranged in age from 28 to 72 years (mean, 42.7 years), and had an average of 11 years of experience working with individuals with type 1 diabetes (range, 4 months to 44 years). A total of 80 questionnaires were distributed to practitioners registered to attend two separate workshops pertaining to diabetes and exercise. Questionnaires were completed prior to workshop delivery.

An additional 13 practitioners completed semi-structured interviews. Of these 13 participants, six were consultants, four were DSNs, two were diabetes specialist dietitians and one was a podiatrist. The six consultants were all male and the other seven participants were female. They

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Article points

1. In this study, practitioners' knowledge and confidence regarding exercise and type 1 diabetes mellitus were examined.
2. Practitioners indicated limited training or education regarding type 1 diabetes and exercise.
3. Most learning about exercise had occurred independently or through experience.
4. Practitioners' confidence regarding recommending exercise to individuals with type 1 diabetes varied.

Key words

- Education
- Exercise knowledge
- Training
- Type 1 diabetes

Authors

Author details can be found on page 276.

Table 1. Participant details.

Participants	Mean experience working with individuals with type 1 diabetes (years; range)
Phase 1: Questionnaire	
23 consultants	20.3 (5–44)
10 specialist registrars	4.4 (0.3–11)
10 health practitioner researchers/clinical fellows	6.0 (0.3–18)
5 GPs	3.5 (0.5–7)
3 CT2 doctors	2.3 (1–4)
Phase 2: Semi-structured interview	
6 consultants	15.3 (7–23)
4 diabetes specialist nurses	15.3 (10–23)
2 diabetes specialist dietitians	11.0 (9–13)
1 podiatrist*	37.0

*The podiatrist worked specifically in a diabetes unit where exercise is one of the key issues that arise when talking to patients.

had been working specifically with people with diabetes for 7–37 years. They were recruited from specialist diabetes care units at two hospitals in Wales. To be selected for interview, participants were required to be regularly working in a specialist diabetes care unit. Further participant details are provided in *Table 1*.

Questionnaire

Following the study's institutional approval, the survey was distributed to the participants. It comprised questions covering demographic and education information (e.g. age, position, years working with diabetes populations and qualifications); training regarding physical activity and type 1 diabetes (e.g. education within university degree, attendance at additional courses); knowledge of physical activity guidelines for individuals with type 1 diabetes (e.g. what are the general physical activity guidelines for individuals with type 1 diabetes, what are the specific guidelines pertaining to endurance or strength work); practitioners' confidence in providing specific guidance regarding physical activity to people with type 1 diabetes; and suggestions for material or information needed to support practitioners in giving guidance to individuals with type 1 diabetes. All questions were open-ended, apart from the questions regarding confidence, which asked practitioners to rate on a scale (see *Figure 1*).

The data obtained from the questionnaires were assessed using content analysis (Sparkes and Smith, 2014), to allow for identification of common responses (participants' knowledge and attitudes) across the sample. Confidence data were recorded using a scale of 1–10 (1=lowest, 10=highest), and comparisons of participants' training and knowledge were made.

Semi-structured interviews

Following analysis of the survey data, it was decided that additional information for healthcare professionals working solely with individuals with diabetes would be beneficial to place the data from the questionnaires in context. Thus, a research assistant with extensive experience in qualitative research conducted semi-structured interviews with practitioners working within specialist diabetes units. The main interview questions focussed on practitioners' knowledge of physical activity guidelines for people with type 1 diabetes; barriers to their knowledge and its application; and issues encountered when trying to encourage physical activity participation in people with type 1 diabetes. Content analysis was also used to assess the interviews. Raw data themes, lower-order themes and higher-order themes were identified. Themes were then placed into a data matrix to allow comparison across participants (Miles and Huberman, 1994). A copy of the interview guide can be obtained from the first author at: **c.j.knight@swansea.ac.uk**.

