

The use of diet diaries in general dental practice in England

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Objectives: Diet diaries are recommended as a tool to support behaviour change in dental patients at high risk of dental diseases. However, little is known about their use in dental practice. This study aimed to investigate whether and how general dental practitioners (GDPs) use diet diaries and identify factors which influence their use. **Methods:** A postal questionnaire was sent to a stratified random sample of general dental practitioners. The questionnaire asked about demographic and professional characteristics of the GDPs and their practices regarding diet advice, collection of dietary information, diet diaries usage (e.g. frequency, considerations and barriers), and interpretation of diet diaries. Descriptive, bivariate and multivariate analyses were conducted. **Results:** From 972 eligible GDP participants, 250 (26%) responses were received. Whilst almost all of these GDPs reported giving diet advice to patients routinely, and 40% reported also referring to dental care professionals in the practice to deliver dietary advice, only 28% (70) reported that they are involved in using diet diaries. GDPs appeared to target patients for dietary advice: GDPs reported they personally gave diet advice to an estimated 63% of their patients, and referred patients to DCPs for diet advice for 11% of their (GDPs') patients. GDPs used diet diaries more often for child than adult patients. Diet diaries usage was lower among younger dentists and in practices with higher percentages of NHS patients ($p < 0.05$). Perceived insufficient remuneration for time involved in using diet diaries was the main reason given for their lack of use. **Conclusion:** Although recommended as best practice, most English GDPs do not frequently use diet diaries to collect diet information in dental practice, mainly due to perceived financial and time constraints. Development of a more efficient tool to assess the dietary habits of dental patients is needed.

Key words: diet, dental practice, health education, caries, diary, England

Introduction

Dental caries is a major public health issue worldwide, affecting a full spectrum of age groups (Marcenes *et al.*, 2013). Although there has been some debate about the place of sugar in caries aetiology in view of the now widespread use of fluoride toothpaste (Burt and Pai, 2001; Marthaler, 1990; Moynihan and Kelly, 2014; Selwitz *et al.*, 2007), there is a general consensus that strategies targeting harmful sugar consumption behaviours both at the individual and population level are still needed to improve oral health; resting on evidence such as the existence of a dose-response relationship between sugar and caries, even in areas where fluoridated water and toothpaste are available (Moynihan and Kelly, 2014). Moreover, with recent data showing that the average amount of free sugars consumed per person in the UK exceeds the current recommended reference value (<5% of daily energy), and particularly so among children from the lowest socio-economic groups (Bates *et al.*, 2014; Rugg-Gunn *et al.*, 2007), ambition to improve sugar consumption behaviour from a dental perspective now increasingly chimes with higher profile interests from a range of other health professions, public policy makers

and the media (Capewell, 2016).

However, the relationship between sugar consumption and the development of caries is not straightforward, because the amount of sugar consumed is not the only concern. Frequency of intake, timing, sequencing (combination with caries protective foods such as milk), drinking style (with or without a straw), and the length of exposure all modify the cariogenicity of sugar intakes (Touger-Decker and Van Loveren, 2003). Since dietary counselling for dental patients has to take account of this complex situation, detailed dietary accounts from patients are necessary to identify dietary sugar patterns which may be cariogenic (Marshall, 2009; Moynihan, 2002; Rugg-Gunn and Nunn, 1999; Watt *et al.*, 2003; Woodward and Walker, 1994). This also enables the tailoring of diet advice to specific consumption patterns that are harmful; optimises the advice and encourages behaviour change (Wanyonyi *et al.*, 2011).

