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Exploring dietitians’ practice and views of giving advice on dietary patterns to patients with type 2 diabetes mellitus: a qualitative study

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provided critical input, reviewed the manuscript for important content, take responsibility for the contents of this article and approved the final version submitted for publication.

**Ethics information:**

The study was approved by the University of Bristol, Centre for Exercise, Nutrition and Health Sciences Ethics Committee (EAN 024-20).
Abstract

Background: Dietary guidelines for type 2 diabetes mellitus (T2DM) emphasise weight management and individualised total carbohydrate intake. Evidence on the most effective dietary patterns (DPs) for T2DM management is mixed, potentially leading to variations in the advice dietitians provide. This study aimed to explore dietitians’ practice of DP advice provision to adults with T2DM, and understand their views when advising their patients on the DPs deemed effective for glycaemic management or recommended by current guidelines.

Methods: Semi-structured interviews were conducted with 12 UK-registered dietitians, with experience in consulting adults with T2DM. Dietitians were asked for their views on five DPs recommended for glycaemic management of T2DM. Interview transcripts were analysed using deductive and inductive thematic analysis.

Results: Nine themes were identified that draw attention to DP advice provision practices, the five DPs (low-carbohydrate, low-fat, low-glycaemic index, Mediterranean diet and Dietary Approaches to Stop Hypertension diet), other DPs, the barriers and facilitators to DP advice provision and following this advice, and the factors affecting the provision of DP advice. Participants’ current practice of DP advice provision to patients with T2DM was perceived to be individualised and patient-centred. Participants discussed their current practice and perceptions of available evidence and how patients respond to advice on the DPs shown to be effective for glycaemic management. Several barriers to providing advice on specific DPs, including safety and compliance challenges, were identified. Participants also highlighted factors that would facilitate provision of advice on specific DPs and would help patients follow this advice, including social support, educational resources and more robust scientific evidence.

Conclusions: These findings provide important insights regarding dietitians’ views of promoting whole DPs to patients with T2DM. Emerged barriers and facilitators should be considered when developing future guidance for dietetic practice to support patients with following whole DPs for T2DM management.

Keywords: dietary patterns, dietitians, dietetic practice, type 2 diabetes, qualitative research; barriers and facilitators; glycaemic management.
Introduction

Diabetes mellitus affects 4.7 million people in the UK, 90% of whom have type 2 diabetes (T2DM)\(^1\). The National Health Service (NHS) spends at least £10 billion a year treating T2DM and its complications\(^1,2\). Following a suitable diet, that is feasible and sustainable, is crucial in the management of T2DM\(^3\). However, people with T2DM find dietary advice confusing and contradictory, and report that making healthy eating choices is challenging\(^4\). Therefore, national guidelines recommend that all people with T2DM should receive individualised dietary advice, which should be provided from a health professional with expertise in nutrition, such as registered dietitians (RDs)\(^2,3,5\), and highlight the importance of weight management and individualised total carbohydrate intake\(^2,6\).

A range of dietary patterns (DPs) may be effective in glycaemic management in patients with T2DM. A meta-analysis of 20 randomised controlled trials examined the effect of low-carbohydrate, vegetarian, vegan, low- glycaemic index (GI), high-fibre, Mediterranean, and high-protein diets in patients with T2DM\(^7\). The low-carbohydrate, low-GI, Mediterranean, and high-protein diets led to greater improvements in glycaemic management, as indicated by reductions in glycaated haemoglobin (HbA1c) of -0.12% [95% confidence intervals (CI): -0.24, -0.00%; \(P=0.04\)], -0.14% (95% CI: -0.23, -0.03%; \(P=0.008\)), -0.47% (95% CI: -0.64, -0.30%; \(P<0.00001\)), and -0.28% (95% CI: -0.38, -0.18%; \(P<0.00001\)), respectively, compared with control diets, with the largest effect size seen in the Mediterranean diet (MD)\(^7\). Similarly, a more recent meta-analysis of 56 randomised controlled trials in adults with T2DM, which compared nine dietary approaches [low-fat (<30% fat of total energy intake; high intake of cereals & grains; 10–15% protein intake), vegetarian, MD, high-protein (20% protein intake of total energy intake; high intake of animal and/or plant protein; <35% fat), moderate-carbohydrate (25–45% carbohydrates of total energy intake; 10–20% protein intake), low-carbohydrate (<25% carbohydrates of total energy intake; high intake of animal and/or plant protein; often high intake of fat), low-GI/glycaemic load, Palaeolithic], found that all approaches significantly reduce HbA1c; the low-carbohydrate diet was ranked as the best dietary approach for reducing HbA1c levels in the short-term (<12 months), followed by the MD and Palaeolithic diet\(^8\). In this analysis, the MD was ranked as the most effective DP to reduce fasting blood glucose levels and HbA1c concentrations in the longer term (\(\geq 12\) months)\(^8\).

In the absence of consistent evidence concerning which DP might produce more favourable results, the 2018 Diabetes UK (DUK) dietary guidelines suggest a Mediterranean-style diet, or equivalent healthy eating pattern, depending on patient choice\(^6\). The American Diabetes Association (ADA) additionally recommends the DASH (Dietary Approaches to Stop Hypertension) diet as a dietary
pattern with reasonable levels of evidence in terms of HbA1c reduction\(^9\). In contrast, the National Institute for Health and Care Excellence (NICE) states that dietary advice should emphasise healthy, balanced eating that is applicable to the general population\(^2\), which in the UK is portrayed by the Eatwell Guide and is generally low-fat\(^11\). As such, there is likely wide variation in the type of DP advice dietitians provide to adults with T2DM, but no study to date has explored this. This study, therefore, aimed to explore dietitians’: a) practices of DP advice provision to adults with T2DM; b) views around advising on DPs deemed effective for T2DM management or DPs recommended by current guidelines\(^2,6-8,10\), and; c) perceived barriers and facilitators around advice provision, and patients with T2DM following this advice.

**Materials and methods**

This qualitative study was conducted in June-August 2020 by experienced and trained researchers in qualitative methods and was approved by the [removed for blind peer review]. The study is reported following the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines\(^12\) (Supporting information, Table S1).

**Participants**

Participants were UK-based registered dietitians (RDs) and were recruited consecutively through the British Dietetic Association and national networks of dietitians, using a recruitment advertisement via e-mail, newsletters and social media. Dietitians were eligible to participate if they were registered with the UK Health and Care Professions Council and had clinical experience in consultations with adults with T2DM. Sixteen dietitians initially expressed interest and were sent an information sheet. Of these, three were excluded because they were not registered in the UK and one was not available for an interview; the remaining 12 dietitians took part in the study. As data collection and analysis proceeded in parallel, recruitment stopped as the range of views given was deemed sufficient to have reached data saturation\(^13\). Participants provided written informed consent before the interviews commenced and were entered into a prize draw to receive one of two £25 gift vouchers.

**Data Collection**

Semi-structured interviews, which lasted 34-55 minutes, were conducted and recorded using teleconferencing facilities. An interview guide was developed to explore topics that addressed the research objectives, while probes and follow-up questions were used to explore emerging themes in detail (Supporting information, Appendix S1)\(^14\). The questioning guide was piloted with a group of
RDs who did not participate in the study, to ensure comprehension and relevance of the questions. Feedback from this pilot formed the final questions, phrasing and formality of interview conduct.

The interview commenced with the interviewer (first author, a female MSc student with a BSc in dietetics, but not a registered dietitian in the UK) introducing herself and briefly summarising the research aims. A short demographic questionnaire was also completed (Supporting information, Appendix S2) and an ice-breaking question was asked to build rapport. Field notes were also kept to help follow up on important concepts and probe for more information. At the end of the interviews, a summary of the main points raised was provided to participants to confirm accuracy of notes and responses\(^{(15,16)}\). No repeat interviews were carried out.

We chose to focus the interviews on five DPs deemed effective for T2DM management by recent systematic reviews\(^{(7,8)}\), and/or those recommended by current guidelines\(^{(2,6,9,10)}\). As such, the low-fat diet was explored because both the NICE guidelines\(^{(2)}\) and the ADA 2019 consensus report\(^{(10)}\) identify it as a DP that improves cardiovascular risk markers, such as blood lipids and body weight, which are important for T2DM management. We explored the MD, as, according to the recent ADA and DUK statements, it is the DP with the strongest evidence for HbA1c reduction, and the DASH and low-carbohydrate diets, as both statements suggest these as DPs with ‘reasonable levels’ of evidence\(^{(6,9,10)}\). Finally, we explored the low-GI diet, because the NICE guidelines encourage the consumption of high-fibre, low-GI sources of carbohydrate in the diet\(^{(2)}\) and the ADA 2019 report states that, despite varying definitions of low- and high-GI foods, and no significant impact on HbA1c levels from two systematic reviews, ‘the use of the GI to rank foods according to their effect on glycaemia continues to be of interest for people with diabetes’\(^{(10)}\). In addition, the DUK 2018 guidelines identified the low-GI diet as exerting ‘clinically small, but statistically significant benefit for glycaemic control’\(^{(6)}\).

**Data Analysis**

Descriptive statistics (means, standard deviations, frequencies and percentages) were utilised to present participant demographic characteristics, using SPSS (IBM SPSS Statistics for Windows, version 24, Armonk, NY: IBM Corp, 2016).

Interviews were transcribed verbatim and anonymised. Data were analysed thematically\(^{(17)}\) using a deductive approach (guided by the research questions and interview guide), supplemented with themes that emerged inductively\(^{(18)}\), according to hermeneutic phenomenology\(^{(19)}\). One researcher (KEM) read all transcripts and formed a preliminary codebook, while the second (CG) independently
read and coded 10% of the transcripts to ensure trustworthiness of the process\textsuperscript{(16)}. A third researcher (AP) then validated all coding. Discrepancies were discussed and the codebook was refined. The codes were then organised into themes and sub-themes based on similarity and were reviewed to ensure coherence within and across themes\textsuperscript{(20, 21)}. NVivo software (version 12.0, QSR, Southport, UK, 2018) was used to facilitate the coding. Themes and sub-themes are illustrated with representative quotations from participants (P1-P12) that captured the diversity of responses\textsuperscript{(17)}.

**Results**

Interviews were conducted with 12 RDs (n=9 women), 33.3% of whom were diabetes specialists and 41.7% had >10 years of practice experience. Participant characteristics are presented in Table 1. Nine main themes were identified around DP advice provision to adults with T2DM (Supporting information, Figure S1).

**DP advice provision**

*Implementation in practice*

Overall, participants recognised the benefits of advising on whole DPs: ‘*Because as humans we don’t just eat individual nutrients. We eat combos of meals and they form holistic dietary patterns*’ (P4). Some participants highlighted that they instead provide advice on balanced eating, rather than DPs per se (‘... *when you sort of label a diet, it could become restrictive and ... changes that people make need to be for life if possible... that’s why we try to avoid saying ‘follow this specific diet’... We want people to be able to eat a varied diet...*’, P3), or that they combine aspects from different DPs when they provide advice (‘*I would go lower carb. I’d add elements of the Mediterranean diet and the types of fats, there’d be less salt... this is where we take the elements from the different diets and we bring them together*’, P7). Participants reported using various ways to provide advice on different DPs, such as explaining concepts and the nutrients and foods involved, using visual aids, pointing patients to credible websites/resources and suggesting practical tips (Supporting information, Table S2).

