A randomized controlled trial to assess the psychological impact of a family history screening questionnaire in general practice

Nadeem Qureshi, PJ Standen, Rhydian Hapgood and Joanna Hayes


**Background.** It has been postulated that systematic enquiry about patients’ family histories of inherited illnesses would lead to a population of ‘worried well’.

**Objective.** The purpose of the present study was to evaluate if the use of a family history screening questionnaire (FHSQ) as part of a general practice health check leads to psychological distress.

**Method.** We conducted a randomized controlled trial of a self-administered FHSQ in a single general practice. Individuals who had not had a health check within the previous 2 years were randomized within three age group strata to intervention group (receiving health check and FHSQ) or control group (only receiving health check). A total of 156 patients were offered health checks; 100 accepted and 76 of them were followed through to the 3-month end point. Responses to the six-item Spielberger State–Trait Anxiety Inventory (STAI), Perception of Health questionnaire and Family History Concern questionnaire were compared between intervention and control groups.

**Results.** A two-way analysis of variance on the STAI scores 1 and 2 weeks after the health check with baseline scores as a covariate showed that at both times anxiety was higher in the intervention group than in the controls ($F = 6.4; d.f. = 1,73; P = 0.014$). Three months later, there was no significant difference between the two groups. The Perception of Health questionnaire only showed a significant result at 1 week, the intervention group having a more pessimistic response to the question eliciting patient’s concerns about future health ($P = 0.025$).

**Conclusion.** Short-term psychological distress due to the family history screening questionnaire was identified but did not persist.

**Keywords.** Anxiety, genetic screening, medical history taking, primary health care, randomized controlled trial.

Introduction

“The genomic challenge is huge, and the NHS is poorly prepared to meet it.”¹ The human genome project aims to identify all the genes in human DNA and so uncover the molecular basis for many traits and diseases. For the health benefits of the human genome project to be delivered equitably to the community, its health professionals must be informed about genetics and, just as importantly, be able to identify genetic risk.

Genetic predisposition is an important determinant of chronic disease and disability. Up to 60% of the population may be affected by diseases with a genetic component during their life span.² At present, however, a family history of genetic disease often goes unrecognized, and avoidable genetic risk is often recognized too late.³ Primary care deals with families in continuity over time and plays a proactive role in health promotion. These qualities make the primary care system the natural milieu for any proactive genetic screening service.⁴ Currently, in primary care, the family history is used more often for psychosocial than for genetic reasons.⁵
Collection of family history information is a recognized component of the new patient registration in primary care, with up to 30–40 patients per GP requiring referral or counselling for familial cancer risk.6,7 GPs recognize the need for evidence-based approaches for identifying possible genetic risk and, despite being part of everyday practice, the role of the family history as a screening tool still needs evaluating.8 Evaluation of any screening intervention should include evaluation of the psychological consequence of such processes.9 There is concern that blanket screening would create a ‘worried well population’. This is particularly pertinent with untargeted genetic screening where the majority of screened patients will have negative results. Grant bodies and research ethics committees have expressed concerns that general practice-based screening family history questionnaires may create undue anxiety in the healthy population. This ‘worried well’ phenomenon has not been confirmed.10 Moreover, screened negative patients do not appear to become unduly anxious after cystic fibrosis carrier screening in primary care.11

Considering the limited time and resources in primary care, self-administered screening questionnaires are likely to be the most effective method for collating family histories.12 This study evaluates the psychological impact on the patient of this approach to family history screening in general practice.

Methods

Design
The single-practice randomized, controlled trial of a self-administered family history questionnaire utilized a parallel groups design with state anxiety, adverse perceptions of health and adverse psychological consequences attributed to having a family history taken as outcome measures.

Approval to carry out the study was obtained from Nottingham University Medical School Ethics Committee.

Participants
Participants were recruited from one general practice with a mixed catchment area which includes council estates, starter homes and detached houses. Most of the patients registered are from administrative/managerial occupational groupings and below. All those patients belonging to one GP’s list who had been in the practice for at least 2 years and who had not received a health check in that time were identified. This gave a population of 1256.

Intervention
The intervention was a self-administered family history questionnaire. The tool has been developed in Nottingham and asked about the health of close relatives (mother, father, sisters, brothers and children) and more distant relatives (aunts, uncles, nieces, nephews and cousins). It asked the relative’s age if alive and any illnesses known to the respondent: if the relative was not alive, then age at death and any illnesses suffered during their lifetime. An accompanying sheet gave a list of illnesses as a prompt together with ways of describing relatives, e.g. mother’s sister instead of aunt.

