Can dietary assessment in general practice target patients with unhealthy diets?

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SUMMARY

Diet is important in the aetiology and management of many conditions in primary care. Although valid dietary assessment is required for both clinical work and research, no dietary assessment instruments have been validated among patients seen in primary care. A range of simple self-completion dietary assessment questionnaires and established research instruments were compared with an accepted reference standard, a seven-day weighed record, in 111 subjects assessed in a practice nurse-run treatment room. Simple self-completion tools based on food groups and portion sizes perform as well (likelihood ratios for a positive test = 2 to 3) as much more time-consuming instruments. The error in using such instruments is comparable with the error of the standard itself. There is little justification for using time-consuming dietary assessment questionnaires, since simple tools are accurate enough to be clinically useful — to allow practice nurses to target patients for counselling and waste less time on inappropriate counselling — and also useful for research.

Keywords: *dietary assessment; questionnaires; research.*

Introduction

DIET is important in the aetiology and management of many conditions in primary care.[1] Valid dietary assessment is essential, not only for research but for clinical efficiency since inaccurate assessment will result in wasteful and inappropriate counselling.[2] Practice nurses' (PNs') roles have increased dramatically since the 1990 contract, including their involvement in dietary assessment and counselling, which has been shown to be moderately cost-effective.[3] However, cost-effectiveness of dietary counselling is critically dependent on nurse time,[3] a major part of which is spent performing dietary assessment. Thus, it is very important to assess the validity of dietary assessment methods with different nurse time requirements — particularly brief methods that could improve cost-effectiveness.

No assessment instruments administered by health professionals have been validated among patients from general practice.[2,4] Since the subjects and setting of dietary assessment are likely to affect perceptions, behaviour, and responses, validation of dietary assessment tools is needed in general practice. This paper reports such validation data for a range of dietary assessment instruments suitable for both clinical work and research.

Method

The methods have been fully reported.[5] Assuming a test method could estimate a high fat diet (>33% energy from fat) with a sensitivity of 70%, 100 patients were required to estimate sensitivity with confidence intervals of ±10%. To ensure the sample included patients who required assessment in practice, and also for a range of dietary values for validation, two groups were invited: patients attending with risk factors for cardiovascular disease (hypertension, hyperlipidaemia, obesity, smokers with a family history) invited opportunistically (a 'high risk' group); and patients randomly chosen from the practice register (a 'population' group) invited by letter. Sixty-one out of 84 (73%) and 50 out of 246 (20%) of the two respective groups agreed to participate, comparable with dietary validation studies in other settings. There was no difference in age, sex, or social class in comparing those who agreed to participate with those who did not agree,or did not respond to the invitation.[5] All participants completed a range of questionnaires chosen to reflect both clinical and research uses in United Kingdom general practice. The questionnaires were identified from a literature search and by approaching those known to be working in the area. All questionnaires were administered by a practice nurse working in the treatment room of an urban non-fundholding training practice.

The questionnaires were compared with an accepted relative standard, a seven-day weighed record in a randomised block design (Table 1; footnote). To limit test–retest interaction, the minimum gap between assessments was seven days. Seasonal drift was minimised by completion of each dataset within 12 weeks. To assess the learning effect, one instrument (HEA2) was administered at both the beginning and at the end. The validity of the standard was assessed using urinary nitrogen excretion[6] and the ratio of total energy intake/basal metabolic rate (TEI/BMR).[7] Since the agreement of test measures with the standard cannot be better than the agreement of the standard with itself, the test–retest reliability of the standard is vital to interpretation; this was assessed in 29 subjects at an interval of four weeks.

Results

Table 1 gives the background (footnote) and characteristics (column 1 and footnote) of each tool, and the performance against the weighed record. Thus, for example, HEA2 (row 7, column 1) is a self-completion questionnaire for assessment and counselling

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Table 1. Validity of assessment of major food components and foods by different dietary assessment methods. The sensitivity and specificity (likelihood ratio [LR] for a positive test; kappa) is quoted from 2´2 tables[a] comparing each test tool with the 'standard', the weighed record. For reference, the performance of the weighed record against itself from test–retest in 29 subjects is quoted in line 1 of the table.

		Sensitivity, specificity (LR; kappa)				
		Major food component			Foods	
	Format of tool[b]	% energy from fat	% energy from saturated fat	Non-starch polysaccharide (NSP)	Fruit and vegetables	Starchy foods
Weighted record (test–retest reliability: for comparison)	2; 4; 9; 13; 15; 16	77, 67 (2.3; 0.43)	83, 50 (1.7; 0.34)	94, 60 (2.4; 0.58)	86, 57 (2.0; 0.43)	100, 100 (N/A; 1.0)
Checklist diary	2; 4; 10; 13; 15; 16	48, 84 (3.0; 0.3)	84, 41 (1.4; 0.23)	80, 92 (10; 0.6)	64, 71 (2.2; 0.31)	72, 68 (2.3; 0.38)
European Prospective Investigation of Cancer Questionnaire	3; 4; 6; 13; 15; 16	68, 66 (2.0; 0.34)	84, 63 (2.3; 0.4)	64, 64 (1.8; 0.21)	43, 88 (3.6; 0.25)	63, 63 (1.7; 0.24)
Structured nurse questions	2; 5; 6; 12; 14; 16	78, 51 (1.6; 0.3)	93, 21 (1.2; 0.18)	82, 56 (2.4; 0.36)	79, 60 (2.0; 0.38)	83, 33 (1.2; 0.17)
24-hour recall	1; 5; 13; 15; 16;	73, 53 (1.6; 0.27)	67, 63 (1.8; 0.29)	88, 56 (2.0; 0.45)	86, 54 (1.9; 0.41)	80, 55 (1.8; 0.36)
HEA1 (food groups; portions per day)	1; 4; 7; 11; 14; 17	68, 54 (1.5; 0.23)	81, 56 (1.8; 0.31)	80, 44 (1.4; 0.24)	54, 80 (2.7; 0.28)	63, 70 (2.1; 0.31)
HEA2 (food groups; portions per day or per week)	2; 4; 7; 11; 14; 17	58, 80 (2.9; 0.36)	82, 74 (3.2; 0.46)	76, 64 (2.1; 0.35)	74, 68 (2.3; 0.38)	82, 46 (1.5; 0.29)
HEA3 (as HEA2 but frequency, portion size separately)	2; 4; 8; 11; 14; 17	61, 78 (2.8; 0.38)	85, 31 (1.2; 0.15)	91, 24 (1.2; 0.18)	78, 62 (2.1; 0.39)	81, 54 (1.8; 0.36)
DINE	2; 5 (4 possible); 6; 12; 14; 18	72, 47 (1.4; 0.19)	63, 70 (2.1; 0.22)	93, 22 (1.2; 0.19)	100, 0 (N/A)	86, 42 (1.5; 0.3)