*Individualised approach*

All dietitians reported that the advice they provide is tailored to the individual patient, so that it suits specific needs and preferences: ‘*So, it’s just sort of adapting what they are doing and then looking at what approach may suit them with what skills they have...*’ (P7).

*Evidence-based advice*
A few participants also reported on the importance of providing evidence-based advice (‘There are myths and you have to provide the right information and the evidence behind it for the patients to understand and believe what you say’, P5).

**Low-carbohydrate diet**

**Implementation**

Most participants reported that their patients often ask about the low-carbohydrate diet: ‘It would be the most common question. They will walk in the door and say, ‘Should I do this? How do I do this?’...’ (P2). Interestingly, one participant mentioned that some patients assume they have to follow this DP: ‘I’d say they come in with the assumption that they’re going to be told that that’s what they need to do’ (P4). Although all participants were familiar with this DP, their reports of its implementation in practice varied. Some would provide options to patients: ‘I will provide different options and if that person decides that’s what they want to do... we’ll talk about the practicalities of it and how they can follow it healthily’ (P2); others would focus on increasing carbohydrate awareness: ‘So, I tend to do a lot of carbohydrate awareness... We wouldn’t necessarily put people on a low-carbohydrate diet, but we’d make them go in that direction...’ (P7); while others would often reduce carbohydrate intake because patients already consume high quantities: ‘... 9 times out of 10, I am reducing carbohydrates in someone’s plan because they overconsume’ (P10). Nevertheless, some participants would not actively promote this DP to their patients: ‘It can be beneficial to some, but I would not promote it... low-carb diets tend to have higher amounts of lipids... I would provide advice on it as an alternative, but I am not fan of it’ (P5).

**Available evidence**

With regards to the available scientific evidence, some participants seemed convinced by the evidence in the short term (‘As a short-term diet, it’s not wrong and as we know it can help with weight loss and glycaemic control’, P3), while others appeared more sceptical (‘So far, there is not very good evidence because it’s a new thing’, P11).

**Perceived patient response**

Participants’ perceptions were mixed regarding how their patients respond to this DP. Some reported good acceptability (‘Some people, they take it and they are away, they are flying and it’s a new way of life that has reduced their medications, their symptoms, they feel better. So, yeah, everyone is completely different with it’, P2), while others found that patients thought it is challenging (‘... when we tell them what it looks like they will often say ‘Uh, I can’t do it’. Because with family, work issues... it’s not realistic’, P1).
Low-fat diet

Implementation

Participants’ practice regarding advising on the low-fat diet varied, with approximately half not being keen on this DP (‘... it isn’t something I have ever worked with... because we know of the benefits of PUFAs and MUFAs... I don’t see that is conducive to a nutritious diet to be cutting those things out...’, P12) and a few advising on cutting down on fat (‘I would always discuss with patients their cholesterol levels... that would then lead to talking about fat and looking at what we can cut down if that’s appropriate for them’, P3). Most reported that their patients do not specifically ask them about the low-fat diet (‘... they would have questions like ‘how does butter affect my diabetes?’ So, they’ll start to make that connection, but I wouldn’t say that they would ask for a low-fat diet’, P4), but some expressed that their patients would enquire about low-fat products (‘Especially a lot of my older patients and a lot of the guidance is quite of historic and they can think back in the 90’s, when everything was low-fat... they kind of hold on to that’, P10).

Available evidence

Several participants perceived there is sufficient evidence to support advice provision on this DP: ‘... that’s the evidence that we go with, in terms of the NICE guidelines and with Diabetes UK and the Eatwell Guide, it’s safe and it suits everyone’ (P1). Some also emphasised how this evidence has been available since previous decades (‘It’s kind of traditional advice that has been recommended’, P9), with one participant being particularly sceptical (‘We’ve been through that low-fat diet for 30 years now and we don’t see any kind of results’, P11).

Perceived patient response

Participants generally perceived that their patients are accepting of advice to cut down fat from their diet, depending on motivation (‘I find people to be fairly accepting if they are motivated’, P6), research they might have done (‘I think they receive that fairly well unless they’ve done research themselves and they’d like to follow this high-fat/low-carb diet’, P3) and their current intake and preferences (‘If they were the type of person who likes meat... they would probably struggle with that approach... It depends a little on their baseline diet’, P7).

Low-GI diet

Implementation

Some participants reported that they always discussed the concept of the low-GI diet (‘We’d always introduce the concept... after outlining carbohydrate awareness and looking at portion sizes, then we
definitely discuss the low-GI or the GI of foods...’, P4), others discussed the diet as a general concept (‘I do provide advice around low-GI foods, I guess. I just don’t paint it as the low-GI diet’, P6), and a few did not provide advice on this DP (‘It wouldn’t be my first choice... it can be a bit complicated’, P12). Two participants reported that they had never been asked about this DP by their patients (‘No, literally no one’, P10), while others received questions by some of their patients (‘Yeah, I’ve had people ask about it in the past’, P12).

Available evidence
Participants largely perceived there is sufficient scientific evidence available to support advice provision on the low-GI diet: ‘There’s no doubt that large amounts of a high GI food would influence blood glucose. So, you have confidence in that’ (P2). A few participants, however, thought that the evidence was not consistent: ‘... it has always been a bit varied to how beneficial the low-GI is’ (P3).

Perceived patient response
Although some participants perceived that patients generally take on board the low-GI diet recommendations (‘It’s received well from the most people I speak to’, P10), others reported that some patients find it difficult to comprehend the details of this concept: ‘When you start talking about the other things that can impact your GI and what you serve it with, with your component of fat for example, that can be a little bit complicated for some people’ (P12).

Mediterranean diet
Implementation
Overall, participants reported that they advocate the MD (‘It’s something that I do promote quite a lot because the evidence is clear for me and that’s really important’, P10), or elements of it, even if they don’t name it as such (‘... we talk about the aspects of it but don’t always necessarily call it the Mediterranean diet, even though it’s pretty much the advice that I would sort of recommend’, P3). They generally described the MD as balanced and potentially the most sustainable DP (‘... because it would be small, sustainable changes...’, P6). Participants largely reported that their patients ask them about the MD (‘People are still bringing it up and are still asking about it’, P4) or that they are already familiar with it (‘They are already familiar with the term or they kind of got an idea of what it entails’, P6).

Available evidence
Most participants considered the MD to be effective, since the available evidence and guidelines suggest so: ‘I think all evidence is there at the moment to say that we can [promote the MD]. I believe
the NICE guidelines, DUK promote it’ (P1). A few, however, were unsure about the evidence specifically for T2DM: ‘I know there’s a lot of cardiovascular benefits… with diabetes I’m not sure…’ (P3).

Perceived patient response
When asked about how patients respond to MD advice, perceptions were mixed. Some thought that patients receive the information fairly well (‘They think it sounds really exotic and they’re really keen… It’s definitely something that captures the imagination, the interest of people’, P4), but highlighted that this would depend on the individual (‘… it’s fairly well-received, I think. Again, it depends on how big the changes are for people’, P3). Others, however, perceived that some patients find the prospect of following this DP challenging (‘Not the concept, but the ‘doing’’, P2).

DASH diet
Implementation
Most participants said that the DASH diet is not specifically named in their practice (‘Not named as the DASH diet, no… I wouldn’t say ‘this is the DASH diet, and this is what we are going to do’, P9). However, they would likely use some aspects of the diet in their consultations (‘We encourage people to limit salt, but we don’t go into specific advice about the DASH diet’, P1). Some participants further reported how they had discussed the diet with patients (‘If someone was really engaged, I’ve had in the past given them links, if they wanted to do some research on that approach’, P9). General familiarity with the DASH diet also varied among participants (‘I’m not very familiar with the DASH diet. I haven’t read in an extent… to feel confident enough to provide advice on that’, P11), but they all reported that none of their patients with T2DM had ever asked them about this DP: ‘In seven years, I’ve never had anyone ask’ (P10).

Available evidence
Some participants further perceived that the evidence linking this DP to T2DM is insufficient (‘I don’t think there is enough evidence to show that the DASH diet alone would manage diabetes, because its focus is mainly on salt and not carbohydrates’, P1), while others were more convinced by the available literature (‘… there is very good research isn’t it? Benefits about the DASH diet for people with T2DM, particularly for cardiovascular outcomes and potentially weight management…’, P3).

Perceived patient response
Participants’ perceptions of how patients respond to the DASH diet were mixed. They largely
expressed that this depended on the individual, with some perceiving that advice was ‘easy to understand’ (P6), and others that recommended dietary changes were challenging (‘The reality of a client completely shifting their diet to follow something like that, it’s unrealistic’, P2; ‘... it depends on the patient’s diet. If they consume sodium-rich foods, it will be really difficult for them’, P5).

Other DPs
Some participants discussed other dietary approaches for T2DM management. Intermittent fasting for glycaemic control was mentioned by three participants (‘There is consensus and obviously evidence that some aspects of intermittent fasting can also help’, P10). Four participants discussed a recent shift of interest towards low- or very low-calorie diets (‘... if they need to manage their blood glucose, they need to control their weight... So, we put some of them at total meal replacement as a start and then we’ll look at every other aspect... helps with putting diabetes on remission’, P8). Participants would only provide advice on realistic and safe implementation of these DPs (‘If somebody wants to try a very low-calorie diet, I’ll try to help them and obviously explain a little bit around the challenges of it...’, P6).

One dietitian briefly stated that vegetarian and ketogenic diets can be beneficial for T2DM management (‘Vegetarian diet of course... Also, I forgot to mention the ketogenic diet’, P11), although they did not advocate the latter due to safety concerns (‘I don’t use the very low because of safety issues’, P11).

When participants were asked to reflect on which DP they think might be more effective for T2DM management and which one their patients find more acceptable, based on their experience, responses varied widely, and all the aforenamed DPs were mentioned. Overall, however, there was agreement for an individualised approach (‘The more I work with people, the more I believe that something needs to be tailored to that individual’, P9; ‘I think we all hold on to our ‘favourites’ and as long as the evidence is behind it and we see good results and it is well received by patients, then that’s fine’, P10).

