‘Focus on diet quality’: A qualitative study of clinicians’ perspectives of use of the Mediterranean dietary pattern for nonalcoholic fatty liver disease

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Abstract

Practice guidelines for nonalcoholic fatty liver disease (NAFLD) recommend promoting the Mediterranean dietary pattern (MDP) which is cardioprotective and may improve hepatic steatosis. This study aimed to explore multidisciplinary clinicians' perspectives on whether the MDP is recommended in routine management of NAFLD and barriers and facilitators to its implementation in a multiethnic setting. Semistructured individual interviews were conducted with 14 clinicians (7 doctors, 3 nurses, 3 dietitians and 1 exercise physiologist) routinely managing patients with NAFLD in metropolitan hospital outpatient clinics in Australia. Interviews were audio-recorded, transcribed and analysed using thematic content analysis. Clinician's described that lifestyle modification was their primary treatment for NAFLD and promoting diet was recognised as everyone's role, whereby doctors and nurses raise awareness and dietitians provide individualisation. The MDP was regarded as the most evidence-based diet choice currently and was frequently recommended in routine care. Facilitators to MDP implementation in practice were: improvement in diet quality as a parallel goal to weight loss; in-depth knowledge of the dietary pattern; access to patient education and monitoring resources; service culture, including an interdisciplinary clinic goal; and knowledge sharing from expert dietitians. Barriers included perceived challenges for patients from diverse cultural and socioeconomic backgrounds; and limited clinician training, time and resourcing to support behaviour change. Integration of MDP in routine management of NAFLD in specialist clinics was facilitated by a focus on diet quality, knowledge sharing, belief in evidence and an interdisciplinary team. Innovations to service delivery could better support and empower patients to change dietary behaviour long-term.

Introduction

Nonalcoholic fatty liver disease (NAFLD) is the most prevalent liver condition worldwide, affecting an estimated 25% of the population [1]. NAFLD is closely linked to metabolic dysfunction [2] and highly prevalent in people with type 2 diabetes and cardiovascular disease, with the comorbid presence of steatosis independently associated with adverse cardiovascular events [3; 4].

In the absence of proven pharmacotherapy, primary therapy for NAFLD remains focused on lifestyle factors. Weight loss targets of 7-10% body weight are generally accepted to reduce hepatic steatosis and liver injury [5; 6]. However, in the absence of weight loss, an acknowledgement of the value of diet quality is emerging in some practice guidelines [5; 7; 8]. The Mediterranean dietary pattern (MDP) promotes regular vegetables, fruit, extra virgin olive oil, legumes, nuts, herbs and spices, fish and seafood; moderate white meat, eggs and dairy foods; and limited red meat and processed foods consumption [9; 10]. The MDP is superior to a low-fat diet for long-term weight reduction [11] and has been shown to reduce hepatic fat in the absence of weight loss [12]. Strong evidence shows that the MDP reduces risk of type 2 diabetes and coronary heart disease [13; 14]. Proposed mechanisms for a beneficial effect of the MDP in NAFLD include decreased lipogenesis, insulin resistance, oxidative stress, inflammation and fibrogenesis [15; 16].

It is unknown whether the MDP is recommended by clinician's managing patients with NAFLD. For translation of evidence into practice, it is important to consider the feasibility of implementing the MDP in routine care, particularly in multiethnic settings. An intervention trial in Northern Europe reported barriers and facilitators to MDP adoption for patients with NAFLD through qualitative interviews [17], but no qualitative study has reported the perspectives of health practitioners. A recent survey of clinical dietitians in Australia demonstrated an evidence-practice gap in use of the MDP for management of chronic diseases in standard care, including NAFLD for which the MDP was recommended routinely by less than one third of participants [18]. Both patients

with NAFLD and treating clinicians have highlighted the need for a multidisciplinary team to support lifestyle management of this condition [19].

Therefore, the aim of this qualitative study was to explore multidisciplinary clinicians' perspectives on whether the MDP is recommended in routine care for patients with NAFLD and the barriers and facilitators to its implementation through semistructured interviews.

Methods

This qualitative study was designed and reported in accordance with the consolidated criteria for reporting qualitative research (COREQ) checklist (Supplementary Table 1) [20]. The study was conducted in line with the Declaration of Helsinki and the protocol was approved by Metro South Human Research Ethics Committee (HREC/2019/QMS/52598). Informed consent was obtained from all participants.

Participants

Potential participants were initially identified purposively by the research team followed by recruited clinicians initiating snowball sampling. Invitation to participate was via email from the lead investigator (HLM). Eligible participants were clinicians' (allied health, medical or nursing disciplines) who were routinely managing patients with NAFLD within the metropolitan public service Metro South Health, Queensland, Australia, who identified as having a role related to dietary care or referrals for this. One site ran a 12-week NAFLD integrated care clinic (ICC) incorporating medical (hepatology and specialist general practice) and lifestyle (dietetics, exercise and psychology) approaches. Sample size was determined by the number of eligible clinicians who agreed to participate. We acknowledge that an international consensus panel recently suggested metabolic-associated fatty liver disease (MAFLD) as the most appropriate umbrella term to define fatty liver disease associated with metabolic comorbidities [21; 22]. At the time this study was

conducted (Nov 2019 to Feb 2020), MAFLD nomenclature had not been proposed, and hence we have used NAFLD to accurately represent participants' perspectives.