Diet diaries are the primary means by which such information may be gathered in dental care setting (PHE, 2014; Rugg-Gunn and Nunn, 1999; Watt *et al.*, 2003). Patients are asked to record on a template, the type, timing and amount of food and drink consumed, as well as the timing of bed-time, for a defined period (usually three days, comprising a combination of week and weekend

days). This dietary record allows the identification of cariogenic dietary habits, prompts discussion between the dentist and patient, and helps to identify behaviour change goals (Watt *et al.*, 2003). The use of diet diaries as a tool of dietary assessment has been recommended by standard dental textbooks in this area (Rugg-Gunn and Nunn, 1999; Wilkins and Wyche, 2013) as well as clinical guidelines and policy documents for preventive dental practice in the UK (PHE, 2014; SDcep, 2010). In England, the current guidance from a panel of experts recommends the use of diet diaries (PHE, 2014). This guidance is circulated to all English NHS practices and dentists and has been incorporated into clinical care pathways which now form the basis of commissioning and delivery of dental care in England (Harris and Bridgman, 2010).

However, despite the recognised merits of diet diaries as dietary assessment and self-monitoring tools, little is known about the prevalence of their use of diet diaries in dental practice. A recent systematic review shows that there is only one other study in this area (Franki *et al.*, 2014) - undertaken among American hygienists; only 4% of whom reported using diet diaries (Levy and Raab, 1993). In light of the general recognition that tailored dietary advice may facilitate behaviour change (Harris *et al.*, 2012), and the consequent necessity to obtain detailed dietary information to allow effective tailoring, we set out to investigate the prevalence and frequency of diet diary use in English dental practices and to examine the factors which influence their use.

Methods

A postal survey of general dental practitioners (GDPs) was carried out in the North West region of England between September 2014 and January 2015. Ethics (reference 14/LO/1204) and NHS research governance approvals were obtained before commencing the study.

A cluster sampling strategy was used to select study participants from both NHS and fully private practitioners. Although the sample was drawn from a sampling frame of GDPs from the North West of England, stratification according to dental caries prevalence data was used to enable the dataset to be more generalizable. A sample size of 385 GDPs was identified as sufficient to allow an estimate of the proportion of GDPs using diet diaries in their everyday practice, with 95% confidence. Given that no previous investigations have addressed the issue of diet diaries use in English dental practices, the calculation of sample size was based on the assumption that half the GDPs would use diet diaries. This sample size was expanded to compensate for 30-40% expected response rate which was based on findings of recent surveys among UK GDPs (Aggarwal *et al.*, 2012; Yip *et al.*, 2013).

A total of 1,060 practitioners, including 102 GDPs from completely private practice, were recruited in a two-stage cluster sampling process. We firstly selected a number of Local Authorities (LAs) in the North West of England (in a stratified random sample of LAs which reflected the proportion of LAs having low, medium or high levels of caries prevalence across a national picture). We then identified all GDPs practising in

the LA areas selected. Stratification of LAs into three levels of caries prevalence (high, moderate and low), was done using the latest dental health data of routine national survey of 5-year-olds (PHE, 2012). Lists of the names and addresses of dentists practising in each LA were obtained from Care Quality Commission (CQC) in combination with information displayed on the NHS Choices website (publicly available information giving reviews and information on all local dental practices), to allow both NHS and private practitioners to be included in the sample. All practitioners in each practice, including newly qualified dentists, were included in the sample list, with GDPs asked about their individual work rather than that of their dental practice as a whole. Orthodontists and dentists providing service to prisons and providing care in dental access practices, dental hospitals and community dental service were excluded. LAs from each stratum were randomly listed and then sequentially added to the sample frame until the optimum number of participants in each stratum was reached or exceeded. The total sample size was equally divided between the three strata.

A socio-economic descriptor of the area in which the practice was located was included in the dataset by linking practice postcodes to area data on the Index of Multiple Deprivation (IMD) in which IMD scores of national data are divided into quintiles with areas ranked in a five-point scale from the most deprived 20% of areas (first quintile) through to the least deprived 20% (fifth quintile). The dataset also included whether the practice was located in a high, medium or low caries prevalence area, by linking practice postcodes to locally collected epidemiological data on the caries experience of five-year-olds described by LA area.