Barriers and facilitators
A common barrier to providing advice on the different DPs was safety. This referred to concomitant medications (‘We need to make sure we modify the medications if required...’, P4; ‘I wouldn’t necessarily [base my decision on medication] because medical treatment can be adapted... The only time it can be limiting is if someone is on biphasic insulin and they need to keep their carbohydrate very consistent...’, P7), comorbidities (‘... we need to be careful if anyone has renal disease with
diabetes...’, P4; ‘It depends on other clinical conditions they might have... if they have hypertension, I might choose the DASH diet’, P5), dietary quality (‘Is it something that has fat removed, but sugar added in to improve flavour?’ , P12) and health implications (‘... who is to know if they are having higher fat intake, whether the cholesterol levels are under control’, P1). Other common barriers included long-term adherence (‘Can they implement it in the long term?’ , P5), and practicalities, such as cost (‘... something can be a little bit more expensive for some people and that can be a big barrier’, P6) (Table 2).

Participants also highlighted factors that would facilitate provision of advice on specific DPs and would help patients follow the advice, including social support (‘... if they’ve got good social support, like a network around... it can work quite well’, P7), educational resources (‘... anything that can translate evidence to a message that patients can understand would be beneficial’, P12), availability of practical advice (‘Recipe ideas and example of meals would help and that seems what people are after’, P4) and more robust scientific evidence (‘Unless there was a really robust well-designed RCT trial... that would make me change my practice’, P2) (Table 2). A detailed report of barriers and facilitators for each DP discussed is presented in Supplementary information, Table S3.

Other factors affecting the provision of DP advice
Another factor affecting participants’ provision of DP advice was patient motivation or commitment (‘People have their own motivations for wanting to change and I would try and tap into that to use as encouragement to make the changes’, P3). Further, participants based decisions on patients’ individual circumstances, such as age (‘I find that younger patients can be less compliant because it can interrupt with normal things they do’, P10), preferences (‘... patients might have one of these approaches preferred so you may go with that’, P7), cultural background (‘... it does depend on how people eat culturally and whether or not they would identify with [that diet]’, P9), what their current eating habits are (‘... it really depends on the dietary pattern of that person’, P12), how long they have had T2DM (‘I find that patients can be very compliant when they are newly diagnosed’, P10), and their exposure to nutrition information (‘... if it’s not something that they would like to hear or they have heard the opposite from the internet or influencers... they still question your evidence and it is really difficult to ‘fight’ in a world that there’s so much misconception and misinformation around dietetics’, P5).

Discussion
This qualitative study among RDs in the UK showed that participants’ practice with regards to providing advice on DPs to patients with T2DM is perceived to be individualised and tailored to each
Participants provided important insights on advising on, and their views of the available evidence for, the specific DPs deemed effective, or recommended for glycaemic management(7, 8, 22) and shared their experiences and views on how their patients respond to advice on these DPs. Several barriers and facilitators to provision of advice on these DPs, and to patients following this advice, emerged from the interviews. These issues are essential to inform practice guidance for dietitians in supporting patients with following whole DPs for T2DM management.

The findings suggest that, depending on their interpretation of the evidence, patients’ needs, existing dietary habits, circumstances and queries, RDs adapted or combined elements from DPs to support patients with T2DM management. This might be due to the individualised approach they perceived to be taking, but also the different perceived barriers and facilitators for each DP. This was corroborated by participants reporting several factors they take into account when providing advice, such as patient motivation or commitment, individual circumstances, such as age, preferences, cultural background and current eating habits, and how long they have had T2DM. For example, it is noteworthy that one participant said they ‘would choose the DASH diet if a patient had hypertension’ but another said that they would not advise a patient to have multigrains if they also had inflammatory bowel syndrome. Nevertheless, the potential implications on clinical outcomes of such an approach (using some aspects of a specific DP or combining aspects of different DPs when providing advice for glycaemic management) should be investigated in future studies. This is because it is uncertain whether advising patients to follow only some aspects of a DP would produce the same effects, compared to advising on following the whole DP, although evidence from the Early Activity in Diabetes study (Early-ACTID) indicates that a non-prescriptive, individualised dietary intervention can be successful(23). The variety of guidelines(2, 6, 9, 10) also needs to be taken into account when considering this issue, as this might mean that dietitians do provide evidence-based DP advice, but that the type of advice might vary widely. However, there was perceived unawareness or uncertainty around the scientific evidence for some DPs, and its translation to practice guidelines. The perceived lack of a robust evidence base and guidelines has also been acknowledged as a reason for not integrating MD advice in routine practice for management of chronic conditions among Australian dietitians(24). In the current study, many dietitians perceived that more robust evidence, especially from long-term studies examining the effect of specific DPs, would help to include them more widely in their practice with patients with T2DM.

The availability of educational resources, for both dietitians and patients, might also help the implementation of available evidence on DPs into practice. Participants discussed how awareness and availability of better, and properly tested, resources would be helpful to them when providing advice
on DPs, and aid their patients with following this advice. In particular, they highlighted that educational resources, for example mobile phone apps that offer visual content, clear, concise messages and tips (e.g. recipes, menu plans, food swaps) would facilitate the understanding of specific DP concepts by patients. This agrees with a recent study, which showed that dietitians would welcome patient education materials that are visually appealing, user friendly and contain recipes, information on low-cost alternatives and tips for practical adaptation to current eating habits\(^{(24)}\). As the integration of nutrition apps in dietetic practice is high\(^{(25)}\), delivery of DP resources through well-designed smartphone apps might facilitate advice provision and patient take-up of the advice\(^{(26)}\).

This could be an important intervention to support patients to follow whole DPs, particularly if appropriate training is provided to dietitians to make apps an integral part of their practice\(^{(25)}\). This training should also incorporate education on DPs, to enhance dietitians’ confidence in providing DP advice. Indeed, several participants in the current study would welcome further training to deliver advice on specific DPs, such as the low-carbohydrate diet, and earlier research showed that dietitians thought professional development would enable them to provide advice on the MD\(^{(24)}\).

Social and professional support, as well as commitment and motivation, were identified as perceived facilitators of patients following specific DP advice, particularly advice on the low-carbohydrate diet and the MD. Social support, including that offered by health professionals, has been suggested to positively influence adherence to dietary guidelines\(^{(27)}\) and the low-carbohydrate diet\(^{(28)}\), and facilitate lifestyle modifications\(^{(29)}\) among patients with T2DM, whereas lack of social support has been a perceived barrier to patients implementing the MD in a survey of Australian dietitians\(^{(24)}\).

Social support might be particularly important when patients are less motivated to change, and, alongside commitment and motivation, may facilitate better dietary adherence in adults with T2DM\(^{(29)}\). Future strategies to enhance adherence to whole DPs by patients with T2DM should include components that aim to build autonomous motivation, such as motivational interviewing consultations\(^{(30,31)}\), and develop social support mechanisms to further facilitate patients follow DP advice.

Several barriers around DP advice provision emerged across the majority of DPs explored in this study. The overarching barrier was safety of the DP in question, where participants discussed the importance of considering patients’ pharmacological treatment, existing comorbidities, overall dietary quality and substitution patterns, as well as considering any health implications, such as eating disorders resulting from more ‘restrictive’ DPs. These findings are consistent with earlier research among dietitians on perceived barriers of the low-carbohydrate diet\(^{(28)}\), and confirm the need to adapt effective DPs to individual circumstances\(^{(6,32)}\). Medicines management, in particular, should be
included in RDs’ professional development training to enhance their confidence with advising patients about their medicines to overcome these barriers. Another overarching perceived barrier was adhering to DPs in the long term, particularly for the low-carbohydrate, low-GI, and low-fat diets. Adherence to DPs declines over time\(^{(33, 34)}\), so it is crucial to develop strategies that would aid dietitians support their patients with following advice in the long-term, if effective DPs were to be promoted\(^{(24)}\).

Other barriers were linked to dietitians’ experiences of patient response to DP advice and included practicalities, such as cost, and concerns related to psychosocial factors, such as habits, preferences and relevance. Cost and preferences have been reported as perceived concerns when providing advice on the low-carbohydrate diet in earlier research\(^{(28)}\) and are well-documented barriers to providing advice on the MD\(^{(24)}\), but also adhering to the MD in non-Mediterranean regions, including England\(^{(35-37)}\). Relevance to the target population was particularly important for dietitians considering advising on the MD and the DASH diet, especially when working with people from diverse cultural backgrounds. These findings emphasise the need for resources that will aid dietitians when promoting whole DPs to their patients, by providing low-cost alternatives and recipes, practical tips to improve taste and preferences and adaptations of DPs to cultural and personal characteristics\(^{(24, 28, 38)}\).

Several participants expressed concerns about specific DPs, with regards to inconsistent definitions (low-carbohydrate diet), challenging concepts (low-GI diet) and dietary messages (DASH and low-calorie diets), and conflicting messages (low-carbohydrate and low-fat diets). Despite a consensus definition of different types of low-carbohydrate diets\(^{(9, 39)}\), it might be that clearer guidance should be provided to both dietitians and patients on what constitutes very low and low carbohydrate intake, so that they make appropriate and tailored decisions on this DP. The DASH diet has been recommended by the American Diabetes Association as one of the effective DPs for glycaemic management\(^{(9)}\), and by Diabetes UK as an ‘equivalent healthy eating pattern’ to the MD\(^{(6)}\), however dietitians in the current study largely perceived it not to be relevant for T2DM management. Mixed messages about nutrition from both media and healthcare professionals over the last few decades have resulted in confusion over what constitutes a healthy dietary approach\(^{(4, 40)}\), which makes the need for clearer guidelines for T2DM, and their communication by dietitians, imperative.

**Strengths and limitations**

This is the first study to explore dietitians’ practice in giving DP advice for the management of T2DM, thus adding to previous research about dietitians’ practice of giving carbohydrate advice\(^{(41)}\). Additional strengths include the use of rigorous methodology, according to current guidelines of
A range of DPs, deemed to be effective for, or recommended for glycaemic management\(^{(2, 6-10, 22)}\) were explored, allowing findings to inform the development of guidance on DPs that should be of current interest to dietitians and patients alike. Similar to earlier research\(^{(28, 41)}\), we recruited participants from existing national networks of RDs who have expertise in T2DM consultations to gain a wide range of insights on practice and views around DP advice provision, specifically for the management of this condition.

Nevertheless, some limitations need to be noted, including the relatively small sample size, which was potentially the result of the study being conducted during the COVID-19 pandemic, when competing priorities, coupled with increased workloads, might have hindered the capacity of dietitians to participate in research. We therefore cannot suggest that the current findings represent the practice and views of all RDs with clinical experience in consulting adults with T2DM in the UK\(^{(6)}\). We also did not gather data about the ethnicity and demographics of each RD’s caseload, which can vary considerably based on geographical location in the UK. Nevertheless, recruitment stopped once a range of views were given, and satisfactory replication of responses within themes and sub-themes was identified that was deemed sufficient to have reached data saturation\(^{(13)}\), thus enhancing trustworthiness of the findings\(^{(16)}\). Further, we did not conduct member checking; however, participants were provided with a summary of their responses at the end of each interview to confirm accuracy of the findings\(^{(16)}\). Finally, we did not explore perceptions on vegetarian or vegan diets despite there being reasonable levels of evidence for T2DM management\(^{(8-10)}\), due to broad definitions of these dietary approaches that might result in different health outcomes\(^{(10)}\). We also did not explore perceptions on the Palaeolithic diet, as according to the ADA 2019 consensus report, results for this dietary approach are still mixed and the evidence is inconclusive\(^{(10)}\). Finally, we did not specifically explore perceptions around the low- or very-low calorie diets, as these were not reviewed in the ADA 2019 consensus report\(^{(10)}\) nor identified as a dietary approach to recommend for glycaemic management of T2DM in the Diabetes UK guidelines\(^{(6)}\). Future research could explore dietitians’ perceptions on providing advice on these dietary approaches due to their potential for T2DM remission, in order to further understand the translation of scientific research into clinical practice.