Data Collection

Semistructured individual interviews were conducted face-to-face or via telephone by the lead investigator (HLM) in the participants' workplace. Only the interviewer and participant were present during the interviews. Because the interviewer worked as a researcher at one of the recruitment sites, professional interactions had occurred with approximately half the participants prior to the interviews. Interview schedules, which included key questions and potential prompts, differed between dietitians and other clinical disciplines (Supplementary Tables 2 and 3). These were piloted with a dietitian and gastroenterology consultant respectively, and amended to improve readability. Interviews were audio-recorded, transcribed verbatim using an online audio to text automatic transcription service (Temi, 2020, CA USA) and checked for accuracy by HLM prior to analysis.

Data Analysis

Descriptive analysis, performed using Microsoft Excel (2016, Microsoft Corp., Redmond, WA, USA), was utilised to summarise participant characteristics with data presented as counts or mean ± SD and total range. Transcripts from each interview were ~~transferred to~~ managed using Microsoft Excel ~~(2016, Microsoft Corp., Redmond, WA, USA)~~ and coded and analysed for themes using thematic content analysis [23]. A deductive style was employed with key research questions and the Theoretical Domains Framework (TDF) informing coding. The TDF is a theoretical framework designed to identify influences on health professional behaviour related to implementation of evidence-based recommendations and has 14 domains: knowledge; skills; social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; reinforcement; goals; memory, attention and decision processes; environmental context and resources; social influences;

emotion; and behavioural regulation (see Supplementary Table 4 for further explanation) [24]. A second investigator (JTK) read a sample of transcripts for familiarisation and to inform the coding framework. The lead investigator coded all transcripts independently. Coded transcripts were reviewed by the second investigator and edited to incorporate feedback and then reviewed by a third investigator (IJH) for triangulation. Dietitian transcripts were coded, reviewed and discussed by the three investigators first, followed by other clinician disciplines. Throughout this process themes and subthemes, with mapping to TDF domains, barriers and facilitators to practicing MDP and illustrative quotes, were identified and consolidated before final review and discussion involving a fourth investigator (GAM).

Results

Participants

Of 19 eligible clinicians invited to participate, 14 were recruited and interviewed (Table 1). All participating clinicians worked in secondary care as part of multiple specialist outpatient gastroenterology/hepatology clinics at one of two hospital sites. Five participants worked in the NAFLD ICC. Non-specialist services for chronic disease management within the relevant public health service were eligible, however none of the nurses, dietitians or allied health professionals invited from those services identified as routinely treating patients with NAFLD, and in some instances this was due to NAFLD not being considered eligible referral criteria. Across participants there was a wide range of time spent in their current clinical role, management of NAFLD patients and working at their respective sites (Table 1). Most clinicians chose to undertake their interview via telephone.

Themes

Four overarching themes with 12 subthemes emerged from analysis of interview transcripts which are summarised, including symbols for inter-related subthemes, in Figure 1. The link between

themes, TDF domains, barriers and facilitators to implementation of the MDP in routine care, and illustrative quotes are summarised in Table 2. Participants are identified by clinical role only.

Lifestyle modification is primary treatment for NAFLD

Clinicians described lifestyle modification as the most important aspect of management for patients with NAFLD, with a focus on weight loss, diet alteration and increasing physical activity. Most clinician's emphasised that improvement in diet quality was a parallel goal to weight loss and that focus of dietetics education had transitioned away from 'calorie counting' to a more food-based diet quality approach which emphasised 'long-term lifestyle changes'. There was acknowledgement that improvement in diet quality has its own benefits 'irrespective of weight loss'.

Clinicians of all disciplines identified a role in dietary management. The doctors and nurses, who typically review patients first and/or generate referrals to dietetics, described their role as 'raising awareness' of diet's role in NAFLD development and as the 'cornerstone of management'. Many also indicated they do a 'brief' diet assessment and education, and felt this was expected by most patients. The dietitian role was viewed by most as conducting a detailed diet assessment and counselling with individualisation. Dietitians expressed the importance of having the doctors reinforce diet's role to enhance patient's motivation for behaviour change. Challenges that doctors acknowledged were their lack of training and skills in dietary assessment and counselling and that some patients were 'unwilling to have appointments' with a dietitian.

