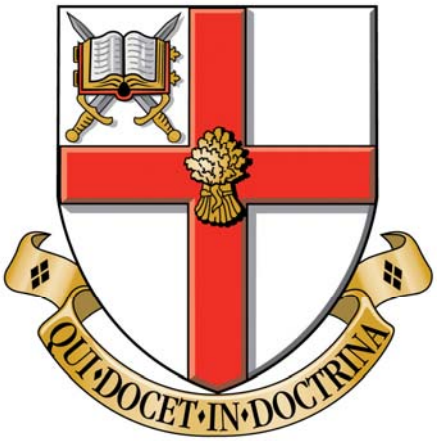

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Title: Fruit and vegetables on prescription: a brief intervention in primary care

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Abstract

Background Increasing fruit and vegetable consumption is a goal for the UK. Therefore, the effectiveness of a fruit and vegetable voucher scheme coupled with key '5-a-day' consumption messages as a brief intervention in primary care consultations was assessed in this study.

Methods 1188 vouchers as a prescription for fruits and vegetables were routinely distributed to patients attending a primary health care centre in a deprived area, and 124 volunteer patients routinely attending the centre were included. Telephone based questionnaires were used to examine changes in consumption in the short and medium term. Other key aspects assessed in the evaluation related to fruit and vegetable purchasing behaviour, knowledge relating to what constitutes a portion size, the relationship between food and health, and barriers to consumption.

Results Although 76.2% of participants used the prescription vouchers when purchasing fruits and vegetables, a significant change in the consumption or purchasing behaviour was not observed ($p>0.05$). Participants' level of knowledge relating to number of portions recommended and the portion size of different fruits and vegetables showed moderate increase from baseline to short term and to medium term. The primary barriers to fruit and vegetable consumption were reported as 'the quality of fresh fruits and vegetables' and 'the money available to spend on food'.

Conclusion The use of "the fruit and vegetable on prescription" scheme was an effective method of engaging participants in improving awareness of key diet related health messages. However, further intervention is required to produce a significant impact on the actual behaviour change.

Keywords fruit and vegetable prescription, mainstreaming prevention, health settings

Introduction

The World Health Organisation (WHO) recommends a daily intake of 400 g of fruit and vegetables a day (WHO, 2009). The United Kingdom (UK) differs from most other countries in Europe in translating this recommendation into five *portions* of fruit and vegetables per day. Although a global proposal to increase fruit and vegetable intake was launched, the minimum intake of fruit and vegetables has still not been achieved by many populations (Casagrande *et al.*, 2007; Bates *et al.,* 2010). In the UK, the average fruit and vegetable intake has remained less than five portions per day: 234 g per day in men and 253 g per day in women (Bates *et al.,* 2010). Lower levels of consumption have been noted amongst younger adults, children and those on low incomes (Henderson *et al.,* 2002; Bates *et al.*, 2010).

It is known that an individual's likelihood of achieving '5-a-day' is affected by many factors such as socio-economic status, health status, nutritional knowledge, awareness of the health impacts of different foods, skills and confidence in buying, preparing and serving fruit and vegetables, as well as accessibility of shops selling good quality food **(**Kearney *et al.*, 2005). Amongst all these factors, the socioeconomic gradient is accepted as one of the major determinants of health (WHO, 2002; Marmot, 2007), thus lower socio-economic groups are particularly likely to consume inadequate levels of fruit and vegetables (Department of Health, 2003). Research has also shown that determinants, such as gender, age and smoking may affect fruit and vegetable consumption. Being female, slightly older, non- or ex- smoker, married or living with someone, with a high education level, is correlated with higher fruit and vegetable consumption (Estaquio *et al*., 2008; Pollard *et al.*, 2001; Pérez-Lizaur *et al.,* 2008).

