Dietitians' practice in giving carbohydrate advice in the management of type 2 diabetes: A Mixed Methods Study.

Paul D. McArdle*

Sheila M. Greenfield***

Amanda Avery **

Gary G. Adams**

Paramjit S. Gill***

Institutions: *Birmingham Community Healthcare NHS Trust (BCHC)

**Faculty of Science, The University of Nottingham, Sutton Bonington Campus, Sutton Bonington, Leicestershire, LE12 5RD **

***Primary Care Clinical Sciences, College of Medical & Dental Sciences, University of Birmingham, Edgbaston, Birmingham B16 2TT

Corresponding Author:

Paul McArdle

Birmingham Community Nutrition, BCHC

St. Patricks Centre for Community Heath

Frank Street

Birmingham B12 0YA

United Kingdom

Tel: +44(0)1214461110

Fax: +44(0)1214461020

Email: paul.mcardle@nhs.net

Word count: 3944

Number of tables: 3

Number of figures: 1

Abstract (250 words)

Background

Carbohydrate is accepted as the principal nutrient affecting blood glucose in diabetes, however current guidelines are unable to specify the optimal quantity of carbohydrate for glycaemic control. No studies exist that describe current practice amongst health care professionals giving carbohydrate advice in type 2 diabetes (T2DM). This study aims to improve understanding of the degree of variation in the current practice of UK Registered Dietitians (RDs) by describing how RDs advise patients.

Methods

UK RDs were contacted through national networks and asked to complete an online survey, which was analysed using STATA 12. Three consultations between dietitians and patients with type 2 diabetes were observed; followed by semi-structured interviews with the dietitians.

Results

320 complete survey responses were received. Dietitians' advice varied according to expertise, training and confidence and the complexity of the patient's blood glucose treatment. 48% (*n*=154) of respondents advised patients to restrict carbohydrate intake either occasionally or frequently, with 35.6% (*n*=114) considering 30-39% of total energy from carbohydrate to be a realistic expectation. The overall theme from the interviews was 'Conflicting Priorities', with three sub-themes: 1) How treatment decisions are made; 2) The difference between empowerment and advice and 3) Contradictory advice. A disparity existed between what was observed and interview data on how dietitians rationalise the type of carbohydrate advice provided.

Conclusion

Dietitians' advice varies for a number of reasons. Consensus exists in some areas e.g. carbohydrate awareness advice, however clear definitions of such terms are lacking. Clarification of interventions may improve consistency of approach and improve patient outcomes.

Introduction

Diabetes affects over 3 million people in the UK and 415 million worldwide (1), most of whom are diagnosed with type 2 diabetes. Diabetes is a complex condition requiring a multi-disciplinary approach, including physicians, nurses and dietitians (2). Treating diabetes and its complications costs the National Health Service (NHS) approximately £10 billion ($14 billion) per year, accounting for about 10% of the budget (3). Effective management of type 2 diabetes should include nutritional advice from someone with specific expertise and competencies in nutrition (4), such as a Registered Dietitian (RD).

In clinical trials, nutrition interventions have achieved reductions in HbA1c of between 0.5% and 2.3% (6-25 mmol/mol) (5). A range of dietary approaches may be effective in managing blood glucose in type 2 diabetes, including low fat, low carbohydrate, low glycaemic index, high protein, and Mediterranean diets (6). However, due to limited published evidence, current UK & international guidelines are unable to recommend a particular regimen and instead highlight weight loss as the principal strategy for managing blood glucose in those who are overweight (7). Carbohydrate is accepted as the only nutrient with a direct effect on blood glucose, and as such attracts significant attention in the literature, with recent reviews unable to conclude the optimal quantity of carbohydrate (8) (9). The ideal proportion of macronutrients in the diet, particularly carbohydrate, is consequently the subject of debate (10). Therefore, in the absence of evidence U.K. and U.S. guidelines suggest people with diabetes follow general population guidelines for 'healthy eating' (11), which recommend 50% of energy from carbohydrate, but with an emphasis on monitoring individual responses to carbohydrate intake in order to achieve glycaemic control. Previous guidelines recommended a specific proportion of total energy from carbohydrate (ref 2003).