The MDP was viewed as an evidence-based dietary approach for both improving diet quality and achieving weight loss, and was recognised as reducing risk of chronic comorbidities such as cardiovascular disease and type 2 diabetes. Some clinicians, particularly dietitians, referred to evidence for improvement in disease risk factors such as hepatic steatosis, insulin resistance and inflammation with the MDP. Some doctors raised that the evidence for NAFLD is not strong but

'emerging' and it is difficult to determine the effects of dietary changes independent of weight loss, nonetheless the consensus was that the MDP was currently the most evidence-based diet choice. Some doctors and nurses had limited knowledge of specific literature to support clinical benefit of following MDP, however, they were aware of its inclusion at professional meetings and/or clinical guidelines and described it as 'very topical' or 'popular at the moment'. Therefore, both knowledge of the scientific rationale and environmental context impacted on belief in diet recommendations. It was also raised that clinical trials of the MDP may not reflect 'real life' and that their patients with NAFLD might not experience the same health benefits as those observed in clinical trials.

Recommending MDP is part of routine care

All dietitians and most doctors and nurses indicated that the MDP was the core dietary recommendation they give to patients with NAFLD. They frequently referenced a 'Mediterranean-style' approach which informed education around foods and macronutrient distributions. A minority of participants raised that a potential competing dietary priority to recommending MDP was the 'high protein, low salt focus' in patients with cirrhosis.

Having an in-depth knowledge of the MDP supported its implementation in practice. Dietitians demonstrated a comprehensive understanding of core foods promoted versus discouraged, including cuisine elements, and had self-confidence to counsel on the broader pattern followed by patient-centred strategies. Dietitians acknowledged that they had accessed recent literature or professional development describing the MDP in detail and how to implement it, which was necessary for practice integration. Other clinicians mostly understood core food-based principles, for example, extra virgin olive oil; fruit and vegetables; legumes; fish; wholegrains; with reduction in red meat and processed foods. Where accessed, knowledge of the MDP was drawn from a Mediterranean diet pyramid, which clinicians acknowledged also emphasises 'social elements of eating including sitting down for meals'. Wine was recognised as a dietary inclusion but was intentionally not

promoted. The minority of clinicians who did not routinely recommend MDP to patients seemed to have a limited understanding of what the MDP encompasses, especially of core foods (e.g. illustrative quote from doctor M2 in Table 2), and they talked about it as a prescriptive 'diet'.

A key facilitator for inclusion of the MDP in routine care was access to patient education tools and resources. It seems that the recent implementation of an ICC model of service delivery for NAFLD had driven the development of a dietary handout focused on MDP, including a Mediterranean diet pyramid [25], that is shared with all clinicians across the hepatology clinics at that site. This handout provided a simple 'visual cue' to guide patient education and acted as a reminder for doctors and nurses to incorporate MDP in their management plan. Some clinicians used one of two short MDP adherence scores [26; 27] which guided patient goal setting and were a tool for monitoring diet quality changes alongside weight. Nurses and doctors unaware or without access to MDP education resources or monitoring tools recommended this diet less routinely and suggested that a specific resource would facilitate practice if available.

Dietary practices are driven by service culture

The dietary practices of clinicians, including dietary education priorities and professional roles, was also driven by the culture of the health services they worked in. Establishment of the ICC with an interdisciplinary team of medical and allied health professionals had facilitated development of clinic guidelines and aforementioned education resources. A focus on improving diet quality through MDP alongside weight loss appears to have become the directive at that clinic, described by clinicians as their 'mantra' or that it had been 'enforced'.

Knowledge sharing between clinicians, with the expertise of dietitians highly valued, was an additional facilitator to practicing MDP in the context of both improved understanding of the dietary pattern and supporting evidence. This was facilitated when dietitians were 'co-located' in

specialist clinics. The dietitians acknowledged that their own MDP knowledge and skills had been supported by experts conducting research in their local dietetics department. Doctors and nurses who did not have access to a 'departmental guideline' or who were less exposed to dietitians were unsure what the focus of their colleagues dietary advice was, had less understanding of the MDP and did not recommend it routinely. These clinicians suggested that 'in-service' from dietitians would be an important mechanism to enhance their use of MDP.

Concerns were raised that dietary advice may differ in community settings where health professionals in primary care providing education may not have specialised training in NAFLD. Many expressed it was more appropriate for long-term patient management to be delivered in a community health setting rather than hospital clinics, but there was currently no mechanism for communication between the two levels of care and hence no feedback on patients after discharge from the hospital clinics.

Perceived challenges for patients to implement MDP

Perceived barriers were predominantly patient-focused. Patients' culturally diverse backgrounds and long-held unhealthy eating patterns, with a heavy reliance on convenience foods, were key perceived challenges to aligning diet education with MDP. In some instances, there was a lack of belief about the patient's capabilities to change behaviour and that more emphasis should be placed on their 'stage of change'. Facilitators to support patients included goal setting around changing their diet pattern, counselling on palatability of MDP and how to integrate within other cultural cuisines.