A self-administered questionnaire was developed from the available dental literature about diet diaries (Rugg-Gunn and Nunn, 1999) and through discussion among the research team. The questionnaire was pre-tested for clarity and face validity among 20 dentists at Liverpool University Dental Hospital (LUDH), who were asked to complete the questionnaire and provide feedback regarding each question. Two participants were interviewed while completing the questionnaire, in a thought-listing exercise to fully understand any area of ambiguity in the questionnaire content and layout. The participants in the questionnaire piloting process were not included in the final sample.

The questionnaire comprised these sections: 1, GDPs' demographic, professional and dental practice characteristics; 2, types of patient groups, whether any particular groups were targeted to receive dietary advice, and whether dietary advice was given personally by the dentist or through referral to a dental team member; 3, clinical practice regarding dietary advice, and in particular the use of diet diaries; and 4, any reasons for using diet diaries and the usual routines and considerations regarding this. GDPs were asked to estimate the approximate percentage of their patients for whom they would personally give or refer to others in the dental team, for dietary advice. Likewise they were asked to estimate the proportion of their patients (children and adults), for whom they used certain dietary assessment methods.

Following best practice in maximising response rate in postal questionnaires (Edwards *et al.*, 2002), the questionnaire was printed in the form of a coloured booklet and mailed to participants, in a pre-paid return envelope along with a covering letter which was personally addressed and signed by the principal investigator. After three weeks a second mailing was sent and a third, three weeks after the second.

Data were analysed using SPSS v.22.0 (Armonk, NY: IBM Corp.), first to describe demographics and professional characteristics of the respondents, dental practices' characteristics and responses to closed questions. Then chi-squared tests, independent samples t test and Mann-Whitney U test were used to predict the use of diet diaries from respondents' characteristics. Binary logistic regression models were fitted to compare the use with non-use of diet diaries across a range of demographic, professional and dental practice variables, with both univariate and multivariate analyses undertaken.

Comparing the characteristics of early and late respondents has been suggested as one of the strategies that can assess the threat of response bias on results generalisability (Lindner *et al.*, 2001), based on many observations which show that late respondents show more similar characteristics to non-respondents (Tickle *et al.*, 2003). We therefore compared respondents to the first, second and third mailings according to their gender, role in the practice, area's caries level, IMD quintiles and years practising since qualification. Chi-squared tests and one way Anova test were used.

Results

Of the 1,060 questionnaires mailed to GDPs, 250 responses were received. A further 88 were returned to the sender because the dentist had left the practice, had retired, was on maternity leave, the practice had closed or the dentist had declined to participate. The overall response rate was therefore 26.0% (250/972). Demographic, professional and practice characteristics of respondents are summarised in Table 1. Respondents had a mean 21.5 (SD 12.1) years of service since qualification, 90.0% (234) of them undertook some NHS work and the majority were males (58.0%, 146) and associate dentists (dentists sub-contracting to the practice owner) (60.0%, 149). Although most respondents worked in practices located in first and second quintile IMD areas (most deprived), there was a relatively even spread of practices according to LA caries prevalence (high, medium and low). The reason for this difference is accounted by the fact that LA areas represent a generally larger catchment area than the electoral ward areas represented by IMD scores. On average, GDPs responding reported that 69.0% (SD 35.0%) of their patients were NHS patients, and 24.0% (SD 17.0%) were children.

Almost all GDPs (99.2%, 248) responding reported personally giving diet advice of some sort to patients, with 40.0% (100) reporting that they also referred patients to dental care professionals such as dental hygienists (DCPs) for diet advice. The general picture is that dietary advice was not provided to all patients, with GDPs estimated that they personally gave diet advice to a mean of 63.0% (SD 30.0%) of their patients, and that they undertook dietary

advice referrals to DCPs for an average of 11.0% (SD 23.0%) of GDPs' patients. GDPs collected information in a number of ways in order to personalise the advice given; most often (41.0%, 101) by simply asking patients to recount their usual dietary habits for a week (Figure 1). Diet diaries were reportedly used by 28.0% (70) of GDPs, for, on average, 18.0% (10) of their patients. Another 21.0% (53) of GDPs used a 24-hour diet recall method to capture diet information.