In the UK central and local government have had a specific focus on improving nutrition across all socioeconomic groups but particularly those in the most deprived groups. In 2004 the Government White Paper, *Choosing Health: Making healthier choices easier* (Department of Health, 2004), emphasised the need to mainstream health promotion and disease prevention by addressing risk factors such as poor diet, in particular low fruit and vegetable consumption. It also detailed the action required if public health work was to be embedded in the day-to-day work of health professionals and, promised funding for training and public health capacity building in primary care (Department of Health, 2004). However, despite the evidence base linking fruit and vegetable consumption with health, there is clearly a problem in bringing about behaviour change at a population level in the required direction (Guenther *et al.*, 2006; Bates *et al.*, 2010).

One approach to increasing the consumption of fruit and vegetables among those living in disadvantaged circumstances that has been developed in recent years is the use of financial incentives, for example, through providing vouchers that give access to free or discounted fruit and vegetables. Studies carried out in the United States of America (USA) and based on an experimental study design have shown that providing vouchers to low income groups can increase fruit and vegetable consumption (Herman *et al*., 2006; Anderson *et al.*, 2001). Using a survey methodology, Kunkel *et al.* (2003) also showed that vouchers provided to low-income seniors for use at local farmers' markets in the USA, increased fruit and vegetable consumption. In Wales, Burr *et al.* (2007) showed that providing vouchers was a simple and effective method of increasing the intake of fruit juice amongst pregnant women in a deprived community. There is therefore some evidence to suggest that financial incentives might be an effective mechanism that could be integrated into a brief intervention delivered in a primary care setting.

The 'Reconnecting Food and Health in Castlefields' project was an example of a brief intervention deployed in primary care consultations to address fruit and vegetable consumption. It aimed to improve the amount of fresh fruit and vegetables consumed by Castlefields Health Centre patients through a sustained approach that involved the delivery of dietary advice, the provision of a prescription for fruit and vegetables coupled with key '5-a-day' messages and "Cook and Taste" sessions. The prescription also contained some '5-a-day' educational information. The scheme aimed to utilise routine primary care encounters to improve access to, and consumption of, fruit and vegetables, and increase food knowledge and skills **(**Kearney *et al.*, 2005).

This paper reports on the findings from an exploratory small-scale pilot study, which set out to test the feasibility of introducing the 'Reconnecting Food and Health in Castlefields' project (previously described by Kearney *et al.*, 2005) and evaluate its impact. Given that this type of brief intervention (a prescription for fruit and vegetables supported by key 5-a-day messages) had not previously been used in the primary care setting a small-scale pilot study was justified. It was hypothesised that a prescription scheme for fruit and vegetables in a primary health care setting 1) improves knowledge and awareness relating to key messages about food and health; and 2) increases fruit and vegetable purchasing behaviour and consumption in the short and medium time frame following intervention.

Methods

Castlefields ward experiences the greatest level of multiple deprivation across all the Halton wards (a local authority area in the North West of the United Kingdom). The ward suffers the lowest ranking for income, employment, health and education (National Neighbourhood Statistics, 2000). For these reasons, this area was chosen for the research setting. Patients who routinely accessed Castlefields Health Centre (the primary health care setting) between February-June 2005 comprised the study population. The prescriptions for fruit and vegetables were distributed by GPs, nurses, health visitors and midwives to all patients, aged over 16 years, attending regular clinics at the Castlefields Health Centre and who were mentally and physically able to use the prescription. Adults who were severely ill, in emergency situations, had severe mental illness or significant cognitive impairment and those whom the clinician deemed the intervention would be inappropriate, were excluded. All clinicians were asked not to target particular patient or disease groups. All patients receiving prescriptions were asked to complete a Reconnecting Food and Health referral form. Included with the referral form was a consent to be contacted form to request patients' participation in the evaluation. Each participant signed a consent form before recruitment. Ethical approval was obtained from Cheshire North & West Research Ethics Committee (No: 05/Q1506/50).