Results

Survey results

Education

Of the 51 participants, only 15 (29%) had received any physical activity or exercise education through their formal training. Of these, the majority (21% of the overall cohort) received a small number of exercise physiology lectures, albeit not specific to exercise and type 1 diabetes.

Over 50% of participants had gained some specific information regarding physical activity

and type 1 diabetes by completing continuing professional development courses. For example, 40% had attended a DAFNE (Dose Adjustment for Normal Eating) course and 38% had attended single or multiple conference events. However, when asked to recall the information covered in the DAFNE course or lectures, only seven participants could provide any detail on the information covered.

Knowledge

In response to being asked to recall their knowledge of the specific physical activity guidelines for type 1 diabetes, 10 participants made reference to an awareness of NICE or Diabetes UK guidelines. However, only five of these participants could accurately recall the guidelines' details. Five participants recalled the general physical activity guidelines for adults and another two recalled them incorrectly. Most participants (34 people [66%]) were not aware of any guidelines pertaining to physical activity for individuals with type 1 diabetes.

Confidence

Participants were asked to indicate, on a scale of 1–10, their confidence to provide either general advice on physical activity or specific advice (e.g. weight training versus endurance training) to individuals with type 1 diabetes. For the most part, participants scored their confidence for general guidance more highly than for specific guidance. Participants who rated themselves at the lower end of the scale shared insights such

Page points

1. More than half of this study's 51 participants had received some education regarding physical activity in people with type 1 diabetes during their continuing professional development; however, very few recalled any details.
2. Few participants were aware of NICE or Diabetes UK guidelines on physical activity, and even fewer could accurately provide any details.
3. For the most part, participants were more confident to prescribe general advice than specific advice on exercise and type 1 diabetes.

Type 1 Diabetes and Exercise HCP Knowledge Survey

We are trying to gain an understanding of health care practitioners' knowledge of physical activity and diabetes. Please can you complete the following questions as honestly and as fully as possible? All information is confidential.

Demographic information

1. Are you male or female? _____
2. How old are you? _____
3. What is your current position as a health care provider? _____
4. How many years have you been working in type 1 diabetes healthcare? _____
5. Please list your qualifications and dates of attainment:

Training regarding physical activity

1. During the life course of your formal medical education did you receive any training or education regarding physical activity and type 1 diabetes? If yes, can you detail what this education consisted of? (e.g. exercise physiology, endocrine changes to exercise
2. In your continuing professional development have you received any specific training or education regarding physical activity and type 1 diabetes? If yes, what did this training or education consist of? (e.g. single lecture, 1 day course, postgraduate modules etc)
3. Have you ever attended a DAFNE, DAFYDD, BERTIE or other diabetes management training course? If yes, what information on physical activity do you receive?

Knowledge of Physical Activity

1. To your knowledge, what are the guidelines around safe exercise for people with Type 1 diabetes?
2. On a scale of 1 to 10, how confident do you feel prescribing general exercise advice (e.g., Dept of Health guidelines) to individuals with diabetes? Please explain why you have rated your confidence at this level.
3. On a scale of 1 to 10, how confident do you feel prescribing specific exercise advice (e.g., guidelines for aerobic exercise v lifting weights) to individuals with diabetes? Please explain why you have rated your confidence at this level.
4. On a scale of 1 to 10, how confident would you be in prescribing advice regarding the following topics to those with type 1 diabetes to allow them to safely perform exercise? Please explain why you have rated your confidence at this level:

a. Pre-exercise	
b. Blood glucose testing	
c. Carbohydrate intake	
d. Insulin (timing, type & dose)	
e. Injection site	
f. Post-exercise monitoring	

5. If you were not confident to prescribe exercise to a diabetic patient, from whom would you seek advice? _____

Information on Physical Activity

1. What do you perceive to be the current barriers for practitioners regarding prescribing exercise to people with diabetes?
2. What information regarding physical activity and diabetes would you find beneficial?
3. How would you prefer to receive information regarding physical activity and diabetes?