**Conclusions**

Dietary patterns form the foundation of dietary guidelines and should be incorporated into dietetic practice, while carefully integrating the complex interconnections of foods and nutrients\(^{(42)}\). This qualitative study provides novel insights into the practice and views of dietitians in the UK in advising people with T2DM on whole DPs. Emerged barriers and facilitators to providing advice on
DPs should be acknowledged when developing future practice guidance and professional development for dietitians, and should be addressed when designing interventions to help patients adhere to whole DPs for T2DM management.

Transparency declaration
The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The reporting of this work is compliant with COREQ guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.
## Table 1: Participant characteristics

<table>
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<th>n (%)</th>
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<td>25-34</td>
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<td>&lt;1</td>
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<td>Setting</td>
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BSc, Bachelor of Science; MSc, Master of Science; BDA, British Dietetic Association; DUK, Diabetes UK; ESPEN, European Society for Clinical Nutrition and Metabolism; NHS, National Health Service; T2DM, Type 2 diabetes.
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<th>Facilitators</th>
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<td>- Commitment</td>
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<td>- Low-carbohydrate vs. ketogenic diet messages</td>
<td>- Training for dietitians</td>
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<td>- Cost</td>
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<tr>
<td></td>
<td>- Restrictive diet</td>
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<td>- Habit</td>
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<td>Low-fat diet</td>
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<td>- Media promotion and conflicting messages</td>
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<td>- Restrictive diet</td>
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</tr>
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<td>Low-GI diet</td>
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<td>Dietary Pattern</td>
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DASH, Dietary Approaches to Stop Hypertension; GI, glycaemic index.
<table>
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<th>Page</th>
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<td>Which author/s conducted the interview or focus group?</td>
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<td>3</td>
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<tr>
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<td>Gender</td>
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<td>Experience and training</td>
<td>What experience or training did the researcher have?</td>
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<td>Was a relationship established prior to study commencement?</td>
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<td>7</td>
<td>Participant knowledge of the</td>
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<td>What characteristics were reported about the interviewer/facilitator? <em>E.g. Bias, assumptions, reasons and interests in the research topic</em></td>
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**Domain 1: Research team and reflexivity**

**Personal Characteristics**

**Relationship with participants**

**Domain 2: study design**

**Theoretical framework**
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<td>What methodological orientation was stated to underpin the study? <em>e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis</em></td>
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<td>How many people refused to participate or dropped out? Reasons?</td>
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<td>Where was the data collected? <em>e.g. home, clinic, workplace</em></td>
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<td>Presence of non-participants</td>
<td>Was anyone else present besides the participants and researchers?</td>
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<td>Guide questions/description</td>
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**Domain 3: analysis and findings**

**Data analysis**

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**Reporting**

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<td>31.</td>
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</table>
Appendix S1: Interview guide

1. So, tell me how did you decide to work with patients/people with T2DM?

2. Regarding T2DM, patients need to manage blood glucose levels in order to delay or prevent complications. How would you summarise current key guidelines in the UK for managing hyperglycemia? (Current UK guidelines for the management of type 2 diabetes (T2DM) emphasise on the importance of weight management and individualised total carbohydrate intake with an emphasis on lower glycaemic index and higher fibre foods.)

   2.1 I would be interested in discussing dietary patterns with you. What’s your understanding of the term “dietary patterns”?
   2.2 What are your views on promoting whole dietary patterns, instead of focusing advice on macronutrients such as carbohydrates?
   2.3 Are you aware of any dietary patterns that have been shown to be particularly effective in glycemic control in patients with T2DM?
      - Follow-up: Which ones are you aware of? / Can you give me an example?
      - Probe: The low-fat diet, the Med diet, others?

2.4 Do you currently give any advice on dietary patterns to patients with T2DM?
   - Follow-up: Which one?
   - Follow-up: Can you give me an example of what advice you give on dietary patterns, and how you provide that information to your patients?
      - Probe: How much detail do you go into (is there a specific structure)? Do you provide information on foods, portion sizes, other? Do you provide illustrations (e.g. Med Diet pyramid) or leaflets?

3. I would like us next to focus on several dietary patterns which have all been shown to be effective on glycaemic control in patients with T2DM. Let’s start with the low-fat diet.

3.1 What does a low-fat diet mean/look like to you?
3.2 Can you tell me about your experiences with the low-fat diet with patients with T2DM?
3.3 How likely are you/ How often do you provide advice on the low-fat diet to patients with T2DM?
   - Follow-up: If yes, why? If no, why not?
3.3.1 Do your patients with T2DM ask about the low-fat diet?
   - Follow-up: If they do, what type of advice do you give?
3.3.2 How do you find patients perceive this information? / What is their reaction to it?
   - Probe: Do you think they find it challenging/easy?

3.4 (If they don’t provide advice on this dietary pattern)
   If you were asked to promote the low-fat diet to your patients, as one of the effective dietary patterns, how would you feel about it?
   - Follow-up: Would you find it easy to do so? Why is that?
   - Follow-up: Would you find it, or specific aspects of it, challenging? Why is that?
   - Follow-up: Are there things that could help you encourage your patients to follow this dietary pattern?
      - Probe: (Clearer) guidelines, training, more convincing evidence, leaflets to give your patients, other resources?

(If they provide advice on this dietary pattern)
What is your experience when promoting the low-fat diet?
   - Follow-up: What about your patients? What type of advice do you think would increase the chances for your patients to follow a low-fat diet?
3.5 (If they don’t provide advice on this dietary pattern)
What would it take to promote the low-fat diet to your patients regarding evidence and current literature?

3.6 Do you think the evidence on the benefits of the low-fat diet on glycemic control is sufficient?

- **Follow-up:** What about it being convincing? Do you think we need to know more before promoting this pattern more widely?
- **Follow-up:** What do we need to know? What are the gaps in the literature?
- **Follow up:** Are there any potential safety issues?
- **Follow up:** From your experience, are there potential acceptability issues from the patient’s perspective?

4. Research also suggests that the low-glycemic index (GI) diet leads to improvements in glycaemic control, therefore better management of T2DM.

4.1 What does a low-GI diet mean / look like to you?

4.2 Can you tell me about your experiences with the low-GI diet with patients with T2DM?

4.3 How likely are you/ How often do you provide advice on the low-GI diet to patients with T2DM?

- **Follow up:** If yes, why? If no, why not?

4.3.1 Do your patients with T2DM ask about the low-GI diet?

- **Follow up:** If they do, what type of advice do you give?

4.3.2 How do you find patients perceive this information? / What is their reaction to it?

- **Probe:** Do you think they find it challenging/easy?

4.4 (If they don’t provide advice on this dietary pattern)
If you were asked to promote the low-GI diet to your patients, as one of the effective dietary patterns, how would you feel about it?

- **Follow up:** Would you find it easy to do so? Why is that?
- **Follow up:** Would you find it, or specific aspects of it, challenging? Why is that?
- **Follow-up:** Are there things that could help you encourage your patients to follow this dietary pattern?
  - **Probe:** (Clearer) guidelines, training, more convincing evidence, leaflets to give your patients, other resources?

(If they provide advice on this dietary pattern)

What is your experience when promoting the low-GI diet?

- **Follow-up:** What about your patients? What type of advice do you think would increase the chances for your patients to follow a low-GI diet?

4.5 (If they don’t provide advice on this dietary pattern)
What would it take to promote the low-GI diet to your patients regarding evidence and current literature?

4.6 Do you think the evidence on the benefits of the low-GI diet on glycemic control is sufficient?

- **Follow-up:** What about it being convincing? Do you think we need to know more before promoting this pattern more widely?
- **Follow-up:** What do we need to know? What are the gaps in the literature?
- **Follow up:** Are there any potential safety issues?
- **Follow up:** From your experience, are there potential acceptability issues from the patient’s perspective?

5. A recent report by the American Diabetes Association, recommends the DASH (Dietary Approaches to Stop Hypertension) diet among others, as a dietary pattern which can possibly reduce average blood glucose levels.

5.1 What does the DASH diet mean / look like to you?
5.2 Can you tell me about your experiences with the DASH diet with patients with T2DM?

5.3 How likely are you/ How often do you provide advice on the DASH diet to patients with T2DM?
   • **Follow up:** If yes, why? If no, why not?

5.3.1 Do your patients with T2DM ask about the DASH diet?
   • **Follow up:** If they do, what type of advice do you give?

5.3.2 How do you find patients perceive this information? / What is their reaction to it?
   o **Probe:** Do you think they find it challenging/easy?

5.4 (If they don’t provide advice on this dietary pattern)
   If you were asked to promote the DASH diet to your patients, as one of the effective dietary patterns, how would you feel about it?
   • **Follow up:** Would you find it easy to do so? Why is that?
   • **Follow up:** Would you find it, or specific aspects of it, challenging? Why is that?
   • **Follow up:** Are there things that could help you encourage your patients to follow this dietary pattern?
   o **Probe:** (Clearer) guidelines, training, more convincing evidence, leaflets to give your patients, other resources?

(If they provide advice on this dietary pattern)
What is your experience when promoting the DASH diet?
   • **Follow-up:** What about your patients? What type of advice do you think would increase the chances for your patients to follow DASH diet?

5.5 (If they don’t provide advice on this dietary pattern)
What would it take to promote the DASH diet to your patients regarding evidence and current literature?

5.6 Do you think the evidence on the benefits of the DASH diet on glycemic control is sufficient?
   • **Follow-up:** What about it being convincing? Do you think we need to know more before promoting this pattern more widely?
   • **Follow-up:** What do we need to know? What are the gaps in the literature?
   • **Follow up:** Are there any potential safety issues?
   • **Follow up:** From your experience, are there potential acceptability issues from the patient’s perspective?

6. There’s one more dietary pattern that I’d like your thoughts on, and that’s the Mediterranean diet.

6.1 What does the Mediterranean diet mean / look like to you?

6.2 Can you tell me about your experiences with the Mediterranean diet with patients with T2DM?

6.3 How likely are you/ How often do you provide advice on the Mediterranean diet to patients with T2DM?
   • **Follow up:** If yes, why? If no, why not?

6.3.1 Do your patients with T2DM ask about the Mediterranean diet?
   • **Follow up:** If they do, what type of advice do you give?

6.3.2 How do you find patients perceive this information? / What is their reaction to it?
   o **Probe:** Do you think they find it challenging/easy?