Other perceived barriers for patients were poor health literacy and low socioeconomic background. Clinicians' described that many patients have a knowledge deficit of diet-disease interaction, a lack of social support, limited skills in healthy food purchasing and preparation, and that MDP is

perceived to be costly. Suggested strategies to overcome these challenges were viewed by all clinicians to be the role of the dietitian. These included providing simple, practical, and pictorial education resources, of which experiential learning such as cooking classes would be ideal, centring counselling on affordability and emphasising social support.

Limited clinician time and resourcing also appears to compound the issue of overcoming potential barriers for patient behaviour change. In the hospital outpatient setting there was limited access to dietitians and/or a lack of long-term follow up, with patients being discharged to primary care where, as previously described, continuation of care is largely unknown. The involvement of a psychologist and exercise specialist was viewed as ideal to achieving lifestyle changes, but funding was typically not available for these roles and only existed as part of the ICC (for a portion, not all patients) in this instance. The doctors and nurses described having ‘increasingly busy’ clinic demands with short consultation times and hence the time in which they can discuss diet is very brief and not always a priority. Access to the MDP handout, which patients can ‘read at home in their own time’, enabled doctors to include dietary information in a short consult.

Discussion

Given the evidence for a MDP in NAFLD and its inclusion in practice guidelines, it is important to explore feasibility of translating MDP for NAFLD into routine care, particularly in multiethnic settings. Through qualitative interviews, we found secondary care clinicians in an Australian metropolitan health service frequently recommended the MDP. Clinician behaviours were influenced by inter-related psychological, social, professional and environmental factors which were highlighted across four primary themes with 12 inter-related subthemes.

Clinicians described lifestyle modification as the primary treatment for NAFLD patients, with both weight loss and improving diet quality through MDP as priorities for most clinicians. Clinical

practice guidelines for NAFLD consistently recommend targets for energy deficit to facilitate weight loss [5; 6; 7], however there is inconsistency with regards to inclusion of macronutrient or food-based recommendations. European [5; 7] and more recently (published after data collection for this study) Asian Pacific [8] guidelines recommend MDP and the growing body of evidence that MDP improves metabolic health and cardiovascular disease risk supports its use in NAFLD [15; 28]. Long term maintenance of weight loss after energy-restriction diets is poor [29] and clinicians in our study acknowledged the MDP may offer a more sustainable approach. Overall, beliefs about consequences (i.e. that MDP improves outcomes) facilitated practicing MDP. These beliefs were influenced by a range of sources such as knowledge of specific scientific evidence or a general awareness of its promotion in a guideline or at professional meetings. Interviews with clinicians in the UK demonstrated beliefs about consequences (or a lack of) was the most prominent influence on whether guidelines for management of NAFLD were implemented, however in that study diet was considered only in the context of weight loss [30].

Clinicians who had more in-depth knowledge of the MDP demonstrated greater self-confidence to educate patients. Dietitians acknowledged the influence of expert mentors to guide their practice. Similarly, European dietitians reported that information from colleagues and experts in the field was prioritised in evidence-based practice, especially in unfamiliar clinical situations [31]. Dietitians in Australia, especially those in junior positions, have also expressed a lack of confidence in applying knowledge translation to their practice and greater workforce development is required [32]. In the context of the MDP specifically, dietitians in Australia have also indicated that direction to up-to-date scientific literature and access to evidence summaries, as well as professional development focused on what the MDP is and how to implement this with patients would support integration in practice with chronic disease patients [18]. Some doctors described a lack of dietetics training as a major barrier to assessing and counselling patients on diet and that professional development from

dietitians can overcome this. Literature supports that limited nutrition education provided to medical students affects their knowledge, skills, and confidence to provide nutrition care [33].

Patient education resources based on MDP assisted education and goal setting, while sharing these with multidisciplinary colleagues facilitated MDP recommendations. Developing educational tools for patients and other clinicians has been shown to facilitate dietitians actively seeking and reading the scientific literature [31], and dietitians have indicated that greater access to practical education resources for patients would facilitate MDP implementation in their practice [18]. Dietitians in the current study described that involvement in developing education resources had supported their MDP knowledge and skills. For doctors and nurses, access to a hardcopy handout supported their memory and clinical decision processes, allowing them to incorporate MDP into short appointments, while the content (particularly a visual MDP pyramid [25]) was a source of education. Patients with NAFLD have described that tools and resources are needed to support ongoing management, while clinicians recognise that monitoring tools are important for behavioural regulation [30]. For the clinicians interviewed in our study, use of a MDP score helped but difficulties remained in regards to sufficient follow up to monitor change. Innovations in digital tools may improve patient access to dietary information and monitoring long-term [34].