Other comments:

Do you have any other comments regarding physical activity and diabetes?

Figure 1. Questionnaire given to 51 healthcare practitioners on their knowledge of type 1 diabetes and exercise.

Page points

1. The most commonly reported barrier to providing advice on physcial activity was lack of knowledge and unclear guidelines.
2. None of the 13 participants who underwent semi-structured interviews recalled having ever received specific education on exercise in diabetes during their training.
3. All perceived that additional training, guidance and support were needed. They were most concerned about the potential impact of providing incorrect information.

as, "I am quite confident I know nothing about it!" and "Don't feel I can ever give good advice on this." In contrast, participants who scored themselves more highly reported that, "I have learnt from experience" and "I have read a lot and committed to learning." Interestingly, 11 of the 34 practitioners who were unable to accurately recall the physical activity guidelines for type 1 diabetes ranked themselves as quite (6–7) or very (8–10) confident in providing general physical activity advice to individuals with type 1 diabetes.

Barriers to knowledge

Finally, participants were asked to identify what barriers they encountered in providing physical activity guidance to people with type 1 diabetes. The most common response (57% of participants) was a lack of knowledge and unclear guidelines from which to draw recommendations. Following this, participants cited a lack of time in consultations (16%), followed by funding issues (8%) as the main barriers. Funding issues were highlighted by consultants, who perceived that insufficient money was made available to produce education materials or upskill practitioners. To overcome such barriers, participants indicated that easily accessible, online material highlighting key physical activity considerations for individuals with type 1 diabetes would be beneficial. Additionally, participants desired information that could be shared directly with patients.

Interview results

Training and knowledge

The participants unanimously agreed that they had insufficient training regarding type 1 diabetes and physical activity, exercise and sport. In fact, when reviewing their training, none of the practitioners had received any specific information. As participant 1, a consultant, illustrated:

> *"I don't. I cannot recall ever having any specific training in type 1 diabetes and exercise whilst training."*

Some practitioners had received training from pharmaceutical companies regarding insulin pumps in sport or physical activity. Others had attended sessions at conferences or worked closely with researchers in this area to extend their knowledge. However, the practitioners perceived that much more extensive training on this topic was required.

Confidence and application of knowledge

All 13 practitioners perceived that additional training, guidance and support were needed to ensure that appropriate information and suggestions were given to people with type 1 diabetes. Despite working with such individuals on a daily basis, practitioners lacked confidence in making suggestions regarding engagement in physical activity and, particularly, sport. Participant 13, a DSN, shared the views of many when she said:

> *"Because there isn't anything formalised around exercise or activity, I think that can hold us back as well, because you haven't got the confidence to relay that over to a patient, you know, when they are trying to discuss things with you. It's like, if you don't feel confident about what you are talking about, you tend to shy away from it."*

Practitioners were most concerned about the potential impact of providing incorrect information to their patients. They also explained that people with type 1 diabetes were hesitant to engage in physical activity and sport due to concerns over negative consequences. As participant 2, a consultant, said:

> *"The thing that is a worry for the patients will be that there have been two major complications with exercise. One is hypoglycaemia and the other one ketoacidosis."*

Given their patients' fears, practitioners were aware that they needed to provide accurate and appropriate information.

Practitioners indicated that much of the guidance they provided was based on experiences with other patients, who were successfully managing their diabetes when engaging in sport or physical activity. They perceived that such experiences allowed them to pass on general information to patients. However, even though practitioners learned from other patients or from research or conferences, they explained that few patients participated in sport or asked questions about sport or physical activity, and as such they often were unable to recall any specific guidance.

Improving knowledge and advice

All practitioners were in favour of more training, information and support regarding physical activity and sport participation for people with type 1 diabetes. Based on their experiences with the people they see, they provided suggestions around research and knowledge dissemination, their own training, the production of patient information and guidelines, and the use of role models and expert groups. These suggestions are discussed here.