Each prescription was coded with a unique patient number which was recorded on the Reconnecting Food and Health database against the referred patient's details. Each patient was provided with one prescription, which was made up of 4 vouchers. Each voucher offered a discount of £1 for every £3 (or more) spent on fresh fruit and vegetables over 4 weeks at the ASDA superstore, Halton Lea. No more than one voucher could be used at each transaction. ASDA was the principal commercial retail outlet in Runcorn used by the majority of the local population, therefore its involvement in the scheme maximised accessibility. Each time a voucher was cashed at the retailer, it was stamped and dated. This enabled identification of when and where the vouchers had been spent. The unique patient number enabled the redeemed vouchers to be matched with the corresponding patient information in the Reconnecting Food and Health database. The unique patient number was used in analysis to ensure patient information and data remained anonymous.

In advance of the Reconnecting Food and Health project, all clinical and administrative staff at the health centre received face to face training provided by the practice's lead health visitor and Halton PCT '5-a-day' coordinator. This training was supplemented by written briefings to emphasise the key '5-a-day' messages and strategies for tackling barriers to healthy eating. A whole practice approach to the project was adopted with bowls of fruit placed in a number of locations in the health centre, including clinicians' desks.

Patients were offered (free) fruit during consultations as well as while in the waiting room where they were engaged by trained volunteers. Patients were also given '5-a-day' promotional leaflets and there were leaflets and posters displayed around the health centre. Participants were assessed in relation to changes in awareness and knowledge about the recommendations, as well as improvements in fruit and vegetable consumption patterns. The instrument used was a questionnaire which was largely derived from the Department of Health FACET (Five-a-Day Consumption Evaluation Tool) questionnaire, a validated tool used to evaluate national '5-a-day' programmes and projects. The questionnaire included questions which allowed detection of changes in fruit and vegetable consumption patterns, the awareness about recommendations and portion sizes of fruits and vegetables, and the barriers to buying fruit and vegetables. Additional questions about general characteristics of participants such as eating patterns, physical activity level and alcohol consumption were included and an extended list of fruits and vegetables (consumed over the last 24 hours) was developed.

Furthermore, the effectiveness of the voucher scheme, including the main incentives and barriers, was assessed at repeated time points. The questionnaire was piloted on the population prior to commencement of the evaluation, members of whom were excluded from the general study population. The questionnaire was administered over the telephone at baseline (T0: 7-14 days after provision of the prescription) and followed up at 3-6 weeks (T1: short term) and 16 weeks (T2: medium term) from prescription issue. Telephone interviews were selected to reduce the inconvenience to participants and to help reduce drop out and non-response rate.

Data from questionnaires and redeemed prescriptions were matched and coded. SPSS v 17.0 was used for statistical analysis. Normality of data was assessed using the Kolmogorov-Smirnow test. Since data were not normally distributed, the Friedman test was used to determine whether there were significant changes in consumption patterns and to compare the results across the three time intervals. The Wilcoxon Signed Rank test was used to determine change between each of two time intervals. The percentage change in relation to participant consumption of fruit or vegetables were analysed using Chi-squared test. The Friedman test was used to rank the importance of the barriers to consumption of fruits and vegetables. Tests were performed at the 5% (0.05) significance level.

Results

Overall, 621 patients received a prescription, completed the referral form and agreed to participate in the evaluation during the five month period. This led to 124 (T0), 84 (T1) and 54 (T2) people being interviewed by telephone. Table 1 shows the baseline characteristics of the participants. Participants were mostly female and described themselves as non-smoking, fairly physically active, and their household income was mostly lower than £1300 per month. The majority (96.8%) preferred supermarkets for buying fruit and vegetables. At T1, 76.2 % of participants reported that they used the prescription vouchers while purchasing fruits and vegetables. A wide range of fruits and vegetables were purchased with vouchers: apples, bananas, grapes, strawberries, oranges, watermelons, pineapples, plums, pears, carrots, potatoes, cabbage, lettuce, cauliflower and broccoli (Detailed data not shown).