Table 1. Characteristics of the study sample (n=250)

Variables	Categories	N (%)	
Gender	Men	146 (58.4)	
	Women	104 (41.6)	
Role	Practice Owner	101 (40.4)	
	Associate/other	149 (59.6)	
Practice sector	NHS	234 (93.6)	
	Private	16 (6.4)	
Year of service		Mean(SD) 21.5(12.1)	
Size of the practice		Median (Range)	
	N ^o of dentists in the practice	4 (1-11)	
	N ^o of surgeries in the practice	4 (1-15)	
Percentages of patients in the practice		Mean(SD)	
	NHS	69 (35.5)	
	Private	31 (35.4)	
	Case Mix children	23 (17.3)	
Dental Auxiliaries in the practice		N (%)	
	Hygienist	153 (61.2)	
	Therapists	109 (43.6)	
	Nurse giving dietary advice	146 (58.4)	
	Nurse applying fluoride varnish	103 (41.2)	
Practice area characteristics		N (%)	
	Caries level	Low	87 (34.8)
		Moderate	73 (29.2)
		High	90 (36.0)
	Index of Multiple Deprivation quintiles	1 (Most deprived)	82 (32.9)
		2	76 (30.5)
3		33 (13.3)	
4		34 (13.7)	
5 (Least deprived)		25 (10.0)	

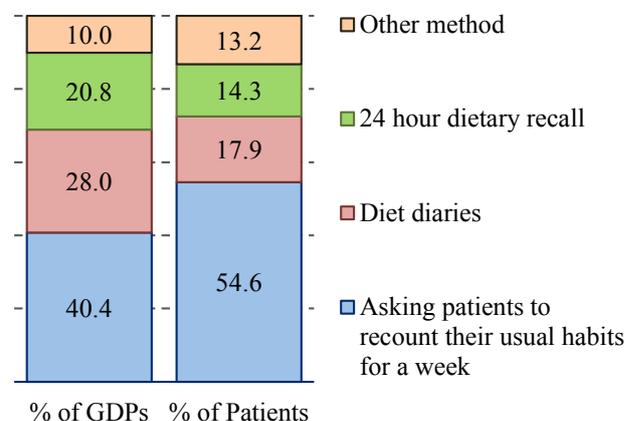


Figure 1. Distribution of methods used for collection of diet information (n=50) as percentages of GDPs reporting using each method, and for the average estimated proportion of their patients

Table 2. The usage of diet diaries (n=70)

	Mean	(SD)
Average percentage of children for whom diet diaries are used	26.7	(21.3)
Average percentage of adults for whom diet diaries are used	14.0	(16.5)
<i>Reasons for using a diet diary</i>	<i>N</i>	<i>(%)</i>
To assess patients' disease risk	45	(64.3)
To monitor patients 'dietary behaviour	35	(50.0)
As a tool to prompt behaviour change	62	(88.6)
Other	5	(7.1)
<i>Considerations when deciding to use a diet diary</i>	<i>N</i>	<i>(%)</i>
A high severity of caries experience	63	(90.0)
An appropriate ability (literacy)	26	(37.1)
Sufficient motivation of parents	37	(52.9)
Sufficient motivation of the children patients	29	(41.4)
Sufficient motivation of the adult patients	25	(35.7)
Other	2	(2.9)
<i>Routines when using diet diary</i>	<i>N</i>	<i>(%)</i>
Ask patients to include at least one weekend day	67	(95.7)
Ask patients to record the time the patient goes to bed	24	(34.3)
Ask patients to record the context of each eating/drinking occasion	46	(65.7)
Ask patients to record the timing of each eating/drinking occasion	59	(84.3)
Review the diet diary with the patient/parent to clarify the information	62	(88.6)
Analyse the diet diary immediately when the patient returns the diary	64	(91.4)
Schedule a separate appointment to discuss the diary	29	(41.4)
In the case of children aged 5-11 years old	<i>N</i>	<i>(%)</i>
Ask the child to keep the diet diaries	0	(0.0)
Ask the parent or guardian to keep the diet diaries	29	(41.4)
Ask both to keep the diet diaries	41	(58.6)
	<i>Median</i>	<i>(Range)</i>
For how long patients are asked to keep diet diaries (Days)	3	(1-7)
Time needed to a complete analysis of a diet diary (Minutes)	10	(1-23)