The organisational culture and professional roles were identified as important influences on implementation of dietary evidence into practice. The ICC had established an *interdisciplinary* team (i.e. disciplines collaborate, share knowledge and practice across professional roles [35]), including allied health, that had developed local guidelines and resources mentioned above. Clinicians who were not linked to the ICC, even some from the same site, had poorer knowledge of MDP and were not aware what dietary advice was being given by their colleagues. Whether practicing MDP or not, diet was viewed as part of each profession's role with consistency of advice valued. Contradictory dietary information remains prevalent in chronic disease management and is a recognised barrier to

changing behaviour [36]. Training all professions within the clinical team on diet for NAFLD, including as a pillar of management and core evidence-based dietary principles, is needed to facilitate a consistent approach [30] and our study found that expert dietitians can provide this training. Concerns that dietary education may differ in primary care, where NAFLD is underappreciated [37], also highlights that upskilling and communication with non-specialist clinicians would improve continuity of care.

A core barrier to implementation of the MDP was a lack of belief in capabilities of people with NAFLD to change dietary habits, which was inter-related to alleged limited resourcing of clinicians to support patients to do so. Contrary to these beliefs, a recent feasibility trial in NAFLD patients in Northern Europe found one dietitian session using personalised behavioural strategies and practical resources on ad libitum MDP improved diet adherence, reduced weight and increased HDL cholesterol after 12-weeks [17]. Patients perceived high acceptability of MDP, which was supported by enhanced nutrition skills. Cost was not an obstacle and sociodemographic characteristics were not associated with intervention adherence, whereas poor understanding about NAFLD and dietary risks affected intrinsic motivation to follow MDP advice [17]. NAFLD patient's perspectives highlight that clinicians may place unnecessary emphasis on potential social barriers. Non-dietetics clinical roles could enhance diet change by prioritising education on diet-disease relationship and consistently reinforce dietitians' education on MDP. Dietitians should use behaviour change strategies that empower patients and improve self-efficacy [38]. Within limited healthcare resources, integration of virtual care, online tools and group sessions are strategies that could support longer-term care whilst maintaining personalised interactions [17; 34; 39].

To our knowledge this is the first qualitative study reporting clinicians' perspectives on recommending the MDP in routine care and our analysis is novel in its comparison of professional roles. The identified barriers and facilitators with mapped TDF domains can be utilised to support

intervention strategies for broader uptake of the MDP in real-world practice in other multiethnic settings. The findings are limited to the perspectives of clinicians ~~(predominantly female)~~ from two metropolitan hospital services in Australia who are typically triaged patients with complex disease. The purpose of this study was to explore practices and perspectives in a local health service context and hence the sample size was limited to eligible clinicians who agreed to participate and data may not be representative of all relevant clinicians across other health services. All but one participating clinician were female and hence the findings may be subject to gender bias; nonetheless four out of the five eligible clinicians who declined to participate were also female. The interviewer was a research dietitian with expertise in the MDP, which was known by some participants and could have influenced participant's responses.

Conclusion

Integration of the MDP in routine management of people with NAFLD in secondary care was facilitated by a focus on diet quality, belief in evidence and an interdisciplinary team approach with expert knowledge sharing and access to education resources. Perceived implementation challenges for patients may unnecessarily restrict clinicians from counselling on MDP or referring to dietetics. Training clinicians to educate patients with NAFLD on the role of diet in their condition and focusing MDP education on behaviour change strategies may improve patient motivation, uptake and therefore clinical benefit. Pragmatic trials should explore innovations in delivery of MDP counselling, and format of education resources and monitoring tools through virtual means and group settings.

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Conflict of interest disclosure

Authors have no relevant conflicts of interest to disclose related to the current study. HLM is an investigator on a clinical trial independent to the current study which received financial support from Cobram Estate Pty. Ltd.

Authorship

HLM conceptualised, acquired funding, designed the study and recruited participants with support from IJH and GAM. HLM led and all authors contributed to analysis and visualisation of the data. HLM wrote the original draft manuscript and all authors reviewed and edited subsequent drafts of the manuscript.