Table 2 presents fruit and vegetable consumption in a typical day and over the 24 hour period immediately before the interviews. The results indicate that participants reported consuming 5 portions of fruit and vegetables at T0 and T1, but it was decreased to 4.5 portions at the T2. However, no significant difference in consumption was obtained across the three time points nor between any two time points ($p>0.05$) (Table 3). Furthermore, the consumption patterns were similar: there was no significant change in the number of participants who neither consumed fresh fruits as a part of breakfast, pure unsweetened fruit juice, fresh, frozen, tinned or dried fruits as a dessert nor a bowlful of salad ($p>0.05$) (Data not shown). Although there was no statistically significant difference in the amount or pattern of consumption, a number of the participants stated that their fruit and vegetable consumption had increased compared to the consumption before the vouchers (48.8 % [n=84] and 62.7% [n=51] of participants, respectively at T1 and T2). The ‘general promotion of five a day message and importance of it’ was reported as the most effective factor in motivating participants to increase consumption at T1 and T2 (respectively, 59.4% and 45% of participants). This was followed by ‘the clinical staff providing the prescription’ and ‘fruit and vegetable in reception area/GP rooms’. On the other hand, 50.0% and 35.3% of participants, respectively at T1 and T2, stated that their consumption did not increase because of the voucher project. Their main justifications were ‘already eating lots of fruits and vegetables’, ‘insufficient value of vouchers’ and ‘quality of fruit and vegetables in the shops’. Twenty-two participants suggested some ideas for improving the programme: increase the value and time validity of vouchers, as well as extend the number of outlets where they can be used.

Table 4 shows the participants’ knowledge of recommendations about the number of portions of fruits and vegetables that should be consumed in a day, and the portion sizes of

different fruits and vegetables, based on answers to 11 questions within the questionnaire. 83.7% of the participants (n=103) stated that they already knew of the '5-a-day' recommendation prior to the study, a further 14.6% (n=18) said that they had learnt of the recommendation during the study. A total score was calculated as a sum of the correct answers of questions relating to recommended daily consumption amount and portions sizes of fruit and vegetables (Figure 1). The median of the total score at T0 was 5 (with a range 0-10), whereas it was 6 at the T1 and T2 (with a range 0-10). Although the difference was not significant across the three time points (p=0.204, Friedman test), significant improvements between T0→T1 and T0→T2 were obtained (p=0.000 and p=0.048, respectively, Wilcoxon signed ranks test). The portion size of some fruit and vegetables such as apples, peas, carrots and tomatoes were correctly identified by most of the participants, however there was a lack of knowledge about the portion sizes of dried fruits, raspberry flavoured yoghurt, potato and orange squash or juices.

The primary barriers to fruit and vegetable consumption were stated as 'the quality of fresh fruits and vegetables' and 'the money available to spend on food' at T0, T1 and T2. However, other barriers such as 'price of fresh fruit and vegetables', 'knowledge about ways to prepare fresh fruit and vegetables', 'likes/dislikes of the household' and 'time to prepare fresh fruits and vegetables' were ranked differently in priority at different stages of the study (Detailed data not shown).

Discussion

Kearney *et al.* (2005) have suggested that delivering a brief intervention in the form of a prescription for fruit and vegetables supported with a '5-a-day' message could serve as a model for embedding public health action in primary care. The findings from this study indicate that the intervention was acceptable to the clinicians who introduced the brief intervention into their routine patient encounters. It was also acceptable to some patients: in a 5 month period 621 patients received a prescription – 2,484 vouchers in total – and 1,188 vouchers were used, a voucher usage rate of 47.8%. However, it is important to consider the reasons why consumption of fruit and vegetables did not increase.