[a]'Target' cut-offs used to generate 2´2 tables: based on national targets: percentage energy from fat: 33% energy from fat. Percentage energy from saturated fat: 10% energy from saturated fat. Non-starch polysaccharide: 18g or less per day; precise national targets not available. Fruit and vegetables: 350g or less per day (= below upper tertile). Starchy foods: 325g or less per day (= below upper tertile).
[b]Format of tool: assessment period: 1 = one day; 2 = seven days; 3 = one month or more. Format: 4 = self-completion; 5 = nurse administered. Type: 6 = food frequency; 7 = portion calculation; 8 = portion, no calculation; 9 = weigh foods; 10 = daily food checklist. Time taken: 11 = 5–10 minutes; 12 = 11–30 minutes; 13 = >30 minutes. Data entry time: 14 = 5–10 minutes; 15 = 11–20 minutes. 'Manual' counselling: 16 = no/difficult manual counselling; 17 = based on food type/groups; 18 = based on fat/fibre/polyunsaturate:saturate score.
Background to tools. HEA1 was developed by the Health Education Authority (HEA) to assess food eaten from major food groups in a 'normal day'; versions expanding this to include a 'normal week' (HEA2/3) were developed by the research team for this study. The Dietary Instrument for Nutritional Education (DINE) was developed at the ICRF group in Oxford and has been widely used in research.[4] The EPIC questionnaire and the checklist diary were developed as part of one of the largest cohort studies to assess the relationship between diet and disease.[9] 24-hour recall is a standard and formal dietary assessment. Structured nurse questions were developed by the research team for this study. Order of completion. Baseline: Nurse Questions/HEA2; Randomised block 1: DINE/EPIC/HEA1; Randomised block 2: 24-hour recall + HEA3/checklist; Weighed record/BMR/24-hour urine; HEA2 administered again (to assess learning effect).

based around patients estimating the number and size of food portions (in five food groups) eaten per day or per week, and takes five to 10 minutes to complete. For categorisation of percentage energy from fat when compared with the weighed record (column 2), HEA2 has a sensitivity of 58, a specificity of 80, a likelihood ratio for a positive test of 2.9, and a kappa of 0.36. Although this is apparently a moderate agreement, the main limitation is not likely to be the error in the questionnaires, but is inherent in the assessment of diet, since the questionnaires' performance is comparable to the performance of the standard against itself (respectively, 77, 67, 2.3, and 0.43 [line 1]). Overall, simple self-completion tools (e.g. HEA2/3) perform as well as the nurse-completed brief tools (e.g. the Dietary Instrument for Nutritional Education), or more time-consuming methods, and almost as well as the standard. Forty per cent of subjects had a TEI/BMR ratio of less than 1.2; i.e. under-reporting total energy intake,[7] similar to most dietary studies and more common (60%) in obese subjects (body mass index 30). Nitrogen excretion correlated well with protein intake from the weighed record (r = 0.57). Repeated administration of HEA2 showed no learning effect.

Discussion

This is the first study demonstrating the validity of simple dietary assessment supervised by practice nurses in general practice. What are the limitations of this study? All dietary validation studies are limited by the associated change in eating behaviour and by recall bias: the low TEI/BMR ratio for many subjects in this and most other studies[8] suggests 'absolute' intake is systematically under-reported. The good rank correlation of urinary nitrogen supports the use of the weighed record as a 'relative' standard, and quoting percentage energy from fat rather than absolute intake limits the effect of under-reporting.[6] The single practice, multiple assessments, and low acceptance rate in the general population group are a potential threat to generalisability. However, the low uptake in the population group probably reflects both the postal invitation and the inherent difficulty of dietary validation studies, since the acceptance rate is comparable with other dietary validation studies. Furthermore, the characteristics of participants and non-participants were similar, there was no evidence of learning effect, and the generalisability of assessment was maximised by using written proformas. Thus,

this study is likely to give a reasonable estimate of the relative validity of available tools for both research and clinical work in primary care.

Simple self-completion tools based on food groups and portion sizes (HEA2/3) perform as well as more time-consuming instruments — comparable with the performance of the standard itself and with other clinical measurements. Such simple tools are accurate enough to be useful, not only for research, but also for clinical practice. They will allow practice nurses to target patients for counselling and waste less time on inappropriate counselling.

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