6.4 (If they don’t provide advice on this dietary pattern)
If you were asked to promote the Mediterranean diet to your patients, as one of the effective dietary patterns, how would you feel about it?
   • **Follow up:** Would you find it easy to do so? Why is that?
   • **Follow up:** Would you find it, or specific aspects of it, challenging? Why is that?
Follow-up: Are there things that could help you encourage your patients to follow this dietary pattern?
  ○ Probe: (Clearer) guidelines, training, more convincing evidence, leaflets to give your patients, other resources?

(If they provide advice on this dietary pattern)
What is your experience when promoting the Mediterranean diet?
  • Follow-up: What about your patients? What type of advice do you think would increase the chances for your patients to follow the Mediterranean diet?

6.5 (If they don’t provide advice on this dietary pattern)
What would it take to promote the Mediterranean diet to your patients regarding evidence and current literature?

6.6 Do you think the evidence on the benefits of the Mediterranean diet on glycaemic control is sufficient?
  • Follow-up: What about it being convincing? Do you think we need to know more before promoting this pattern more widely?
  • Follow-up: What do we need to know? What are the gaps in the literature?
  • Follow up: Are there any potential safety issues?
  • Follow up: From your experience, are there potential acceptability issues from the patient’s perspective?

7. Another dietary pattern, which is deemed to be an effective dietary approach for reducing glycosylated haemoglobin (HbA1c) is the low-carbohydrate (and/or high-protein) diet. [‘low’ (50-130g per day) or ‘very low’ (<50g per day): be prepared to gather different information about each scenario]

7.1 What does a low-carbohydrate diet mean / look like to you?
7.2 Can you tell me about your experiences with the low-carbohydrate diet with patients with T2DM?
7.3 How likely are you/ How often do you provide advice on the low-carbohydrate diet to patients with T2DM?
  • Follow up: If yes, why? If no, why not?

7.3.1 Do your patients with T2DM ask about the low-carbohydrate diet?
  • Follow up: If they do, what type of advice do you give?

7.3.2 How do you find patients perceive this information? / What is their reaction to it?
  ○ Probe: Do you think they find it challenging/easy?

7.4 (If they don’t provide advice on this dietary pattern)
If you were asked to promote the low-carbohydrate diet to your patients, as one of the effective dietary patterns, how would you feel about it?
  • Follow up: Would you find it easy to do so? Why is that?
  • Follow up: Would you find it, or specific aspects of it, challenging? Why is that?
  • Follow-up: Are there things that could help you encourage your patients to follow this dietary pattern?
    ○ Probe: (Clearer) guidelines, training, more convincing evidence, leaflets to give your patients, other resources?

(If they provide advice on this dietary pattern)
What is your experience when promoting the low-carbohydrate diet?
  • Follow-up: What about your patients? What type of advice do you think would increase the chances for your patients to follow a low-fat diet?

7.5 (If they don’t provide advice on this dietary pattern)
What would it take to promote the low-carbohydrate diet to your patients regarding evidence and current literature?
7.6 Do you think the evidence on the benefits of the low-carbohydrate diet on glycemic control is sufficient?
- **Follow-up:** What about it being convincing? Do you think we need to know more before promoting this pattern more widely?
- **Follow-up:** What do we need to know? What are the gaps in the literature?
- **Follow up:** Are there any potential safety issues?
  - **Follow up:** From your experience, are there potential acceptability issues from the patient’s perspective?

8. So, we’ve looked at 5 different dietary patterns that have all been found to help with glycaemic control, the low-fat diet, the low carbohydrate diet, the low glycaemic index diet, the Dietary Approaches to Stop Hypertension (DASH) diet and the Mediterranean diet.

8.1 Do you/Would you provide different type of advice on dietary patterns to patients with T2DM based on their medical treatment? **OR** What would influence your choice of dietary pattern for advising patients with T2DM?

8.2 From your experience, which dietary pattern would you say might be the most effective for T2DM management?
- **Follow-up:** Why?
- **Follow-up:** Which do you think your patients might find more acceptable/easier to follow? Why?
  - **Probe:** Think of issues like adherence in the long term, suitability for everyday habits, eating out etc.?

9. Is there anything else that you would like to add? **(OR** Are there any topics you’d like to discuss which we haven’t covered?)
Appendix S2: Demographic questionnaire

This questionnaire aims to collect basic demographic and professional information about you. Your answers to the following questions will be used for research purposes only and will be kept strictly confidential.

1. Gender: □ Female □ Male

2. Age:
   □ 18-24 years old
   □ 25-34 years old
   □ 35-44 years old
   □ 45-54 years old
   □ 55-64 years old
   □ 65 years or older

3. Education: □ Bachelor’s degree □ Master’s degree □ Doctorate degree

4. Professional Memberships (you can choose more than one option):
   □ British Dietetic Association (BDA)
   □ Diabetes UK (DUK)
   □ Other: ______________________

5. Job title: _________________________________

6. NHS pay band (if applicable): □ Band 5 □ Band 6 □ Band 7 □ Band 8 (a-d)
   □ Non-NHS/Not applicable

7. Years of qualification as a Registered Dietitian: □ Less than 12 months □ 1-3 years □ 4-6 years □ 7-9 years □ 10 years and more

8. Are you a Diabetes Specialist Dietitian (DSD): □ Yes □ No

9. Where did you undertake your Dietetic training? □ UK □ Overseas

10. In which country or region of the UK do you currently work?
   □ England – South West
   □ England – South East
   □ England – Midlands
   □ England – North East
   □ England – North West
   □ Scotland – Borders
☐ Scotland- Central  
☐ Scotland – Highlands & Islands  
☐ Wales  
☐ Northern Ireland  
☐ Channel Islands  
☐ Other (please specify):  __________________________________________

11. Number of patients with type 2 diabetes seen per week: _______________________

12. Practice Setting (you can choose more than one option):

☐ Outpatient  
☐ Hospital- Inpatient  
☐ Community centres/clinics  
☐ Private Practice  
☐ Online  
☐ Other:  __________________________________________
Figure S1: Themes and sub-themes resulting from the thematic analysis
Table S2: Methods used by participants to provide advice on dietary patterns to people with type 2 diabetes mellitus, with representative quotations

<table>
<thead>
<tr>
<th>Dietary Pattern</th>
<th>Representative quotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-carbohydrate diet</td>
<td>- Explaining the concept and the nutrients and foods involved</td>
</tr>
<tr>
<td></td>
<td>‘I’ve talked to people about the range and the different definitions around it, about what it is... what it looks like.’ (P5)</td>
</tr>
<tr>
<td></td>
<td>‘We would talk about type of carbohydrate and to try to include sort of the high-fibre, wholegrain options...’ (P3)</td>
</tr>
<tr>
<td></td>
<td>- Using visual aids</td>
</tr>
<tr>
<td></td>
<td>‘I just use hands, like little drawn diagrams on the page to show them differences in what a carbohydrate portion would look like.’ (P2)</td>
</tr>
<tr>
<td></td>
<td>- Pointing to credible websites and resources</td>
</tr>
<tr>
<td></td>
<td>‘I turn to the DUK website because it has meal plans and information on following a low-carb diet or what it would look like over a week to do that.’ (P2)</td>
</tr>
<tr>
<td></td>
<td>‘Resources like ‘cals and carbs’ are quite useful or apps many people like to use.’ (P6)</td>
</tr>
<tr>
<td></td>
<td>- Suggesting practical tips, such as recipes and/or substitutions</td>
</tr>
<tr>
<td></td>
<td>‘I try to recommend some recipes or some meal ideas because most people don’t have that creativity, let’s say. And also suggest how they can implement that when they go and eat outside.’ (P11)</td>
</tr>
<tr>
<td></td>
<td>‘I think sometimes it’s about breaking it down to them, rather than telling them the numbers. Because someone might think ‘oh, I’m going from 300 grams to 130’... it might be quite daunting. If you then break it down ‘you are having two pieces of toast for breakfast, you could do one.’ (P7)</td>
</tr>
<tr>
<td>Low-fat diet</td>
<td>- Explaining the concept and the nutrients and foods involved</td>
</tr>
<tr>
<td></td>
<td>‘I quite often explain it as more calories in grams of fat compared to carbohydrates or protein.’ (P6)</td>
</tr>
<tr>
<td></td>
<td>‘I’ll try to maintain some key guidelines, which foods are high in fat and how to implement a low-fat diet in their dietary history that they give me.’ (P11)</td>
</tr>
<tr>
<td></td>
<td>‘... and I think we can talk more freely and more comfortably about... replacing some of the fats that we know that are linked to poor health outcomes and saturated fats with unsaturated fats.’ (P12)</td>
</tr>
<tr>
<td></td>
<td>- Using visual aids</td>
</tr>
<tr>
<td></td>
<td>‘I do use the Eatwell Guide quite a lot...’ (P7)</td>
</tr>
<tr>
<td></td>
<td>‘We used to use kind of a visual guide of fat content in test tubes of different meals. So, a roast dinner compared to a steamed chicken meal.’ (P9)</td>
</tr>
</tbody>
</table>
- Educating on food labels
'I suppose what I would be looking at with people would be how they might read a label, how they might identify foods, that may be high-fat.' (P9)

- Pointing to credible websites and resources
'We are using the NHS website guidance as well and we almost tailor the advice as well ourselves. For diabetes patients, I do point towards diabetes specific organisations, such as Diabetes UK for example.' (P10)

Low-GI diet
- Explaining the concept and the nutrients and foods involved
'I just talk to them in a very broad overview. I'd say this particular food will send your blood sugars higher than this one would... I wouldn’t go into the numbers at that stage.' (P2)

- Using visual aids
'I normally draw them a picture of the glycaemic index, glycaemic load a little bit. Explain how a higher-GI food will give you this quicker rise in your blood sugar, you might get high blood sugar for a little bit... That might get a little bit worse and demonstrate to them the time of the come down and talk them around what it does a lot of the time in a simple way.' (P6)

- Pointing to credible websites and resources
'I sometimes give out the BDA food fact sheet on glycaemic index.' (P3)

- Suggesting practical tips, such as recipes and/or substitutions
'I tend to look more at food swaps... how they can swap from white bread to brown bread... swapping high-GI for low-GI options... might suggest a low-GI cookbook to get more practical solutions to what they try to achieve, rather than giving them just ‘must eat low-GI foods.' (P7)

Mediterranean diet
- Explaining the concept and the nutrients and foods involved
‘... it’s just explaining the aspects of the diet...' (P3)
'I talk about what it is and I talk about what it is not. I talk about the foods that feature a lot in the Mediterranean diet, I talk about the other aspects to it (the lifestyle)....' (P12)

- Discussing the scientific evidence
'I talk about the evidence and the famous studies that have been done and the benefits of people seen in other countries', P12 ‘... whether that’s easy with their family.' (P1)