Dietitians are the only statutory registered diet and nutrition specialists in the UK and play an important role in advising people with diabetes (11). The lack of strong evidence or a professional consensus on the optimal quantity of carbohydrate in people with type 2 diabetes means there is the potential for wide variations in dietetic practice (12). However this has not previously been studied.

Research is lacking regarding current advice and dietary management in type 2 diabetes, and little is known specifically about advice given by dietitians. Due to the lack of a definitive guideline on the quantity of carbohydrate in type 2 diabetes, the authors believe this area warrants further study. Therefore the aim of this paper is to describe and explore the practice of UK dietitians with respect to carbohydrate advice in type 2 diabetes, focussing on the degree of variation in advice.

Methods

A mixed methods approach was taken, adopting a convergent, parallel design (13). A national, cross-sectional survey was used to provide quantitative data on the practice of dietitians, together with qualitative data (from observations and interviews) to provide further insights into how dietitians advise patients about carbohydrate. Sponsorship was provided by The University of Nottingham. Ethical approval was obtained from NHS REC (13/SW/0120).

Cross-sectional survey of Registered Dietitians

Subjects & Survey Administration

The survey was constructed using Bristol Online Surveys (BOS) (14), which automatically codes responses, and was distributed by email using national networks of dietitians; principally members of The British Dietetic Association (BDA) whose membership represents >80% of UK dietitians (15). Data on the number of dietitians

working in diabetes in 1996 identified a population of 512 dietitians (16), however there is no official estimate of the current figure. The survey was also promoted using social media (Twitter, Facebook, LinkedIn) and personal contacts. The population reach was conservatively estimated at 3,000 dietitians and approximately half were likely to have been eligible to take part, using data available from The BDA (17), suggesting a target population estimate of 1,500. Based on these figures, the target sample size was calculated as 341 respondents, using a 95% confidence level and 5% confidence intervals. Before completing the survey, respondents were asked to confirm their eligibility to participate by answering two screening questions (if they were a UK Registered Dietitian **and** consult patients with type 2 diabetes in one-to-one clinic settings). An optional prize draw for a £50 shopping voucher was offered as an incentive to participate.

Survey Design

The survey was piloted by asking two colleagues to check the clarity of questions and the length of time taken to complete the survey. Feedback was also obtained from academic supervisors, following which minor changes were made to the layout and wording of the questions relating to the types of advice given, in order to improve clarity of the terms used. The survey contained questions about dietitians' training and confidence in advising patients about carbohydrate before asking about advice given regarding glycaemic index, glycaemic load, frequency and level of carbohydrate restrictions used and their definition of carbohydrate awareness advice. Dietitians were then asked to state how frequently different types of carbohydrate advice were given to different patient types. For the purposes of the survey, five categories of patient type were defined simply by the level of complexity of treatment for blood glucose control: 1) No medication; 2) Oral medication Only; 3) Once or twice daily

background insulin; 4) Once or twice daily premixed insulin, and 5) Multiple daily injections (MDI). These patients are referred to as patient types 1-5 accordingly.

Statistical Analysis

Response data were extracted, together with a codebook detailing the descriptive meaning of each coded answer, from BOS and imported into STATA 12 [18] for generation of descriptive statistics. Non-parametric tests (Chi squared, Fisher's Exact) were undertaken to check for independence. A linear regression model was developed to establish how much of the variation in the carbohydrate advice given could be attributed to the different patient types (i.e. the complexity of the treatment for blood glucose control). Dummy variables were created to represent the likert scores for carbohydrate counting advice in each patient type. These were then used in a stack form in order to combine each patient type and other predictor variables (previous training, confidence etc.) in the regression model.