Research and dissemination. The participants perceived that there was insufficient research about physical activity and sport participation for people with type 1 diabetes. As one of the consultants, participant 3, explained:

"It's not a huge thing, exercise in type 1 diabetes doesn't feature enormously in diabetic meetings and diabetic journals it has to be said, so it would be useful if there was a bit more of it [research]."

Participants perceived that a more extensive research base would be beneficial in the production of information both for them and for patients. However, they cautioned against using "atypical" patients in research, which might prevent its translation to a broader population. Furthermore, the participants highlighted the importance of considering the range of individuals with type 1 diabetes (e.g. young people, older adults, those with and without health complications and comorbidities) and the range of physical activity and exercise types (e.g. competitive sport, leisure activities) in research. In addition to conducting more studies, the participants also indicated that researchers need to ensure that research dissemination includes clear, applicable suggestions that could be easily used by practitioners working in time- and finance-constrained environments.

Practitioner training and knowledge. The practitioners unanimously believed that they would benefit from continuing upskilling in this area. One consultant, participant 2, explained:

"I think we could do with more courses more periodically because we do tend to, in time, lose our skills; as in refresher courses would be helpful for our people with diabetes, but continuing practice does also help."

Various suggestions were provided regarding how such training could occur, with another consultant, participant 4, suggesting:

"I think it would be useful to have a modular course, a proper course, you know, which you can keep in touch with regularly and be made part of the regular curriculum for trainees."

The general consensus was that training and information were necessary to ensure practitioner confidence in providing advice to patients and allow subsequent proactive discussion of this subject rather than relying on patients to raise the issue. In addition to specific training and knowledge updates, practitioners highlighted that clear, accessible (preferably online) guidelines, which they could refer to during consultations, were necessary. Furthermore, practitioners wanted guidelines to address the different types of individuals and issues that might be encountered.

Patients' knowledge and guidelines. All practitioners expressed that it was the individuals with diabetes who were the experts of their own body and their experiences of sport and physical activity. As such, the individuals should take the lead in managing their diabetes. Ensuring that they had access to patient-friendly guidelines and monitoring mechanisms was perceived to be very important because, as one of the dietitians (participant 12) stated:

"It is their condition and we give them as much knowledge as we can, to empower them to look after their condition then."

The practitioners indicated that there were some very broad, patient-accessible guidelines available on the Diabetes UK website but that, for most people, knowledge was acquired through trial and error. Participant 10, a DSN, said:

"Sometimes it is literally a case of try and see, and somebody does exercise and you've had a discussion [but] they still have a hypo and they're disappointed. You just got to encourage them to keep going back."

Page points

1. When asked for specific examples on how to improve knowledge, participants stated that a more extensive research base spanning the whole range of people with type 1 diabetes would be required.
2. They also called for upskilling and continuing training in this area.
3. Ensuring that people with diabetes have access to accessible guidelines and information is also crucial.

Page points

1. Both people with diabetes and their healthcare providers can learn from "expert patients" who can provide direct support and guidance.
2. Several programmes that may improve patients' and providers' knowledge have been or are in the process of being developed.
3. The advent of secure ways of sharing blood glucose data between people with diabetes and their healthcare providers, along with new online tools and apps, may lead to more collaborative approaches to managing blood glucose levels while exercising.

Authors

Camilla J Knight is a Senior Lecturer, School of Sport, Health and Exercise Sciences, Swansea University; Rob Lowe is Senior Lecturer, Department of Psychology, Swansea University; Michelle Edwards is Research Associate, School of Social Sciences, Cardiff University; Jane E Yardley is Assistant Professor, Augustana Campus, University of Alberta, Camrose, AB, Canada; Stephen C Bain is a Professor in the School of Medicine, Swansea University; Richard M Bracken is Associate Professor, School of Sport, Health and Exercise Sciences, Swansea University.