- Pointing to credible websites and resources
‘I would go online and give an example of the types of foods... because we can talk about these thing verbally, but I like to give a picture to patients... and also show the variety of choice with such a plan.' (P10)
Table S3: Perceived barriers and facilitators to adherence or provision of advice on dietary patterns to people with type 2 diabetes mellitus, with representative quotations

<table>
<thead>
<tr>
<th>Dietary Pattern</th>
<th>Barriers</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-carbohydrate diet</td>
<td>- Inconsistent definition</td>
<td>- Social and professional support</td>
</tr>
<tr>
<td></td>
<td>‘There is no real, official definition that I am aware of in terms of</td>
<td>‘... if they found that likeminded individuals who are also pursuing the</td>
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<tr>
<td></td>
<td>grams of carbohydrate per day… ’ (P12)</td>
<td>diet... having that social support on board can be a facilitator.’ (P4)</td>
</tr>
<tr>
<td></td>
<td>‘The set level of what is perceived as the low-carb diet, I’ve seen</td>
<td>‘... there are safety aspects and that’s why they should always do it with</td>
</tr>
<tr>
<td></td>
<td>evidence where there is a range, a huge range.’ (P10)</td>
<td>guidance or giving the right education for the patient first.’ (P10)</td>
</tr>
<tr>
<td></td>
<td>- Low-carbohydrate vs. ketogenic diet</td>
<td>‘...the key with the people I’ve seen being more successful with are the</td>
</tr>
<tr>
<td></td>
<td>‘And also, people mistake the low-carb diet with ketogenic diets... So,</td>
<td>ones that you can maintain contact with and who are motivated to make those</td>
</tr>
<tr>
<td></td>
<td>there is a lot of confusion regarding to that also.’ (P10)</td>
<td>changes... ’ (P12)</td>
</tr>
<tr>
<td></td>
<td>‘... it can be mixed because people hear a professional talking about</td>
<td>- Specific guidelines and resources</td>
</tr>
<tr>
<td></td>
<td>a low-carb diet and they often link it with the quite extreme dietary</td>
<td>‘... if there’s practical ideas, ways of tracking carbohydrate intake, so</td>
</tr>
<tr>
<td></td>
<td>patterns, like Atkins or others fad diets.’ (P10)</td>
<td>the ‘carbs and cals’... ’ (P2)</td>
</tr>
<tr>
<td></td>
<td>- Long-term adherence</td>
<td>‘... resources that we can give to the patients. Some information about</td>
</tr>
<tr>
<td></td>
<td>‘So, I think the big question mark is over sustainability of maintaining</td>
<td>it and maybe what a low-carbohydrate diet looks like and sort of have a</td>
</tr>
<tr>
<td></td>
<td>this approach.’ (P12)</td>
<td>little bit of a plan for them. But also, for myself, yeah guidelines... ’</td>
</tr>
<tr>
<td></td>
<td>‘So, initially they probably find it with enthusiasm quite easy to</td>
<td>(P3)</td>
</tr>
<tr>
<td></td>
<td>master but then as they try it long-term, the sustainability, the</td>
<td>‘Maybe send them some resources beforehand to them as well, to just give</td>
</tr>
<tr>
<td></td>
<td>adherence is an issue... they can get a bit tired of not having or</td>
<td>them a feel, to know what to expect.’ (P8)</td>
</tr>
<tr>
<td></td>
<td>having to prepare sort of in advance these types of meals... And then</td>
<td>‘I try to pinpoint them towards places like the Diabetes UK, Heart UK,</td>
</tr>
<tr>
<td></td>
<td>also just not being able to eat the same things as the family.’ (P4)</td>
<td>those charities that have that kind of good patient information that are</td>
</tr>
<tr>
<td></td>
<td>‘I would say most people if they’ve tried to follow a low-carbohydrate</td>
<td>really easy to understand.’ (P12)</td>
</tr>
<tr>
<td></td>
<td>diet, they have found that they can’t sustain it</td>
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</tbody>
</table>
in long-term. So, they might cut down all carbs most of the time but maybe on the weekends or at special occasions they might have more carbohydrates. So, they are not strictly in theory to a low-carbohydrate diet long-term.' (P1)

- **Commitment**
  ‘I think the people who are really committed and maybe haven’t got the stresses in life are more likely to do it, but I’ve not met many of those.’ (P1)

- **Media promotion and conflicting messages**
  ‘We did start to talk about it a little bit in some search education lessons, it was just sort of acknowledge it because it there was a lot in the news and the media about it but also acknowledge that it’s not right for everybody.’ (P3)
  ‘Of course, because ‘carbs are bad’. This is all over the internet.’ (P5)

- **Cost**
  ‘And also the cost of it sometimes I’ve heard can be a bit of a barrier to it.’ (P4)
  ‘And then people have costs... you know the costs of the food.’ (P7)

- **Safety**
  ‘If a doctor is increasing insulin and I am telling someone to reduce their carbohydrates, then that’s a conflict straight away.’ (P10)

- **Practical advice**
  ‘... recipes on a budget, ideas for a variety. People get stuck in monotonous diets when they are doing low-carb or any extreme diet, it becomes very monotonous.’ (P2)
  ‘What usually goes down quite well is practical advice and swaps.’ (P12)
  ‘...sharing recipes and cookery ideas usually goes down quite well... And if it’s someone who is relying really heavily on meals and foods they buy, then having a good knowledge of what’s out there in retail is really helpful as well. To say there’s various supermarkets that have choices that are lower-carb or you can mix and match and do this and that and this is how you can make it easy for yourself.’ (P12)

- **Training for dietitians**
  ‘... some training, some webinar or something with the very most recent research and guidelines, I suppose.’ (P3)
  ‘And a little more training or just get to know all the evidence and the benefits and the drawbacks. So, basically just a bit more education around it, more familiarity with the evidence.’ (P6)

- **Scientific evidence**
  ‘I don’t think there is any long-term evidence, we don’t know what the side effects about it long-term... how long can people stick to that approach is not being measured’ (P1)
  ‘So, I think is having more studies about what the different amounts of carbohydrate are and looking at the long-term
‘If they are on medication, then they can lower their blood glucose levels and they still then reduce their total carbohydrate intake significantly, then the medication would have to be reviewed and monitored.’ (P1)

‘If someone has a T2DM on insulin and they are manipulating their carbohydrate intake quite strictly, if there isn’t good management for the insulin from health care team, then there are at risk of hypos.’ (P2)

‘And also, for a group, where nephropathy is a complication, if you are forcing a very high protein intake as a result of reducing your carbs, it’s the impact is having on the kidney function.’ (P2)

‘... by the time they see me... they are literally at the point where they are craving these foods and I say that is not what we want... We don’t want the peaks and the drops in blood sugar control, it’s the last thing we want.’ (P10)

‘... and as soon as someone has an event, or they eat something the feel they shouldn’t, it starts this whole spiral of guilt and it can lead to... I’ve seen binge eating disorder developed from a low-carbohydrate diet.’ (P2)

‘I would have a concern around restrictive eating and restrictive eating behaviours... pre-occupation with food...’ (P4)

‘Then the reduction in fibre intake. There is a real concern in our profession that the long-term effect on bowel cancer.’ (P2)

‘effects of that.’ (P7)

‘...there isn’t anything that proves a long-term benefit and that’s difficult...’ (P12)

‘... if we are reducing carbohydrates, what exactly are we replacing it with? What’s the displacement of the nutrient...’ (P4)

‘... we can’t know the direct impact of the low-carbohydrate diet on things like lipid profile, on renal profile... ’ (P4)

‘I suppose long-term an impact on emotional well being and the impact on whether or not restricting in that way has an impact on disordered eating.’ (P9)

‘...when we are looking at research papers, what they define as low-carbohydrate will range... I think general information of what the low-carbohydrate diet is would be good in moving forward, if it ever does happen.’ (P10)

‘...I would be very interested to see what the future research will hold about low-carbohydrate diets and how is the feasibility of that actually.’ (P11)
‘... they may be missing out on some types of fibre or they may be replacing the carbohydrate with a high-fat or a high-protein diet which, potentially has safety issues in itself.’ (P3)
‘And then I suppose what they substitute it with. If they substitute carbohydrates with saturated fat, obviously there is an issue around that as well.’ (P6)
‘... people get constipated on a low-carbohydrate diet as you know. So, that is an undesirable side effect.’ (P12)

- **Restrictive diet**
‘They came back to me, they actually found that they felt like it was actually a bit too restrictive for them.’ (P4)
‘I think people struggle with portion sizes. So, that’s a really hard thing to change because they are used to eating a certain amount.’ (P7)

- **Habit**
‘... for other people that is actually quite a big change because they were maybe previously used to things like a whole plate of pasta and then to reduce it just to this size is actually... They are more shocked... ’ (P3)
‘For some people, they do successfully follow a low-carbohydrate diet for an extended amount of time, but I think for a lot of people it wears off, the old habits start to creep back in.’ (P12)

**Low-fat diet**

- **Enjoyment**
‘... most people don’t like the taste of low-fat products. People

- **Specific guidelines and resources**
‘I tend to find is that if we explain things and use visualisations, whether that is portion sizes, whether that is pictures, people...’
often say, 'I want butter, I want the real thing.' (P7)
‘Because if it’s not that enjoyable to you because it has no fats in it, you are not going to have a nice mouth-feel...’ (P12)
‘I would want to know how satisfied they are when eating that low-fat product.’ (P12)

- Adherence
‘I think diets like that are hard to comply to in terms of maintenance. So, people may not get their results quick enough for what they want.’ (P7)
‘But I don’t think it’s very sustainable... So, it wouldn’t be something that I would be comfortable with for long-term.’ (P12)

- Motivation
‘They main issue is motivation in that type of diets. So, some of the other diets, like a low-carb/high-fat may be more attractive to some people because they will give them foods they like and may get better results.’ (P7)
I’ve seen patients who have received such low-fat advice... a lot of them did and not many got results. And I worry about the motivation of these patients because they’ve been told by half health professionals such a plan, they followed it, it hasn’t worked how they would want it to and therefore they are not motivated to achieve what they want to achieve...’ (P10)

- Media promotion and conflicting messages
‘When you start to talk about low-fat then they question it because they hear it in the media and magazines and papers about how they should be in high fat. And so, I’m hearing all these different messages but what’s the downside is that they are really confused and when someone is confused, they can’t change anything.’ (P2)

have more of an understanding, and they are more likely then, to follow to that information and that advice.’ (P1)
‘I think that patients would respond well to sort of clear messages and concise message... I think a clear and concise message would really help.’ (P4)
‘So, yes I think the Eatwell guide... I think it is a useful guide in at least outlining different food groups to patients.’ (P4)
‘So, if there was a picture that represented the diet in a day or in a meal, that would be helpful.’ (P7)
‘The British Heart Foundation resources have been really useful. Other activities, where you look at fat content from different foods... I found that people actually really engage with that format because it’s so visual and it’s almost self-guided learning.’ (P9)
‘If some big organisations like NICE take some decisions on low-fat diets, I think that would make a big change for me.’ (P11)