Table 3. Bivariate analysis and binary logistic regression models for diet diary use by demographic, professional and practice characteristics of participants (N=134)

Variable	Bivariate analysis			Binary logistic regression models				
	Using diet diaries (n=70)	Do not use diet diaries (n=64)	P value	Unadjusted model		Adjusted model		
				OR	CI (95%)	OR	CI (95%)	
Gender	Women [†]	30 (42.9)	30 (46.9)	0.64	1.00	Reference	1.00	Reference
	Men [†]	40 (57.1)	34 (53.1)		1.18	(0.60,2.33)	1.87	(0.77, 4.38)
Role	Practice Owner [†]	27 (38.6)	25 (39.1)	0.95	1.00	Reference	1.00	Reference
	Associate/other [†]	43 (61.4)	39 (60.9)		1.02	(0.51,2.05)	1.06	(0.29,3.01)
Years of service [‡]		19.4 (12.9)	21.6(11.8)	0.28	0.97	(0.96,1.01)	0.96	(0.92,1.00) *
N ^o of dentists in the practice ^{†‡}		4 (1-11)	4 (1-10)	0.81	0.95	(0.82,1.11)	1.23	(0.93, 1.62)
N ^o of surgeries in the practice ^{†‡}		4 (1-13)	4 (1-13)	0.55	1.00	(0.86,1.15)	0.81	(0.61, 1.06)
% of NHS patients in the practice [‡]		66.9 (35.0)	74.9 (30.9)	0.03*	0.99	(0.98,1.00)	0.97	(0.95, 0.99) ^
% of Case Mix children in the practice [‡]		28.2 (19.4)	23.4 (13.6)	0.34	1.02	(0.99,1.04)	1.05	(1.01,1.08) ^
Practice has Hygienist(s) [†]		46 (65.7)	36 (56.3)	0.28	1.49	(0.74,2.99)	2.09	(0.81,5.34)
Practice has Therapist(s) [†]		40 (57.1)	27 (42.2)	0.12	0.58	(0.23,1.16)	2.07	(0.89,4.80)
Practice nurse gives dietary advice [†]		45 (64.3)	36 (56.3)	0.34	0.71	(0.36,1.43)	1.50	(0.59,3.83)
Practice nurse applies fluoride varnish [†]		31 (44.3)	39 (54.9)	0.81	0.91	(0.46,1.82)	0.95	(0.37,2.43)
Caries Level [†]	High	24 (34.3)	25 (39.1)	0.82	1.00	Reference	1.00	Reference
	Moderate	19 (27.1)	15 (23.4)		1.17	(0.54,2.57)	1.02	(0.34,3.04)
	Low	27 (38.6)	24 (37.5)		1.32	(0.55,3.18)	1.59	(0.52, 4.88)
Index of	1 (Most deprived)	17 (27)	21 (30)	0.66	1.00	Reference	1.00	Reference
Multiple	2	23 (36.5)	27 (38.6)		0.94	(0.41,2.20)	0.87	(0.31,2.43)
Deprivation	3	10 (15.9)	8 (11.4)		0.65	(0.21,2.00)	0.82	(0.20,3.42)
quintiles [†]	4	6 (9.5)	7 (10.0)	0.96	0.94	(0.27,3.43)	0.61	(0.23,2.90)
	5 (Least deprived)	7 (11.1)	7 (10.0)		0.81	(0.38,2.76)	0.84	(0.77,4.39)

[†]Count (%), X²; [‡]Mean (SD), independent samples t test, ^{†‡} median (Min-Max), Mann-Whitney U test, *P<0.05, ^P<0.01; Binary logistic regression models were fitted and Odd ratios (OR) at 95% confidence interval (CI) are reported.