Intervention with the questionnaire occurred immediately following baseline measurement of outcome variables, with repeated outcome measures at 1 week, 2 weeks and 3 months.

Primary outcome measurement
State anxiety was measured at baseline, 1 week, 2 weeks and 3 months post-intervention. The six-item short form of the state subscale of the Spielberger State–Trait Anxiety Inventory (STAI) was used.13 It has acceptable reliability, and is more acceptable to participants than and produces results that are comparable with those obtained using the full form of the STAI. Each item is rated on a four-point scale and the total score is readjusted to produce results equivalent to the standard 20-item questionnaire which has a maximum score of 80. The higher the score, the higher is the reported anxiety. It has been used previously to evaluate the psychological impact of a general practice-based carrier testing for cystic fibrosis.14

Secondary outcome measures
Perceptions of health. These were measured using a five-item questionnaire developed by Marteau et al.15 This measures perceived health from three time perspectives: current health, past health and future health. The five questions were asked at baseline, 1 week, 2 weeks and 3 months post-intervention. Two of the questions are taken from the SF-36 Health Status Questionnaire. The five questions are analysed separately. Question 1 is rated on a four-point scale (poor, fair, good, excellent); question 2 on a five-point Likert scale from ‘strongly agree’ to ‘strongly disagree’; 3 and 4 on a five-point scale from ‘much better’ to ‘much worse’; and question 5 on a five-point scale from ‘very high risk’ to ‘very low risk’. It was developed for use in a study of screening for Tay-Sachs disease carrier testing and has also been used in a population-based study of carrier testing for cystic fibrosis.15,16 No figures are given for reliability and validity, but the items concerning perceptions of future health distinguished controls, non-carriers and carriers of the Tay-Sachs disease gene.15

Concern about the family history. This was measured using the Psychological Consequences Questionnaire (PCQ) developed by Cockburn et al. to measure the response to breast screening.17 The questionnaire was applied at 2 weeks and 3 months post-intervention. The authors report good validity and reliability for the questionnaire in breast cancer screening and it was used
by Ong et al. as they found this method of measuring context-specific concerns to be more sensitive than the six-item STAI. In their study, it successfully distinguished between women placed on early recall for breast screening because of diagnostic uncertainty from those placed on routine recall. The original version asked respondents to say how often (‘not at all’, ‘rarely’, ‘some of the time’ and ‘quite a lot of the time’) in the preceding week the respondent had experienced the effect (e.g. ‘. . . had trouble sleeping’) ‘. . . because of thoughts and feelings about breast cancer’. In the current study, this final phrase was replaced by ‘. . . thoughts about your family medical history’. Similarly to the approach taken by Ong et al., respondents were assigned to one of two categories depending on whether they reported ‘not at all’ for all 12 items or reported at least one of the effects.

At all data collection points, patients were informed that completion of the questionnaires was voluntary and that they could leave blank any questions that they did not wish to complete.

Sample size
A power calculation, based on an effect size from Bekker et al., gave a sample size of 98 with power of 0.9, significance of 0.05 and assuming 20% loss to follow-up.\(^{13,14}\)

Procedure
The unit of randomization process was used. This involved allocating patients to one of three strata according to their age (18–34, 35–50 and 50–60 years). The first 26 males and the first 26 females were selected from each stratum, ensuring that individuals from the same household were excluded. Within each of these six groups, patients were allocated at random to either the intervention or the control group. The allocation occurred prior to recruitment.

Patients were invited by letter to attend two health check appointments. All booking was carried out by one of the authors (JH), and clinic staff remained unaware of the purpose of the study to prevent this information from inadvertently being conveyed to the participants.

The initial appointment for both groups consisted of a standard health check including blood pressure, body mass index and urinalysis, all taken by the researcher (JH) after the patient had completed a baseline STAI, Perceptions of Health and a self-administered medical history enquiry. Additionally, the intervention group was asked to complete a self-administered family history questionnaire in the absence of the researcher. Patients were told that the results of the health check would be reviewed by a GP. Additionally, the intervention group was told that the family history questionnaire would be reviewed by a clinical geneticist. At the end of the session, the patient was given copies of the STAI and the Perceptions of Health questionnaire to take home to complete 1 week later and return at the next visit. The second appointment, 2 weeks after the first, allowed the researcher to report the results of the health check and family history recording and any advice for further action. At the end of this session, the patient completed a third STAI and Perceptions of Health, together with, for the first time, the Family History Concerns questionnaire. Three months later, copies of all three outcome measurement questionnaires were sent to the patient’s home address together with a stamped addressed envelope for their return to the surgery.