- Practical advice
‘... it’s getting them to consider making changes. This can happen with someone who has maybe 6 portions of fat at the moment, even reducing that to 4, would be beneficial.’ (P1)
‘Recipe ideas and example of meals and a typical meal patterns would also help and that seems what people are after most of the time.’ (P4)
‘Again, it varies from person to person but it’s normally small goals we are trying to set really... So, if somebody has a particularly high-fat diet, it’s about trying to change that slowly overtime.’ (P6)

- Scientific evidence
‘Well, when you look at any nutrition study it’s so difficult to control all the variables and cofounders. They are looking for
People often know that fat is higher in calories I suppose, but the thing is that there’s a lot of mixed messages out there and they find it really confusing.’ (P3)

‘... because of previous public health message around low-fat diet, they might then link having a higher-fat diet with having a detrimental impact on their blood glucose levels on their body.’ (P5)

‘Yeah, I think it’s been around for so long, that people expect you to say that. That’s what they perceive as the right thing to do. So, if they do it, I’d say you can use a little bit of olive oil and you can have a few nuts and things like that. They get a little bit panicky, so you kind have to put that in the perspective, that is about quantity in their diet.’ (P7)

‘They are all frustrated, particularly people that have been ‘dieting’ for years. We’ll talk about… ‘you’ve been telling us for years to cut down on fat and now you say that we can eat more of it’...’ (P9)

‘... in the past they just focused on cutting carbohydrate out and replacing with protein and fat and not actually taking much consideration of the quality of the diet. And that’s why I think the message is difficult to get across to public and it takes a bit of work I think for somebody.’ (P12)

‘I think sometimes people are quite surprised, that low-fat doesn’t always necessarily equate to healthier. I think those messages have taken a lot of time to sort of start moving their way-out people’s minds.’ (P12)

- Safety

‘... as long as we didn’t encourage them to over-eating carbohydrates.’ (P1)

‘I suppose the risk when people reduce fats is that they increase their carbs and adversely increase sugar intake.’ (P2)

‘Well I I suppose I wouldn’t want people to then go for a very high-protein or high-carbohydrate diet because they are associations and so that’s the difficulty with nutrition research is that you have to have very well-designed studies that are very controlling and that won’t even replicate real life for people and so you can take the best evidence that you get or the best associations and pull the recommendations from it then.’ (P2)

‘Unless there was a really robust well-designed RCT trial, that was unquestionable in its findings, that would make me change my practice.’ (P2)

‘I think if people aren’t following the low-carbohydrate diet and we assume they are following a low-fat diet, then it’s not defined where are these carbohydrates from. So, we work with the estimate of 250 grams per day but again I’m not sure that that’s fully substantiated and there’s enough kind of research to really suggest that the population have that, that’s what they should currently do.’ (P4)

... with the low-fat diet, it’s just seems sort of more historical and outdated as to where we are currently.’ (P4)

‘I think more thorough evidence, or some more systematic reviews.’ (P11)

‘... we don’t measure for other variabilities. So, in the sense that they became low-fat, did they become low-sugar? We didn’t take this into consideration. So, we don’t take many things into consideration along with the low-fat diets. I think that’s the main problem in the literature.’ (P11)

‘I guess bringing evidence to the surface a little bit more would be helpful because it’s kind of falling out of fashion I think in recent years, the low-fat diet...’ (P12)

‘I think maybe a slightly more flexible approach. So, a way that you can discuss with the patients how they could feel good, to benefit from the omega-3 fats MUFAs and PUFAs, but overall keeping their fat intake relatively low. You know, not to be sacred of salad dressings or avocado or oily fish and nuts.’ (P12)
reducing their fat. I guess it’s just how it affects the rest of their intake.’ (P3)
‘... because we don’t want the fat content to be too low because the carbohydrate content would rise, I would keep the percentage around 30%.’ (P5)
The problem with the low-fat is, that when a programme is low-fat, is usually high in carbohydrates. So, as a result, the calories pretty much remain the same and has a worst impact on people’s glucose.’ (P11)
‘Is it something that has fat removed, but sugar added back in to improve flavour... or texture...?’ (P12)

‘Or if they go into low-fat products they might be using too much... ’ (P7)
‘... you are probably not going to feel that satisfied afterwards. You might have a really big portion that you wouldn’t necessarily need’ (P12)

‘I suppose it’s the way a person translates it for themselves but someone can take it to the extreme and so, you will see cases where people have cut fat all together and have cut the good fats, which have health benefits for heart disease and inflammation.’ (P2)
‘But then it also affects the fat-soluble vitamins, so you will see some deficiencies and that could be potentially problematic for people.’ (P2)
‘... this is why it gets so complicated... if we are advocating a low-fat diet, we know that is not just the total fat intake, it’s actually the displacement, replacing saturated fat... swapping with different types of fat. So, we need to really make that clear to people and clarify that because they might feel like all fat intake is detrimental to their health when we know that unsaturated fat is really important for lipid and heart health.’ (P4)
‘Well, if it’s too low maybe they don’t receive the essential fatty
acids and that depends on the kind of fats the patient are consuming. And lipids or vitamins.’ (P5)

‘I think people could exclude fats too much. So, yes. A lot of my older population, they are scared of their cholesterol, they don’t eat fats at all. Actually, they need those calories, they need those vitamins.’ (P7)

‘Well, people kind of missing out on their essential fatty acids, fat soluble vitamin deficiencies maybe, if people are really excluding fats from their diets.’ (P9)

‘... if you thing about the types of recommendations, that are made around healthy eating, people get caught up with avoiding unsalted nuts from their diet for example or oily fish and thing like that.’ (P9)

‘... dietary fat is very important... it plays a huge role in the membrane and it has also some vital vitamins I would say. So, yeah, some vitamin deficiency can be one of the things that a low-fat diet can cause.’ (P11)

‘And I think you can end up having a less balanced and nutrient-rich diet, in terms of the healthy fats..., by following a low-fat diet in the long-term.’ (P12)

‘And some of the patients, I see are maybe quite frail, so for some of them, I don’t modify their fats as much.’ (P7)

- **Restrictive diet**

‘If it was around from 25-30% I would be ok, but if it was less than that, I wouldn’t promote it to my patients. I believe very much in moderation and I do not promote very ‘strict’ diets.’ (P5)

- **Low-GI diet**

- **Challenging concept**

‘What I don’t really like about GI, is that when certain foods are considered as high-GI people often perceive them as

- **Specific guidelines and resources**

‘... maybe if there was a mobile app... if there was something that worked like that, that might be helpful.’ (P2)
unhealthy and they are often not... So, is getting them to realise, that even though some foods are higher in GI, it is not to say they are the healthiest or they’re unhealthy and some foods that have lower GI they are not so healthy...’ (P1)

‘... if the literature is saying that low-GI foods alone will reduce your blood glucose levels, are people then restricted in what they are eating and going for maybe the lowest GI foods which has the highest fat? So, are they getting the right messages?’ (P1)

‘...trying to explain to someone why high-fat food, which they have maybe been told or understand to be not particularly healthy and it might not be particularly healthy, why it has a lower GI.’ (P2)

‘... you sort have to gauge whether it’s something that people will understand and comprehend or is it something that you just need to talk more about fibre, wholegrains types of carbohydrates and where potentially swaps can happen without necessarily labelling it as low-GI.’ (P3)

‘I think it’s really important, that you kind of make sure people really understand how they are going to use that and that it doesn’t become overwhelming.’ (P9)

‘I think the whole point with glycaemic index is that if you overconsume, it doesn’t matter. Portion control is very first and foremost. It is very difficult to advocate that without portion control.’ (P10)

‘To me, it’s too detailed... I think it’s too much for a patient that is newly diagnosed with that.’ (P11)

‘I think people just mistakenly think it’s the same as a low-carb

‘I think it’s really again about detailed information about what it is, what it entails. People respond well to sort of resources that are laid out quite clearly.’ (P4)

‘... training and education to the patients, yeah... I think... I don’t really have a guideline to give them or a piece of evidence to give them I suppose...’ (P6)

‘I think BDA has... and also some new books. I think the Australian website, they’ve got some low-GI guidance. So, they’ve got some resources... I’d refer patients to that website before... glycaemicindex.com. I think the BDA has some courses for dietitians anyway and the website is good for dietitians as well.’ (P8)

‘I find it kind of hard to find reliable sort of information sources in terms of numbers of GI...’ (P12)

- Practical advice

‘I think things such as meal ideas, recipes...’ (P1)

- Scientific evidence

‘... it would have to be a very robust, well-designed RCT, that I think are pretty difficult to design for nutrition research and also the problem is that they are not replicable to the variation in the society that we see.. it would need to be done in a very varied group, different groups of society, perhaps at different weight...' (P2)

‘I would like to see in some cases... and the mechanisms to explore for example, how exactly different foods, their
diet.’ (P12)

**- Long-term adherence**

‘Um, long term effect. Can they stick to that? So, is it realistic long term and can they stick to that? Do they find it easy to implement it in their family...’ (P1)

‘I think most patients I advise want to follow it. Maybe they really try in the beginning and then stop going to their professional and stop trying to do it.’ (P5)

‘I don’t know about the long-term impact on sugar control with such a plan. And also, there are gaps in regards to certain foods, which might be slightly higher, which might be very beneficial for patients.’ (P10)

**- Safety**

‘I would just be concerned if they are still overeating. If they didn’t take total carbohydrate intake into consideration.’ (P1)

‘... the only time that sometimes is a bit difficult is if somebody has say T2DM and something like diverticulitis or something similar to that. Actually, they need to follow more of a low-fibre diet...’ (P3)

‘I suppose if it was misinterpreted and the patient didn’t fully understand what was involved, that could cause an issue. I think what I have actually seen is that people might change to a lower-GI food in their meal but they have kept the quantity so high.’ (P4)

‘...when you have patients with type 2 diabetes, and they have to ‘limit’ their carbohydrate intake or their glycaemic index they might cut out whole food groups... Over time this can lead to more restricting eating and more and more...’ (P5)

‘... encouraging them to optimise their fluid intake because it’s got more fibre in it. Making sure we think about the bowel health... and also I would like to see the long-term effects.’ (P5)
as well.’ (P8)
‘I guess with the low-GI diet the main issue that you can have is lots of hypoglycaemias if you don’t eat enough.’ (P11)
‘… looking at lists of foods that are low-GI and looking at them just based on that and not considering again the nutritional balance of diet overall. That could be a potential safety issue. So, leading to deficiencies, undesirable dietary balance because you are only looking at that one number.’ (P12)

Mediterranean diet

- Myths
‘They often think it’s sitting with a lot of wine or drinking a lot of wine (laughs). There are some myths around it but it is something that it’s discussed I would say.’ (P4)