Non-participant observation and interviews

Subjects and sampling

Purposive sampling [19] was used to identify dietitians who specialise in or see patients with type 2 diabetes in two England NHS sites (one community-based and one incorporating both acute and community). The second site was included to minimise bias as the RDs working there were not known to the researcher. Sample size was determined by data saturation, the point at which no new information or themes emerged [20] and can be achieved with as few as 10 participants [21]. Each dietitian was observed in consultation with one patient and then interviewed. Written, informed consent was first obtained from the dietitians who were then asked to identify

clinics with patients with a confirmed diagnosis of type 2 diabetes. Written, informed consent was obtained from patients by the researcher at the clinic.

Observation of consultations

Non-participant observations of consultations between dietitians and patients with type 2 diabetes were undertaken immediately prior to semi-structured interviews with the dietitian. Observations of health consultations can be a useful method for understanding the components of care and decision-making (22). The highly contextual nature of qualitative research interviews means that conducting the interview immediately following the observation should allow for a richer account of the nature of the phenomenon (23). The purpose of the observation in this setting was to observe how dietitians advised patients about carbohydrate, to inform the framing of the questions in the interview and enable comparisons to be made between what is reported in the interviews and what is actually observed in practice. Observed consultations typically lasted 30-45 minutes and were not recorded but field notes were made, consisting primarily of the researchers' reflections and areas to explore in questioning in the interviews.

Interviews with dietitians

The interviews were allocated 30 minutes each to minimise pressure on the clinician's time and none of the interviews required longer than this to fully explore the topic. An interview schedule was used and interviews were recorded using a digital audio recorder. Interview questions initially focussed on exploring the dietitian's aims and focus of the observed consultation, and their rationale for these. Later questions asked about how the dietitian usually advises patients about carbohydrate, and what they believe to be the essential knowledge and skills required by different types of patients.

Analysis of data

Data collection took place throughout July 2013. All observations and interviews were conducted by the lead author (PM). Interviews were recorded, transcribed verbatim and underwent thematic analysis (24). Texts were read and re-read, and then coded for meaning using an inductive, iterative process (25). Codes were then grouped into meaning units and themes generated. The notes from observations primarily captured what the observer felt was influencing the dietitians' decision-making process during the consultation. The field notes from observations were not subjected to the same thematic analysis but were used to guide specific questions during the interview and were later reviewed during the analysis of interview transcripts as an aide memoire to assist in interpreting the contextual meaning of the texts (26).

Results

Cross-sectional Survey of Dietitians

A total of 377 survey responses were received, however only 320 were complete and used in the analysis, representing a 21.3% response rate based on the estimated population of 1,500 dietitians. Respondent characteristics are described in *Table 1*. The sample was largely female and comprised mostly experienced dietitians in NHS pay bands 6 and 7, who identified as specialists in diabetes and were UK trained.

Table 2 summarises participants' responses for questions relating to general advice about carbohydrate. Advice about glycaemic index (GI) and glycaemic load (GL) is not covered in detail by most dietitians, but advice to *avoid* specific high-GI and conversely to *include* specific low-GI foods is given by most of the dietitians surveyed. Carbohydrate restrictions are advised occasionally or frequently in 48% of

respondents, and the most popular restriction is 30-39.9% of total energy from carbohydrate.

Table 3 shows that Diabetes Specialist Dietitians (DSDs) were more confident and more likely to recommend a restriction in carbohydrate quantity than non-DSDs (p <0.01, n=320). In addition, DSDs felt a greater restriction in the proportion of energy from carbohydrate was more realistic than did non-DSDs (p 0.01).

Carbohydrate Awareness advice was reportedly given 'almost always' in all patient types by ≥78% of respondents. The most popular definition was 'Education about identifying foods and drinks that contain carbohydrate'. Respondents were allowed to select more than one definition, and many did so, indicating either a plurality of definitions or some uncertainty amongst the profession.