It has been suggested that knowledge of the '5-a-day' recommendation is positively associated with the increased fruit and vegetable consumption (Campbell *et al.*, 1999). Baseline knowledge of the '5-a-day' recommendation was higher in this study compared with other studies (Stables *et al.*, 2002). It is therefore plausible that awareness was gained from other promotional tools such as media campaigns, reporting and general advertising and the

‘5-a-day’ logo presented on many packaging materials in supermarkets. However, the knowledge of portion sizes of various fruit and vegetable was limited. Furthermore, some participants reported that they already ate sufficient fruit and vegetables. High baseline levels of knowledge and consumption might indicate that those participating in the project and its evaluation were a self-selected group of individuals. One of the challenges to projects delivered in areas of deprivation is engaging those who have most to gain from the intervention. It may have been the case that this study tended to engage those who were already familiar with the importance of fruit and vegetable consumption and, consequently, buying and eating fruit and vegetables. Most of the participants were older than 45, female and non-smoking in this study. The potential influence of clinicians in recruitment is also relevant to note; if clinicians were viewed as valued sources of information and advice then some patients may have been more likely to participate in the study.

A further factor to consider is the reliability and validity of using an instrument based on self-report. The questionnaire used in this study was based on the well-validated FACET tool and self-report is commonly used to measure consumption. However, the fact remains that there is inevitably uncertainty associated with the measures of consumption used in this study and there may well have been a drift towards people reporting on the basis of social desirability. Similarly, the use of a baseline measure 7-14 days after the issuing of the prescription might have inflated some of the measures. Ideally, the baseline should have been on the day the prescription was issued (to record consumption prior to the use of the prescription). However, the participant recruitment process for which ethical approval had been given made this difficult to do in practice. For those who agreed to participate, details were passed to the researcher, who then attempted to make contact for the first time to confirm their consent and collect the baseline information (T0). In reality this process took between 7-14 days because of the time that elapsed between contact details passing from clinician to researcher and the time it then took the researcher to make contact with the patients, with, in some cases, the weekend intervening in between. It would have been difficult to have collected the information prior to the issuing of the prescription; this would have involved clinicians asking all patients seen for this information, which would have been redundant if the patients had either declined the prescription or declined to participate in the evaluation. The study design was observational and small-scale: this was thought to be justified in a context of testing out a new intervention in a novel setting with limited resources. There are also major challenges to conducting an evaluation in a ‘real world’ setting in which ethical issues and practical difficulties constrain design of the study. The fact

that this was not an experimental study design and had no control group for comparison weakens the conclusions that can be drawn from the study and indicates the need for future research in this area. The study also had a large degree of attrition over its duration; of the original 621 patients who received a prescription only 54 were contacted at 16 weeks. This may have further biased the sample due to selective drop out in favour of those who were more likely to use the vouchers, know about the value of eating fruit and vegetables and actually consume them.

In spite of these limitations, the study provided some insights into the perceived value of a brief intervention voucher-based scheme. The high cost and high spoilage rate of fruit and vegetable, the accessibility of fruit and vegetable shops, time needed for preparation, lack of cooking skills and difficulties in giving up favourite foods in an obesogenic environment have been reported as the main barriers to consuming fruit and vegetable in low socioeconomic groups (FSA, 2001; Reicks *et al.*, 1994; Yeh *et al.*, 2008; Pérez-Lizaur *et al.*, 2008). Participants in this study reported that the high cost of fruit and vegetables was the main impediment to adequate consumption. Furthermore, participants reported that the prescription was limited in relation to the value and time validity of the vouchers as well as the limited number of outlets where vouchers could be used.

In conclusion, a prescription scheme for fruit and vegetables in a primary health care setting resulted in limited success. A single intervention such as in this study may not be enough on its own to lead to change in purchasing behaviour and further investigation would be needed to see if repeated or reinforced interventions would be more effective. In addition to further intervention, longer term strategies need to be developed to produce demonstrable long-term changes in behaviour via a discounted scheme and supporting educational activities.

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Conflicts of interest, source of funding and authorship

The authors declare that they have no conflict of interest.