Further information provided by the 70 GDPs reporting their use of diet diaries indicated that they targeted their use more towards children than adults, with patient's high levels of caries experience as the main consideration (Table 2). Bivariate comparisons and binary logistic regression models revealed that having a *lower* proportion of NHS patients was predictive of clinical practice geared towards the use of diet diaries with patients, (OR=0.97, 95%CI 0.95,0.99), as well as a higher child patient case mix (OR=1.05, 95%CI 1.01,1.08) (Table 3). Table 4 summarises GDPs reasons given for not using diet diaries for children (168 responses) and adults (172 responses). The predominant concern appears to be issues related to insufficient NHS remuneration to support the time spent, although about a quarter of GDPs also perceived that the tool was not useful (Table 4).

There were no significant differences between those who replied to the first, second or third mailings according to demographic (p=0.22 for gender), professional (p=0.97 for years in service, p=0.54 for dentist's role in the practice), practice area characteristics (p=0.70 for area's caries level) and the proportion of dentists who reported they use diet diaries (p=0.44).

Discussion

Before interpreting findings, it is necessary to acknowledge that the response rate for the study was 26%, despite a range of recommended approaches being taken to maximise response rate (Edwards *et al.*, 2002). However, this level of response rate is not unusual for studies of this type involving health care practitioners, for whom response rate is known to be relatively low (Cummings *et al.*, 2001), and following a downward trend (Cook *et al.*, 2009). In these types of studies, response rates of below 50% are not uncommon, for instance, a response rate of 30% was reported in a recent survey on how UK dentists deal with adverse drug reaction reporting (Yip *et al.*, 2013).

However, response rate is not necessarily a key indicator of collected data quality (Shelley *et al.*, 2012). A more important and direct indicator of response quality is the non-response bias which results from differences between respondents and non-respondents (Dillman *et al.*, 2014), and this can occur equally in surveys with high and low response rates (Groves and Peytcheva, 2008). We therefore undertook a response bias analysis to explore this further before findings can be interpreted fairly. One approach to investigating potential response bias is by comparing respondents' data and/or characteristics with that of non-respondents obtained through direct contact

or follow up study (Vink *et al.*, 2004). However, this approach is expensive and time consuming. It also has the potential for practical and ethical difficulties as well as introducing a potential sampling error (O'Neill *et al.*, 1995; Sivo *et al.*, 2006). An alternative is to compare early and late responders - based on the assumption that delayed and non-respondents have similar characteristics (Locker, 2000; Miller and Smith, 1983; Tickle *et al.*, 2003). This approach has become increasingly applied to assess the non-response bias since it does not incur additional costs or data sources (O'Neill *et al.*, 1995; Sivo *et al.*, 2006). Using this approach our response bias analysis proved to be reassuring; showing the use of diet diary and demographic characteristics of early respondents and late respondents to be similar. Moreover, profile of our responders in terms of gender distribution (40.0% females) and NHS work (75.0%), is similar to the profile of GDPs according to these characteristics in nationally held statistics (Kravit and Treasure, 2009).

Although the response rate was low, because of the large sample size, the number of responses received still gives a relatively narrow margin of precision ($\pm 0.06\%$) around our estimate of the proportion of using diet diaries. Our study therefore gives us an idea of what is happening in the English dental practice setting, and suggests that while diet advice is a role undertaken by the vast majority of GDPs, relatively low proportion (28.0%) use diet diaries as a tool to support this activity. Bearing in mind that respondents are likely to be that most interested in this area (Kaner *et al.*, 1998; Tan and Burke, 1997), and some degree of social desirability in responses may be present (Van de Mortel, 2008), this is likely to represent the maximum figure of the population of GDPs using diet diaries in their clinical practice.