Consequently, more specific and consistent guidance was desired that people with diabetes themselves could use. Additionally, practitioners suggested that an online insulin and glucose monitoring tool or app, in which people with diabetes could store information to share with their practitioners, would be beneficial in ensuring safe exercise participation.

Role models and expert patients. Finally, the practitioners indicated that they used stories of successful sport role models to inspire and educate their patients. This was something one of the consultants, participant 2, did frequently:

> *"I've had people who have done mountain cycling for long distances, we've one that's been a swimmer and I think we've got famous names as well who have achieved a lot with diabetes. So there is a lot of it around, but I think we just need to show them that it's plausible."*

Practitioners indicated that access to stories and examples of successful individuals with type 1 diabetes would be useful to overcome patients' fears. Furthermore, practitioners perceived that, if people were able to contact such individuals for direct guidance on how to successfully manage their diabetes while training and competing, it would be beneficial. Practitioners learnt from their patients and they felt that such learning should be expanded to others. Suggestions for clinical champions who could provide direct support and guidance in the areas of exercise and type 1 diabetes were also recommended.

Discussion

The need for more information, resources and training was a common theme throughout the survey and interviews. This is consistent with another observational study of healthcare providers working with people with chronic conditions (Joyce and O'Tuathaigh, 2014). It is also in line with recent examinations of medical education in both the UK (Weiler et al, 2012) and the US (Cardinal et al, 2015), where an overall lack of training related to physical activity has been acknowledged. Where exercise has emerged as a means of treatment, if not primary prevention, for several chronic conditions, it is evident that practitioners need to be better equipped and willing to prescribe exercise with the same regularity and detail as pharmaceutical options (Nunan, 2016).

In addition to providing more information on physical activity and type 1 diabetes during medical training and ongoing education, approaches that have been successful in improving practitioner and patient knowledge around physical activity can be considered. For example, a Canadian programme developed by exercise specialists for diabetes educators was shown to improve the educators' confidence in providing physical activity and exercise advice to people with type 2 diabetes (Shields et al, 2013). Future programmes such as JDRF's PEAK (Performance in Exercise and Knowledge) programme, a comprehensive 1-day programme on the management of physical activity in people with type 1 diabetes announced in late 2015 (available at: **www.jdrf.org/peak**), might fill gaps in both patients' and healthcare providers' tools and knowledge. Alternatively, it has been suggested that the inclusion of exercise specialists in primary care and national exercise referral schemes could assist in improving knowledge in both patients and practitioners (Cheema et al, 2014; Johnson et al, 2015).

Participants also expressed a need for people to take more ownership on exploring the impact of physical activity on their blood glucose levels. This might be achieved by the use of secure data repositories of individuals' glucose information that are accessible to healthcare providers. Furthermore, new online tools and apps (e.g. Glooko, mySugr), and peer support forums (e.g. the Sporty Diabetic Type 1s Facebook group, Runsweet.com) show the growth of patient-driven education and an increase in the collaborative approach to management.

Study limitations

These findings and conclusions must be considered in line with the limitations of the study. Specifically, data were obtained from a small number of individuals from one geographic area in Wales. Further research outlining the experiences of healthcare professionals working

in different locations would be beneficial to extend knowledge in this area.

Additionally, to encourage completion of the questionnaire, we decided to limit the number of questions. As such, the depth of information obtained during the first stage of data collection was somewhat restricted. Gaining more detailed insights from the broad range of practitioners included in stage one is an important next step to extend this research area.

Conclusion

These data indicate that a disparity exists between practitioners' training, knowledge and confidence in advising people with type 1 diabetes about physical activity. This raises concerns regarding the accuracy of the information being provided to these individuals. The findings suggest the need for more productive relationships with allied professionals whose knowledge base might close the gap between healthcare providers directly involved in diabetes care and existing physical activity tools, structures and information. ■

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