Figure legends

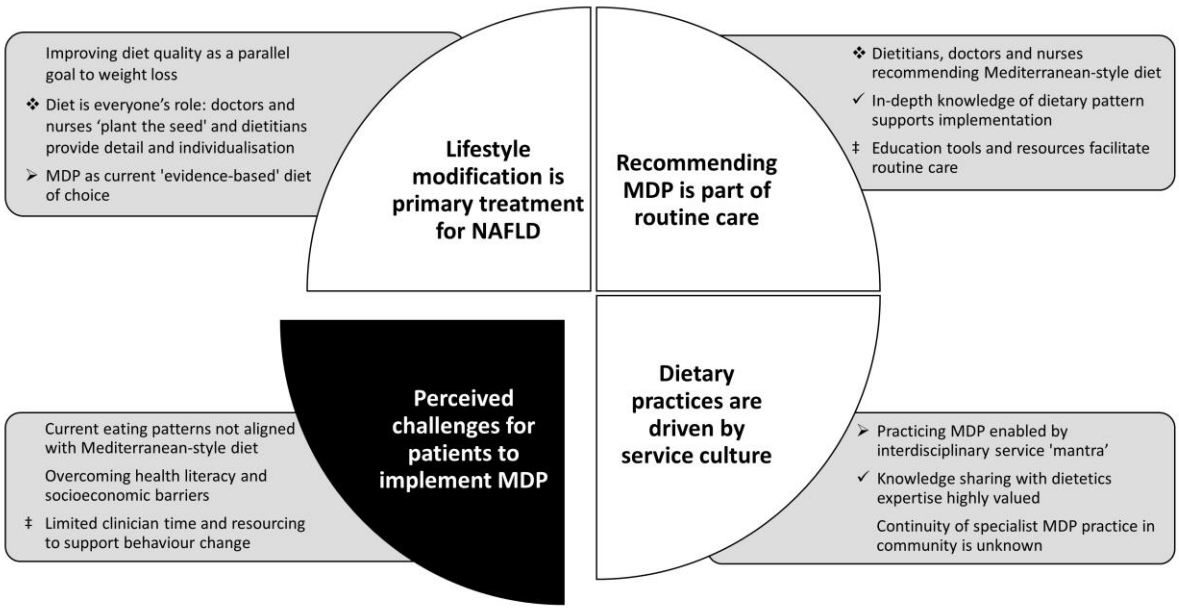

Figure 1. Schematic of themes from interviews with NAFLD clinicians. The central circle presents major themes with facilitators to practicing MDP in white and core perceived barrier in black. Outer grey boxes present subthemes; those with matching bullet symbols are inter-related. NAFLD, nonalcoholic fatty liver disease; MDP, Mediterranean dietary pattern.

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Table 1. Characteristics of multidisciplinary clinicians participating in individual qualitative interviews

Variable	Total n=14
Gastroenterology and Hepatology role (n)	
Doctor	7
Dietitian	3
Nurse	3
Exercise physiologist	1
Sex (n)	
Female	13
Male	1
Time in current practitioner role (years)	
Mean (SD)	12.0 (10.0)
Total range	3.0 - 33.0
Total time in clinical management of patients with nonalcoholic fatty liver disease (years)	
Mean (SD)	10.0 (9.3)
Total range	0.3 - 28.0
Time working at current hospital (years)	
Mean (SD)	7.2 (7.3)
Total range	0.3 - 25.0
Individual interview type (n)	
Face-to-face	5
Telephone	9
Interview duration (min:sec)	
Mean (SD)	29:58 (08:11)
Total range	16:00 - 45:31

Table 2. Themes associated with Theoretical Domains Framework (TDF), barriers and facilitators to practicing the Mediterranean dietary pattern (MDP) and illustrative quotes from data generated by clinicians treating patients with nonalcoholic fatty liver disease (NAFLD) in secondary care

Subthemes	TDF domain(s)	Barriers	Facilitators	Illustrative quotations*
Lifestyle modification is primary treatment for NAFLD				
Improving diet quality as a parallel goal to weight loss	Beliefs about consequences Goals	Healthy high fat foods and weight loss	Diet quality benefits irrespective of weight loss Transitioned focus to sustainable approach for management	"One of the key things that's come out is more of a focus on diet quality rather than, um, you know, calorie counting per se, and really thinking about, um, you know, the importance of cooking food from fresh". "We're not looking for a quick fix" (D1) "The main focus of treatment is to get people to, is, is weight loss, um, and diet alteration. So, diet quality as well as weight loss" (N2) "It needs to be long-term lifestyle changes that they make, um, to sustain weight loss." (M5)
Diet is everyone's role: doctors and nurses 'plant the seed' and dietitians provide detail and individualisation	Professional role and identity Skills	Perceiving diet education as dietitian role only Patient unwilling or do not believe in seeing dietitian Limited skills in dietary assessment and education (doctors and nurses)	Doctors raising and/or recommending (motivate and illuminate importance) Perceiving diet education as everyone's role Simple messages to recommend (doctors and nurses) Reinforcing dietitian advice No medical therapy	"I think it's really important that, um, I guess we have the support from the consultants and I think it actually does make a difference having consultants who are enforcing those types of things with the patients because obviously patients respect what their doctors say." (D2) "I think my role is more in terms of raising the awareness and getting them to, to make those links and that having them understand that the recommendations that we'll be making for their care, will need involvement from them." (N3) "I think the actual core nutritional advice is probably better delivered by an expert in that area such as a nutritionist, the dietitian. But my role is to reinforce that and to make that a core, a key part of the feedback or management discussion that I have with my patients that I think this is important." (M5)
MDP as current 'evidence-based' diet of choice	Knowledge (scientific rationale) Beliefs about consequences Environmental context and resources	Lack of real-world research Not learned in degree Other diets also supported by evidence	Management focused on prevention and treatment Multimorbidity health benefits Belief in evidence Access to evidence summary Inclusion at local and international meetings Inclusion in clinical practice guidelines Topical and high profile	"Its [MDP] benefits in like primary and secondary prevention of cardiovascular disease, things like obviously fatty liver disease, diabetes and even things like mood and cognition has important benefits for." (D2) "Mediterranean diet has shown to reduce hepatic steatosis, improve insulin resistance and that's irrespective of weight loss. But then obviously that 5 to 10% weight loss has been shown to have positive effects in patients with fatty liver disease. And that's in the most recent, um, ESPEN guidelines that were released in 2018 and yeah, so there's good quality evidence to support the use of Mediterranean diet and weight loss." (D2) "There's an emerging data in the NAFLD group, but there is data with cardiovascular disease and the, weight loss...No study has proven major differences in fibrosis, at this point in time so there's no point getting ahead of yourself on a diet." (M1) "And I guess the evidence at the moment seems to be very topical around Mediterranean