A linear regression model was developed to examine the relationship between increasing complexity of advice (i.e. likelihood of giving detailed carbohydrate counting advice) and patient type. The analysis demonstrated, after accounting for the confidence and training of dietitians, there was a 24% increase in the likelihood of the patients being offered carbohydrate counting advice comparing patient type 5 to patient type 1 (p < 0.05). Therefore, increasing complexity of blood glucose treatment does not fully explain the likelihood of patients receiving more complex carbohydrate advice. Carbohydrate awareness and GL advice increased to a lesser extent between patient type 1 and 5 (8.4%, p <0.05), and the association with GI advice was even smaller.

Non-participant observation & interviews

In total, 3 out of 10 dietitians approached took part (3 dietitians from site one and none from site two). Dietitians who did not take part cited a reluctance to be interview and

observed. Two specialist dietitians and one non-specialist were included. The non-DSD had no specific training in carbohydrate counting and the two DSDs had been trained and both had more than 4 years' experience working in diabetes. The purposive sampling was intended to include specialists and non-specialists to reflect the survey respondents, however comparisons between the two groups would not be appropriate due to the sample size.

The analysis resulted in the generation of one overarching theme, 'Conflicting priorities', and three sub-themes linked to this.

Overall theme: Conflicting priorities – carbohydrate versus other advice

RDs appeared to have difficulty in differentiating the various types of carbohydrate advice and separating it from other forms of advice. For example, where the definition of carbohydrate awareness may overlap with the definition of carbohydrate counting, or the difference between discussing carbohydrate for blood glucose management and for obtaining a balance of nutrients or for controlling weight.

> *"I think the basic skill is basically carbohydrate awareness. Which means basically education on what exactly carbohydrate foods are. Identify what are carbohydrate foods. Not only identify carbohydrate but at the same time the amount of carbohydrate as well and what will be the implication of eating that amount of carbohydrate on blood glucose"*

[RD1 - DSD]

> *"Obviously, within healthy eating, we can't talk about healthy eating without bringing in carbohydrate advice but for, certainly at my level, keeping it*

relatively straight forward, basic and portion sizing being correct but overall, looking at overall energy intake rather than just focusing on one food group."

[RD2 – non-DSD]

So, people who are wanting to control their weight they know that it's the carbs that they need to inject for so for example, if they want to have any carbs at lunch time, because sometimes you know, people, patients, have said to me that the insulin puts weight on and we keep saying that well actually insulin is non calories, its what you're eating that would put the weight on… So they can manipulate it to that advantage really so if they were having something like a chicken salad then they would say, what's the carbohydrate content there, and if there is nothing you say then you don't need to inject for that. So, I think it is a good skill to have in terms of balancing the meals as well.

[RD3 - DSD]

There was a description of a patient-centred approach alongside a contradictory account of how the approach is chosen by the Dietitian, following their assessment, as outlined below.

"I think it depends on the individual so I wouldn't force a low carbohydrate diet on my patient because it depends on what stage of change they're at and what they want from the consultation. So what is their priority, what is their aim."

"…when they come to clinic you'll see them and when you do the whole assessment process, you've taken all the details, you will then be able to identify which way you are going to go with them, whether its going to be

looking at very low carb diets or is it going to be looking at carbohydrate

portion control to begin with, then gain their confidence…"

[RD1 - DSD]

This overall theme highlights the conflict between the evidence-based guidelines and everyday practice. Weight loss and overall calorie reduction is highlighted as best practice, yet dietitians acknowledge quantity of carbohydrate as an important factor in managing blood glucose.

Sub-theme one: The difference between empowerment and advice

RDs in interviews highlighted the importance of patient 'empowerment' and offering support, whilst distinguishing this from the giving of advice. Empowerment was not seen as advice, yet in observations RDs were seen questioning patients about how they feel, what they understand and what they do, whilst simultaneously giving carbohydrate advice to patients. This advice about types and quantities of carbohydrate was termed 'education' by the dietitians, and therefore appeared to fall outside their definition of 'advice'.