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Figure 1. Total score of the correct answers to questions relating to recommended daily consumption amount and portions sizes of fruit and vegetables

Fig 1: Total correct answer score

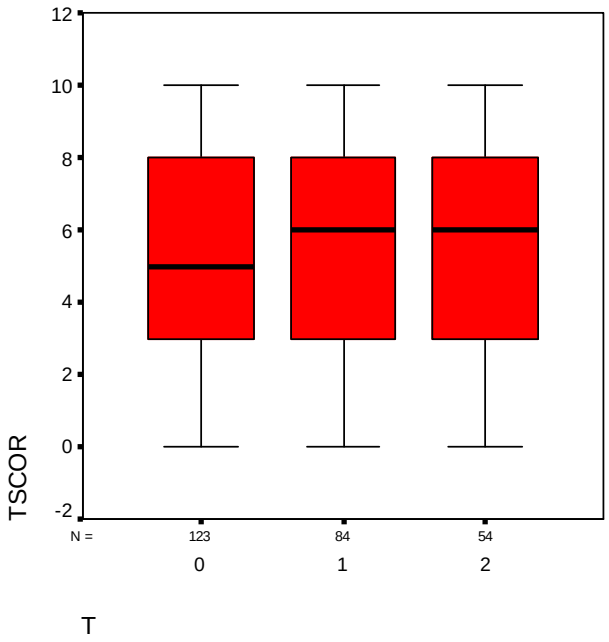

Table 1: General Characteristics of Participants

	Total(n=124)	Male (n=35)	Female (n=89)
Age	**%**	**%**	**%**
16-25 years	10.5	0.0	14.6
26-35 years	12.1	2.9	15.7
36-45 years	16.9	8.6	20.2
46-55 years	12.1	8.6	13.5
56-65 years	25.0	42.8	18.0
65-70 years	8.1	14.3	5.6
70 years +	15.3	22.8	12.4
Monthly income			
<£430	15.3	20.0	13.5
£431- £870	33.9	22.9	38.2
£871- £1300	19.4	28.6	15.8
£1301- £1730	8.1	11.4	6.7
More than £1730	10.5	11.4	10.1
Do not know	12.9	5.7	15.7
Smoking Status			
Yes	32.3	31.4	32.6
No	67.7	68.6	67.4
Consumption of Alcoholic Drinks			
Yes	64.5	77.1	59.6
Never	35.5	22.9	40.4
Physical active level			
Very active	19.4	20.0	19.1
Fairly active	43.5	54.3	39.3
Not very active	27.4	14.3	32.6
Not at all active	9.7	11.4	9.0
The place which most of fruit and vegetables were bought from			
Supermarket	96.8	94.2	97.8
Greengrocers	0.8	2.9	0.0
Halton Food Co-op	0.8	2.9	0.0
Others	1.6	0.0	2.2

Table 2: Fruit & vegetable consumption patterns

	T0 (n=124) Median (Min-Max)	T1 (n=84) Median (Min-Max)	T2 (n=54) Median (Min-Max)	p
Usual fresh fruit consumption (no of portions per day)	3 (0-7)	3 (0-7)	2.5 (0-6)	0.433
Usual vegetable consumption (no of portions per day)	2 (0-7)	2 (0-7)	2 (0-4)	0.562
Fruit (fresh, frozen, dried or tinned) consumption over the previous 24 hour period (no of portions)	2 (0-7)	2 (0-7)	2 (0-7)	0.371
Vegetable (fresh, frozen, dried or tinned) consumption over the previous 24 hour period (no of portions)	2 (0-7)	2 (0-7)	2 (0-6)	0.426

Table 3: Evaluation of the differences in consumption pattern between two interview time points

	p value
Usual fresh fruit consumption(no of portions per day)	0.433
T0→ T1	0.335
T0→ T2	0.305
T1→ T2	0.186
Fruit (fresh, frozen, dried or tinned) consumption over the previous 24 hour period (no of portions)	0.371
T0→ T1	0.659
T0→ T2	0.124
T1→ T2	0.387
Usual vegetable consumption (no of portions per day)	0.562
T0→ T1	0.994
T0→ T2	0.577
T1→ T2	0.725
Vegetable (fresh, frozen, dried or tinned) consumption over the previous 24 hour period (no of portions)	0.426
T0→ T1	0.940
T0→ T2	0.354
T1→ T2	0.082