			MDP has most amongst limited diet evidence	diet and so that seems to be the thing that we've been promoting recently." (M3) "Of all the studies it's probably got the most evidence over any other diet" (M1)
Recommending MDP is part of routine care				
Dietitians, doctors and nurses recommending Mediterranean-style diet	Skills (practice)	Acute priorities of complex patients Inclusion in literature without details on what and how	Literature or professional development on how to implement (dietitians)	"In the patients with fatty liver disease that I see in my general hepatology clinic, um, I guess my main focus of their nutritional care and nutrition education is around a Mediterranean-style diet" (D2) "For most people include macronutrient composition of their diet, as well. Um, by, you know, various means but, so typically the Mediterranean-style diet is what we advocate." (M6) "We just sort of focus on giving them the, um, ideas of what the Mediterranean diet is. So talking about, you know, reducing their red meat, increasing, um, some legumes and, you know, plant based…" (N1)
In-depth knowledge of dietary pattern supports implementation	Knowledge Beliefs about capabilities (self-confidence)	Perceived as prescriptive 'diet' Lack of personal experience Limited knowledge of principles, especially foods No dietetics training (doctors) Lack of confidence to discuss whole pattern Differing diet definitions	Confidence in knowledge (dietitians) Personal experience / interest or Mediterranean background Perceived as diet quality focused / style / pattern Provides something to 'follow' MDP pyramid and adherence score guides knowledge	"I'm pretty confident that I have a good understanding of what, like a traditional Mediterranean style diet that we're trying to educate these patients about is." (D1) "I really just think about it as education, as quality um diet rather than, um specifically following something…So we're not trying to change everyone to eat Mediterranean. If they've got an Asian background and they cook a certain way, how can we adjust their diet to also be Mediterranean style?...getting people to cook and you know, know what's in their food and know what they're eating and thinking about that quality of the diet and not thinking about it as being a diet, as being a lifestyle" (N1) "I would say that the dietary pattern would be, um, um, I don't know if this is strictly Mediterranean, but, um, to have less saturated, saturated fats, um, a more plant-based diet. Um, and in general, um, uh, uh, the foods would have a, a lower glycaemic index." (M2)
Education tools and resources facilitate routine care	Environmental context and resources Memory, attention and decision processes Behavioural regulation	No access or awareness	Inclusion in core or 'endorsed' handout Visual aids (e.g. MDP pyramid) Readily accessible MDP adherence score (outcome measure, monitoring and education tool)	"The departmental brochures ... are really helpful because they're just quite easily digestible. They're just two pages. They've got pictures that clearly demonstrate what the Mediterranean diet is. Um, and being able to give patients that brochure in the clinic is, is a really good aid to, um, helping patients understand what, uh, what the diet is... prior to those brochures being produced um, I might've mentioned it, but I think now I always mention it, cause you can back it up with something that they can take home and remember, um, what you discussed." (M7) "I do go through the short… 14-point Mediterranean diet questionnaire with them, just to start that conversation going… I go through each line as to how to do it and I always cross off the alcohol... I say to them, look, this is where we want to end up, 13 out of 13. Don't feel bad if you end up at five or less that's where most of the population is. This is an aspirational goal to, to work towards. And I explain to them that these are the types of