"…with talk about empowerment, empowerment is much more important just to educate people and then once we educate people and we work together with them we are not basically making things changing for them we are basically facilitating decision making, making them decide for themselves what's basically good for them and what changes are more really suitable for them in the long term and things like that. So having that thing in mind [empowerment] *and, like her really poor understanding of healthy eating, carbohydrate awareness and things like that, it was much more important for*

me to give her some education, to inform her, to be aware of carbohydrate

food."

The importance of 'support' rather than advice and the use of behaviour change skills were emphasised by one dietitian.

"She has…there are things going on at home, I think there are issues of going into the kitchen, the kitchen is all upside down and what have you and that is not really advice, that's 'how can I help you…' how can we problem solve that really"

Sub-theme two: How treatment decisions are made

It was unclear from the dietitians' accounts whether the dietary approaches were intended to support the medical management or vice versa. There was a contradiction between what the dietitians reported in interviews and what was observed during the consultations. Interviewees reported the patient as the driving force for decisions over the type of carbohydrate advice whilst simultaneously stating it was a team approach in collaboration with other health professionals, or that the type of medication patients take will largely decide what carbohydrate advice is given.

"She had heard about this approach [carbohydrate counting] *and… so she sort of brought that up and we said okay if that's what you would like to do we will try that… I think it just depends because we work closely with the DSN's* [diabetes nurse] *and its kind of like a joint decision and we will say, well*

actually, I think before we try anything else, and this person doesn't like multiple injections, then maybe we will go with the twice a day insulin…"

[RD3 - DSD]

"...because of all her symptoms of poor diabetes control I mean we don't have many options available in terms of medication. The only option is basically dietary intake..."

[RD1 - DSD]

Sub-theme three: Contradictory Advice

Dietitians were inconsistent or unclear both within and between interviews when describing the various forms of advice relating to carbohydrate. For example, low carbohydrate is referred to both in terms of being 'good' (useful) and 'bad' (not healthy), whilst the message is mixed as part of an overall calorie or portion reduction. They had difficulty assigning the relative importance of carbohydrate advice versus advice to reduce portion sizes or reduce total calories. There was ambiguity over the use of 'low carbohydrate' approaches and the terms 'restrict' and 'reduce' were used when referring to carbohydrate, in preference to use of the term 'low'.

"Low carbohydrate is quite good. Good and bad. Good for those patients if they can just manage reducing their total portion intake and as part of that total, that reduction in portion, if they reduce carbohydrate intake that's absolutely fine…"

[RD1 - DSD]

"I think if this patient gets to grips with carb counting and knows, you know, that some days it's okay if she didn't fancy any carbs with her lunch, in terms of weight loss, I wouldn't always promote, you know, don't have a carb free day because we know carbs provide you with energy but she's got that flexibility to have less to control her weight. Because the carbs are not necessarily in isolation, it could be fat and sugar with them you see, so that's why we kind of say with this regime you've got that flexibility to control your weight really."

[RD3 - DSD]

Discussion

The aim of this study was to improve understanding of the degree of variation in the current practice of UK RDs by exploring and describing how dietitians in advise patients with type 2 diabetes about carbohydrate.

This is the first study of its kind and has shown there is variation in practice, which could be accounted for partly by the imperative to provide patient-centred and individualised care. However, it could also be due to the lack of a clear evidence base and guidelines relating to carbohydrate advice in type 2 diabetes. Specialist Dietitians were more likely to recommend a carbohydrate restriction and to recommend a greater restriction in carbohydrate than non-specialist dietitians, thereby suggesting less reliance on specific guidelines by more experienced dietitians.

Non-specialist dietitians reported a lack of confidence in teaching people with type 2 diabetes about the quantity of carbohydrate in food, which is likely related to a lack of specific training in carbohydrate counting or diabetes education. Considering the low uptake of structured patient education in diabetes (27) and the limited resources with

regards to access to diabetes specialist dietitians, it is vital that non-specialist dietitians are equipped with a good level of knowledge and skills and are confident in advising people with type 2 diabetes about carbohydrate in food.