Also of interest in this study, is that giving diet advice to patients is clearly part of accepted clinical practice for dental practitioners where almost all GDPs reported giving diet advice of some sort. It should however be noted that clinical practice in this area was widely variable. The mean number of patients to which dietary advice was given was 63.0%, but with a standard deviation of 30.0%. For practitioners using diet diaries, this study provides some details as to approaches used. GDPs appear to prefer asking patients to recall their usual diet habits, which is less time-consuming than introducing records, although arguably more subject to errors and distortions of memory. This is in keeping with findings from a previous qualitative observational study involving 35 English GDPs which identified very little dietary information was communicated between dentists and their patients (Barton *et al.*, 2001). Table 4 shows a number of reasons that GDPs reported discourage the use of diaries.

Table 4. GDPs' reasons for not using diet diaries in dental practice for child and adult patients

<i>General Dental Practitioners' reasons for not using diet diaries</i>	<i>Children (N=168)</i>		<i>Adults (N=172)</i>	
	<i>n</i>	<i>(%)</i>	<i>n</i>	<i>(%)</i>
The NHS remuneration is insufficient to cover my time spent on a diet diary	82	(48.8)	80	(46.3)
Lack of knowledge needed for diet analysis	27	(16.1)	26	(15.0)
I do not feel they are useful	42	(25.0)	48	(27.7)
No need for their use	22	(13.1)	18	(10.5)
Time consuming	13	(7.7)	11	(6.4)
Poor compliance	24	(14.3)	27	(15.7)
Feels patronising and intrusive	2	(1.2)	3	(1.7)

One prominent reason is that GDPs have concerns about time and financial constraints associated with English NHS remuneration arrangements. This is supported by two strands of evidence. First, GDPs directly stated this and, second, in the multivariate analysis diary use was associated with a lower case mix percentage of NHS patients. With attention now shifting in recent years towards more fully rewarding prevention practices within the NHS dental remuneration system (Department of Health, 2015), what represents 'best practice' in terms of dental practice dietary advice needs to be clarified; with discussions around how remuneration and rewards might be set to fully recognise the time required.

Respondents reported a perception of poor patient compliance, and this formed a further barrier to diet diaries usage. Certainly, it is well recognised that user's compliance and motivation are essential to obtain reliable dietary information and hence the successful use of diaries (Thompson and Subar, 2013). However, there are no previous studies of patients' perceptions of dietary advice given in dental practice and the place of diet diaries in this, therefore further research is needed in this area. Nevertheless, collecting dietary history information on a paper template in the form of a diet diary may seem out-moded, given more recent technological interventions in the field of self-monitoring of health related data. A recent study has shown that mobile apps have the potential to motivate patients to adopt evidence based health behaviour (Underwood *et al.*, 2015). Techniques such as ecological momentary analysis which can record information on behaviour and attitudes in a real-time way, in a smart-phone application, also offer possibilities (Schüz and Ferguson, 2015). Taking photographs of food/drink using smart phones might also give a more authentic picture of patients' habits and be useful, although the impact of a social class digital divide needs to be considered and explored.

The use of diet diaries as a prompt to giving tailored health education advice is just one mechanism by which counselling may increase patient engagement and motivation to change behaviour. There is growing current emphasis on the use of risk assessment tools to highlight patients' responsibility to maintain their own health (Bratthall and Hänsel Petersson, 2005; Crall *et al.*, 2015; Featherstone *et al.*, 2007). Likewise, Motivational Interviewing (MI) which also takes a patient-centred approach, has been used to facilitate the giving of health education messages in dental practice with some success (Gao *et al.*, 2014; Harrison *et al.*, 2007). In all these approaches, however, discussions regarding dietary pattern may still be detailed, complex and necessary. The use of dietary assessment tools may therefore still be useful alongside broader risk assessment and MI methods. The issue remains however that whilst our study shows that diet-related discussions are appropriately held in dental practice setting, the tools to support this are currently underused and probably under-developed.

Conclusion

Although recommended as best practice, most English GDPs do not use diet diaries to collect diet information in dental practice, probably because of perceived constraints related to finance and time. Development of a more time efficient tool, which can assess diet and help stimulate behaviour change is needed to tackle high sugar consumption and other related dietary issues pertinent to the dental health setting.

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