				things you should be eating" (M3)
Dietary practices are driven by service culture				
Practicing MDP enabled by interdisciplinary service 'mantra'	Social influences Environmental context and resources (organisational culture) Reinforcement	Lack of team communication on education provided True interdisciplinary team rare	Aligned interdisciplinary clinic goal involving MDP Local protocol or guidelines Recommending is an expectation or enforced Consistent team message Primary shared clinic handout Champion doctor	"If we are all singing the same song essentially, it allows us to, um, really reiterate you know, the potential changes that we could have." (D3) "Linking in more and more with the multidisciplinary team… we put a lot of time and extra effort into doing, uh, guidelines, protocols, education sheets, so we can consistently give out these messages." (M5) "I mean it's really where we've, where we've gone, I mean it's kind of been the mantra of the ICC, to, to use the Mediterranean diet" (M6) "I don't think there is actually a, uh, like a, um, you know, a specific guideline the way there is for, you know, say for like viral hepatitis, you know, this is the, the treatment. I don't think there is such a thing for fatty liver disease" (M2)
Knowledge sharing with dietetics expertise highly valued	Professional role and identity Knowledge Environmental context and resources		Dietitian educates and upskills interdisciplinary team Special interest / research of local dietetics teams Local experts / opinion leaders Co-located clinic dietitians Online learning useful for professional development	"The ICC really has pushed that along. I think, you know, really focusing on NASH and NAFLD and getting a team together that are going to be the, sort of looking at being the experts of this, um, style and obviously having [Consultant] and his team of, um, dietitian researchers that have been able to bring us the evidence and things as well." (N1) "I think we need, there needs to be a consistency. And so, I think, um, in-service or upskilling, the clinician managing the patients is just as an important role for dietitians as is seeing the patients." (M5) "It's a bit of a common, I guess theme… people in our dietetics department are probably a bit more knowledgeable about Mediterranean-style diet compared to maybe some other, um, areas, other departments" (D1)
Continuity of specialist MDP practice in community is unknown	Professional role and identity Environmental context and resources	Perceived conflicting dietary advice by external dietitians or doctors No feedback from community dietitians	Upskilling community dietitians	"It's a bit of a black hole as to what we're referring into in the community. And this is a big ah weakness that I think really needs to be addressed." (M5) "Upskilling as many or having specific dietitians that we know will be trained in the right style that we want for our patients to be able to send them to in the community as well is really important for us" (N1) "It can be difficult sometimes trying to provide advice that may be somewhat conflicting with the advice they've received … maybe more aligned with the traditional calorie counting, um, low fat kind of diet." (D1)
Perceived challenges for patients to implement MDP				
Current eating patterns not aligned with	Beliefs about capabilities	Unfamiliar cuisine Cultural diversity	Cross-cultural translation Provide education on style /	"I think the biggest thing is their stage of change and also, yeah, their current diet quality and where they're coming from and their ability to be able to make changes that might be

Mediterranean-style diet	Intentions	Long-term habits Stage of change Self-efficacy Baseline diet quality Convenience prioritised Assumption patients lack ability to change	pattern not 'diet' Positive focus Motivational interviewing Group education for support Diet palatable	limited" (D2) "That's challenging for many of my patients because probably a third of my patients would be, uh, from Southeast Asia and their diet, their typical diet would not comprise of sort of Mediterranean style food." (M5) "Um, some people do really well, but for the most part people don't follow it. And you know, you get people in the clinic and they're like, what's a legume? You know, like they just, it's difficult for people to change the way that they've been cooking and eating for so long... And people's motivation is different" (N2)
Overcoming health literacy and socioeconomic barriers	Knowledge Skills Environmental context and resources	Perceived knowledge deficit of healthy diet and diet-disease relationship Cooking, preparation and purchasing skills (lack of experiential education) Perceived cost / not spending priority Lack of social support Healthy food access	Personal experience or Mediterranean background Simple, practical, pictorial resources Education centred on affordability Social eating promoted Involving family in consult	"Their nutrition knowledge, which you obviously work on with them in clinic to educate them. But also things like, um, cooking skills or cooking ability, um, which obviously you can talk, talk to them about, you know, developing those skills and simple ideas that they can use at home. Um, another big thing that does come up is, you know, patients particularly not having the family support at home. So while they are trying to make these active changes, they might have other family members that, you know, aren't really being conducive to them making those changes." (D2) "Cost or perception of cost. Uh, access to fresh fruit, vegetables and preparation and time poorness, um, of patients or again, a perception of the time and the money with this. Um, just health literature, reading, understanding it, is always still poor." (M1)
Limited clinician time and resourcing to support behaviour change	Environmental context and resources Professional role and identity	Tertiary dietitian access Psychology resourcing Comorbid depression / anxiety Long-term follow up required for change / accountability Consultation time (doctors and nurses)	Readily accessible handouts Psychologist involvement for behaviour change Linkage with community for continuation Exercise care alongside diet for motivation	"We are time poor with the model as we're dealing with these patients...we have an important role, but it's one of many aspects, in a short consultation with each patient to touch on." (M1) "If they do get to see our dietitian…generally it's one visit to just set them up, then they'll be directed on how to keep going and following up in their community." (N1) "The psychologist really helps…from a behavioural change point of view to make some, you know…strategies…to facilitate these dietary changes. A lot of them we find have real issues with emotional eating, so the psychologist can help to address some of those issues as well…our exercise physiologist I guess maybe a bit less directly helps with, um, dietetics, but, uh, you know, I guess a healthy lifestyle for these patients when they start exercising a little bit more, it helps them to, um, you know, I guess it helps reinforce that behaviour, a healthy behaviour." (D1)

ICC, Integrated Care Clinic. *Clinical roles: D, dietitian; M, medical doctor; N, nurse. Numbers are random order to distinguish quotes.