Dietitians reported almost universally providing 'carbohydrate awareness' advice yet were unable to coherently define and in some cases distinguish this from advice about portion-control in general. The frequency with which dietitians give carbohydrate awareness advice highlights the importance of this term being properly described and defined as an intervention for the dietetic profession and others working with people with type 2 diabetes. The qualitative strand of this study corresponds with the survey findings and provides further narrative regarding the difficulty dietitians have in defining this term.   The recent media and professional focus regarding the balance of specific macronutrients, namely carbohydrate and fat, in the diet of people with type 2 diabetes (9) requires that RDs are able to speak confidently and coherently both to other health professionals and patients regarding the evidence base in this important area.

The mixed methods study design allowed for a deeper understanding of the factors that may influence how RDs determine which patients should receive what form of carbohydrate advice. The benefit of the mixed methods approach in this study is the way in which the qualitative data informed the interpretation of the survey data (28). The survey had an estimated reach of approximately one third of UK RDs (29) and provided a national view of dietetic practice. The interviews and observations, helped add meaning to this. The survey results suggested an increase in the likelihood of patients being offered more complex carbohydrate counting advice with increasingly complex treatment regimens, however the regression model suggests this only accounts for a small proportion of the variation in advice. Understanding of this finding was enhanced by the observations and interviews, which reveal a number of

influences on the decision for what type of advice the patient should be offered, including collaboration with other team members. Without the qualitative strand to this study, interpretation of the variation in advice shown in the regression model would have been more challenging.

The sampling approach may have led to a risk of selection bias in this study, for the quantitative and qualitative elements. More experienced dietitians and those specialising in diabetes may have been more likely to take part, which may explain some of the participant characteristics for the survey. However, the characteristics suggest a representative sample in terms of gender distribution (BDA membership 3.9% male as of September 2012) (16). Although the qualitative sample did not allow for saturation, there was consistency amongst the participants in terms of overall themes. The qualitative data helped to expand on the quantitative data, despite the relatively small sample. In addition, the recruitment and selection for the survey being entirely through electronic means may have excluded a particular section of the dietitian population. It is likely that practice will always vary due to the imperative to provide patient-centred care, and dietitians are skilled in individualising advice for each patient. However there is also a need to provide advice that has a clear rationale and can be explicated clearly and concisely. This warrants further study to gain a deeper understanding of this decision-making process amongst dietitians and to aid the development of future interventions.

Conflicts of Interest

PM is a member of the Professional Practice Board of the BDA and a Committee Member of the Diabetes Specialist Group of the BDA.

References

1.   IDF. Internation Diabetes Federation Diabetes Atlas: 7th Edition: 2015 Update. IDF, 2015.

2.   IDF Clinical Guidelines Task Force. Global Guideline for Type 2 Diabetes [Internet]. Brussels;   2012   [cited   2016   Aug   19].   Available   from: https://www.idf.org/sites/default/files/IDF T2DM Guideline.pdf

3.   Diabetes UK. Diabetes: Facts and Stats. Diabetes UK, 2015.

4.   NICE. Clinical Guideline NG28. Type 2 diabetes in adults: management. London: National Institute for Health and Care Excellence, 2015.

5.   Franz MJ, Boucher JL, Green-Pastors J, Powers MA. Evidence-based nutrition practice guidelines for diabetes and scope and standards of practice. J Am Diet Assoc. 2008 Apr;108 (4 Suppl 1):S52-8. PubMed PMID: 18358257. eng.

6.   Ajala O, English P, Pinkney J. Systematic review and meta-analysis of different dietary approaches to the management of type 2 diabetes. The American journal of clinical nutrition. 2013 Mar;97 (3):505-16. PubMed PMID: 23364002.

7.   Dyson PA, Kelly T, Deakin T, et al. Diabetes UK evidence-based nutrition guidelines for the prevention and management of diabetes. Diabet Med. 2011 Nov;28 (11):1282-8. PubMed PMID: 21699560. eng.