- Relevance to target population
‘I think what concerns me, is that in the UK, our diet is so different, that people… and our lifestyle is so different, that people find it hard to implement more of a Mediterranean diet…’ (P1)
‘… it’s a different pace of life, it’s a different lifestyle, there’s bigger factors other than diet when it comes to the health outcomes of a country. And so, the evidence… You can take parts of it and then you can try to think how does this apply to the population that I’m working with…’ (P2)
‘… looking at the dietary habits of our population it would be… it’s a far step to get close to that. So yeah, it would be difficult to accept that.’ (P2)
‘Well, when you introduce some food items that they are not that

- Social and professional support
‘… it’s just really taking the time to explain it. I just think really the explanation of that in greater detail would really help, which can be done in group sessions, probably better than one-to-one settings.’ (P4)
‘… with help and specific advice and recipes, you can help them to follow the diet.’ (P5)
‘… if they’ve got like good social support, like a network around… it can work quite well.’ (P7)
‘… some special training in order to… how to implement this diet, would be really useful. I guess we are trying to provide them with some diet sheets, but it’s not easy… it is really important to have at least a monthly consultation with a dietitian to guide you on that.’ (P11)
‘What I think is mostly helpful for patients is that they can continue to contact their dietitian because actually if you say
much used to them, in the beginning they will find it a little bit uncomfortable or not very easy.’ (P5)

‘... the Mediterranean diet... I see it more of a lifestyle change and in a way that you can really enhance your diet and potentially your lifestyle as well, but for some people is a really big change from where they might currently sit with their diet.’ (P12)

- **Cost**

‘... a huge shift in life, managing the resources around it and shopping for it...’ (P2)

‘... this Mediterranean diet, is not cheap to follow. And when the person can’t afford all the things I’m telling him to eat, then they’d tell me no or they might say yes but then wouldn’t comply.’ (P8)

- **Availability**

‘... you know some of the foods on the Mediterranean diet is not so available to us.’ (P1)

- **Convenience**

‘... in the UK we do rely quite a lot on processed food and so to limit that, they find it quite difficult.’ (P1)

‘I think it does require to have some cooking skills, which a lot of people don’t always have. So, it depends on the individual.’ (P12)

- **Preferences**

all the points of the Mediterranean diet in one go, it’s quite a lot of stuff that someone potentially has to change. And that’s where I think you can tie it with goal setting and looking at what their diet looks like right now, where they would ideally like it to be, what are three-four areas that can actually be changed quite easily, without overwhelming that person.’ (P12)

- **Media promotion**

‘We probably don’t get a lot from the media, as it is with more extreme diets.’ (P6)

‘I think you can tie it with campaigns that people know about.’ (P12)

- **Specific guidelines and resources**

‘You know if there are apps that could help people because everyone has got a smartphone really... apps available with easy resources, meal ideas and recipe ideas about how to do it on a budget. If there’s all of the practical tips around how to do it in a way that doesn’t cost more money. That’s the biggest challenge really.’ (P2)

‘And maybe more visual resources because I haven’t looked for that recently ...’ (P9)

‘... any kind of translation of the evidence, whether it’s diet sheets or websites... translation of that for the general public is beneficial as well. So, anything that can translate evidence or benefits to a message that patients can understand, I think would be a benefit’ (P12)
‘I think it just depends on people’s preferences, food preferences. If you speak to somebody that doesn’t really like fruits and vegetables, which we do sometimes or people that very rarely eat them, then it would be a quite big change to suddenly include fruits and vegetables in their diet.’ (P3)

‘I think the only reason why I wouldn’t (promote it), is if there are aspects of the Mediterranean diet that a patient doesn’t like. This is when my own skill set comes into play and I might look at an alternative plan for them.’ (P10)

- Safety
‘Only thing I think of, is that people eat more fat and that they increase the cholesterol levels and yet again trying to get them of thinking of the unsaturated fat. And also, if alcohol is more accepted as part of the Mediterranean diet, is that something that people... have to start drinking if they don’t now?’ (P1)

‘If the patients... they need the education to have combined food items and not to eat meals with only carbohydrates without protein or fats and fibre.’ (P5)

‘... but then modify the fats because people would be too liberal with the fats. They’ll just go crazy with the olive oil and if they’ve got a hefty BMI, that would just add in the calorie load. So, it wouldn’t be ideal.’ (P7)

‘Again of course, being mindful of any carbohydrate aspects of it...’ (P10)

‘... it’s a portion issue... If you are overconsuming even aspects of that, your cholesterol could rise, your saturated fat levels could rise, which can then have an impact in blood glucose’ (P7)

- Practical advice
‘Um, it’s maybe getting people to think of ways of increasing maybe oily fish, so it doesn’t have to be expensive.’ (P1)

‘I think they need more specific examples... we, healthcare professionals should focus on what they can do and not on what they can’t. Say ‘you can do that, change that…’, provide them with alternative choices and not just say ‘you can’t eat that’ or ‘you are forbidden to eat that’. Support them to find their own way to implement the diet and their own solutions... , alternative cooking methods and recipes...’ (P5)

- Scientific evidence
‘I still think that there are no robust studies and associations really... So, certainly the evidence so far is adequate that it is healthy but there will always be that question in the back of your mind of is it replicable to the population in Wales because they don’t live the lifestyle that they do in Mediterranean countries.’ (P2)

‘... you can’t link a causation. So, you might not know exactly what helps and it’s the general pattern that has all the benefits. Maybe more specific details about the specific components of the diet and maybe it can enhance the advice in the future.’ (P5)

‘... how you implement it with the calorie restriction and with weight loss... in the real environment, not in the research environment.’ (P7)

‘I think from the evidence of the Mediterranean diet with
control in the future, as well as weight loss initiatives. Again, it might not be good for specific diabetes patients.’ (P10)

someone who has diabetes for 10 years... is the Mediterranean diet something that is going to turn this around? Well, no, the evidence is not there for that per se.’ (P10)

‘... I am talking large studies, I am talking not small populations studies in regards to that, I think there could be more, there could be stronger... the evidence can expand a little bit.’ (P10)

DASH diet

- **Dietary message**
  ‘I think it’s just the title you know, with hypertension. And I think it can be a struggle to understand why it’s being used in a context of diabetes.’ (P4)
  ‘Something even in my very early days of practice, in the late 90’s was very fashionable.’ (P2)

- **Relevance to target population**
  ‘I just think culturally, I don’t think it would fit with the group of patients I work with.’ (P7)
  ‘... I wouldn’t tell them to go research that diet. It’s more American-based... I don’t think it would fit my patient group that well. I work with Bengali community, so I don’t think the foods really fit with that group that much.’ (P7)
  ‘... the typical British diet is very different from the DASH diet. So, it’s harder to promote it. In contrast to America, where it’s easier for them to follow it.’ (P11)

- **Safety**
  ‘... because of all those considerations especially around medical conditions requiring a low-salt diet
  ‘If they’ve got a clinical condition that would indicate they need a low-salt diet, then I would go with that.’ (P1)
  ‘... if the patient has comorbidities like T2DM and comorbid hypertension, then I would consider it, but again I would talk with their disciplinary team, with their doctor if the patient is receiving or can receive medication for hypertension.’ (P5)
  ‘Whether they have low sodium for some reason, whether there is some massive fluid retention, or some medication is causing them to have low sodium.’ (P6)
  ‘The salt is also really important because a lot of my patients with T2DM, they sort of edging to renal disease and they kind of have a lot of salt.’ (P7)

- **Specific guidelines and resources**
sodium and potassium, we need to be careful if anyone has any sort of renal disease with diabetes, that would be one thing to be mindful of.’ (P4)

‘Well, it depends if they have hypertension first of all because if their sodium levels are normal or not very high, they are not over the upper limits, I wouldn’t advise that.’ (P5)

‘Most of them would have high blood pressure as well and they might be on one blood pressure medication or the other. You don’t want them to increase their potassium because of the risk of a heart attack as well.’ (P8)

- Restrictive diet

‘Um, I don’t think they’d accept very well because it’s quite restrictive and it’s not realistic for them to change their diet that much.’ (P1)

‘The restriction and probably how achievable it might and how overwhelming it might feel to increase the kind of vegetable content of their diet.’ (P9)

- Burden

‘As soon as things become very specific and you must not eat more than this much salt... It kind of changes things because people need to be looking at food labels, counting amounts of various things that they are eating... It very much depends on whether that person is likely to be somebody that will kind of look at food labels.’ (P3)

‘If there were specific guidelines, for example from the BDA, then yes maybe we would use that specific diet a bit more.’ (P3)

‘So, they’d need quite a lot of detailed advice or guidance around that, particularly when the diet gets to the quantities of the different foods. I think we’d need to support them with more resources around that.’ (P4)

‘And I guess having less American resources and have more English resources.’ (P7)

‘... yeah, and statements from big organisations like NICE and the American Association of Diabetes.’ (P11)

‘So, anything that can translate evidence or benefits to a message that patients can understand, I think would be a benefit.’ (P12)

- Practical advice

‘... but from the start I think it’s making the advice practical and a little bit taking it away from saying this many grams and that many grams with them a lot. It helps them make a difference with that at the start.’ (P6)

‘To be successful and accepted, you have to provide alternative choices or ‘tricks’. For example, more herbs and spices, more lemon or other items and ingredients to enhance the flavour and you have to provide... help them with their recipes.’ (P5)

‘I think really knowing what is available to them. Knowing financially, knowing culturally, how they are eating already and how much of a jump that would be to do that. Because I think approaches like that quite often are very far away from how somebody might be currently eating.’ (P9)
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<th>Low-calorie diet or very low-calorie (VLCD) diet</th>
<th>Dietary message</th>
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<td>'I think we can get a bit carried away when weight loss occurs and then just selling it as purely restrictive diet to achieve weight loss and then ignore that the ultimate aim is to regenerate diabetes, to delay diabetes progression.' (P4)</td>
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<td>'Um, I suppose is looking at, are there any of results to suggest that following the DASH diet alone improves glycaemic control and what are the long-term outcomes of this?' (P1)</td>
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<td>'Try to do the research and find evidence from different ethnicities, different countries... I think, but I am not sure that the DASH diet has some more longer-term evidence.' (P5)</td>
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<td>'... we need good quality research to convince me. So, a lot of double RCTs... of course it's very difficult with nutrition research because you can’t provide a placebo as a diet. If it’s only single blinded, I’m happy with that... and a lot of systematic reviews maybe, metanalyses...' (P11)</td>
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<th>Intermittent fasting</th>
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<td>'I think it’s important what you eat within that fasting period is taken into consideration. It won’t work with any food.' (P10)</td>
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<td>'I like low calorie, but not very low calorie, if that makes sense. I think it has to be realistic because a very low calorie means that the consistence of this plan is really hard to keep.' (P10)</td>
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<td>'There’s obviously more research to be done around those before recommend kind of blanketly to anyone.' (P9)</td>
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7 BDA, British Dietetic Association; DASH, Dietary Approaches to Stop Hypertension; GI, glycaemic index; MUFAs, monounsaturated fatty acids; NICE, National Institute of Health and Care Excellence; PUFAs, polyunsaturated fatty acids; VLCD, very low-calorie diet.