8.   van Wyk HJ, Davis RE, Davies JS. A critical review of low-carbohydrate diets in people with Type 2 diabetes. Diabet Med. 2016 Feb;33 (2):148-57. PubMed PMID: 26413954.

9.   Dyson P. Low Carbohydrate Diets and Type 2 Diabetes: What is the Latest Evidence? Diabetes Ther. 2015 Dec;6 (4):411-24. PubMed PMID: 26446553. Pubmed Central PMCID: 4674467.

10.   Mann J, Morenga LT. Carbohydrates in the treatment and prevention of Type 2 diabetes. Diabet Med. 2015 May;32 (5):572-5. PubMed PMID: 25510817.

11.   Franz MJ, Powers MA, Leontos C, et al. The evidence for medical nutrition therapy for type 1 and type 2 diabetes in adults. J Am Diet Assoc. 2010 Dec;110 (12):1852-89. PubMed PMID: 21111095. eng.

12.   Wennberg JE. Tracking Medicine. New York: Oxford Univeristy Press; 2010.

13.   Creswell JW, Plano Clark VL. Designing and conducting mixed methods research. 2nd ed. ed. Los Angeles ; London: SAGE; 2011.

14.   UoB. Britsol Online Surveys Bristol: University of Bristol; 2013 [24 April 2013]. Available from: https://http://www.survey.bris.ac.uk/?op=login.

15.   BDA T. The British Dietetic Association Annual Report 2014/15. Birmingham, UK: The British Dietetic Association, 2015.

16.   Nelson M, Lean ME, Connor H, et al. Survey of dietetic provision for patients with diabetes. Diabet Med. 2000 Aug;17 (8):565-71. PubMed PMID: 11073177.

17.   BDA. Membship Survey Demographics. In: McArdle P, editor. Report of the age and sex distribtion of members of The British Dietetic Association at September 2012 ed: The British Dietetic Association; 2013. p. 2.

18.   StataCorp. Stata Statistical Software: Release 12. College Station, Texas: StataCorp LP; 2011.

19. Marshall MN. Sampling for qualitative research. Family practice. 1996 Dec;13 (6):522-5. PubMed PMID: 9023528.

20. Dworkin SL. Sample size policy for qualitative studies using in-depth interviews. Archives of sexual behavior. 2012 Dec;41 (6):1319-20. PubMed PMID: 22968493.

21. Mason M. Sample Size and Saturation in PhD Studies Using Qualitative Interviews. Forum: Qualitative Social Research. 2010;11 (3):8.

22. Ford S, Schofield T, Hope T. Observing decision-making in the general practice consultation: who makes which decisions? Health Expectations. 2006;9:130-7.

23. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse education today. 2004 Feb;24 (2):105-12. PubMed PMID: 14769454.

24. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006;3:77-101.

25. Wicks A, Whiteford G. Conceptual and practical issues in qualitative research: reflections on a life-history study. Scandinavian journal of occupational therapy. 2006 Jun;13 (2):94-100. PubMed PMID: 16856466.

26. Decrop A. Triangulation in qualitative tourism research. Tourism Management. 1999;20 (1):157-61.

27. Diabetes UK. Diabetes education: the big missed opportunity in diabetes care [Internet]. London; 2016 [cited 2016 Aug 19]. Available from: https://www.diabetes.org.uk/Upload/Get involved/campaigning/Taking Control/Diabetes UK_Diabetes education - the big missed opportunity_updated June 2016.pdf

28. Mason J. Six strategies for mixing methods and linking data in social science research. ESRC National Centre for Research Methods, 2006.

29. HCPC. HCPC - Health & Care Professions Council - Professions 2013 [20/08/2013]. Available from: http://www.hpc-uk.org/aboutregistration/professions/index.asp?id=5.

Tables – see separate file

Figure 1 – see separate file