Statistical analysis
The data were analysed on an intention to treat basis using SPSS version 8.0. The two arms of the trial were compared for the main and two secondary outcome variables, using repeated measures ANOVA for repeated continuous measurements, t-tests for continuous variables at one time point, and chi-squared and Fisher’s exact tests for categorical data.

Results
State anxiety
At baseline, there was no difference between those on whom complete data was available and those that dropped out before 3 months in terms of sex, housing area and state anxiety. Therefore, the results presented below are for the individuals for whom a complete data set was available. Of these, there was no significant difference at baseline between the intervention and control groups in terms of age, sex and housing area (see Table 1) or state anxiety (see Table 2). Loss to follow-up was 24%.

To examine the short-term effect of the intervention on anxiety, a two-way analysis of variance on the STAI scores at 1 and 2 weeks with baseline scores as a

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (range; median)</td>
<td>44.96 (36–53; 48)</td>
<td>43.14 (30.75–53.5; 45.5)</td>
</tr>
<tr>
<td>Sex (%)(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>20 (40)</td>
<td>25 (50)</td>
</tr>
<tr>
<td>Female</td>
<td>30 (60)</td>
<td>25 (50)</td>
</tr>
<tr>
<td>Housing (%)(^c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>34 (68)</td>
<td>41 (82)</td>
</tr>
<tr>
<td>Medium</td>
<td>7 (14)</td>
<td>4 (8)</td>
</tr>
<tr>
<td>Small</td>
<td>9 (18)</td>
<td>5 (10)</td>
</tr>
</tbody>
</table>

\(^a\) The total population has a bimodal distribution so standard deviations are not given. A Mann–Whitney U-test showed no significant difference, \(P = 0.541\).
\(^b\) No significant difference, chi-squared = 0.646, d.f. = 1, \(P = 0.422\).
\(^c\) No significant difference, chi-squared = 2.642, d.f. = 2, \(P = 0.267\).
covariate showed that at both times anxiety was higher in the intervention group than in the controls \((F = 6.4; \text{ d.f.} = 1,73; P = 0.014)\). To examine whether this effect continued over a more extended period, scores at 3 months were compared using a \(t\)-test and no significant difference was found. The state anxiety scores over time are displayed in Figure 1.

Perceptions of health. At baseline, a two-tailed Fisher’s exact probability test found no difference on any of the questions between the intervention and control on the number indicating any negative response. To examine the scores over time, change scores for individuals for each question were produced by first calculating the difference between the original baseline score and the score at 1 week, 2 weeks and 3 months. These scores were then grouped into those scores indicating a change for the worse versus all others. The only significant difference was found for the change from baseline to 1 week when the intervention group (26%) were significantly (Fisher’s exact test, two-tailed \(P = 0.025\)) more likely than the control group (7%) to give a worse rating to the question “What do you think is your risk of developing something wrong in the future?”

Family history concerns. There was no significant difference between the two groups for having concerns about the family history at either 2 weeks (chi-squared = 0.18, d.f. = 1, \(P = 0.67\)) or 3 months (chi-squared = 1.30, d.f. = 1, \(P = 0.25\)).

### Discussion

**Statement of principal findings**

Enquiring after the family history in a primary care population transiently increased state anxiety levels. Similarly, 1 week after the systematic enquiry, patients were more pessimistic about their future health. After being informed about the outcome of their health checks and systematic family history enquiry, we found no evidence that the intervention group had more concerns about their family history.

**Strengths and weaknesses of the study**

This is a randomized, controlled trial with 76% follow-up of trial participants. It is to our knowledge the first randomized control study evaluating a self-administered method of eliciting the family history in primary care. There are some limitations to this study. First, the effect could be underestimated if non-responders tend to be more anxious than those who accept health check invitations. However, evidence from other studies suggests the opposite, with non-responders tending not to cite anxiety about possible results as a motive for non-participation.\(^{19}\) Secondly, as the research took place in

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**TABLE 2** Mean state anxiety scores and 95% confidence intervals between the intervention and control groups at all four time intervals

<table>
<thead>
<tr>
<th>Group (n)</th>
<th>Baseline</th>
<th>1 week</th>
<th>2 weeks</th>
<th>3 months</th>
</tr>
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<tbody>
<tr>
<td>Intervention (34)</td>
<td>36.74</td>
<td>39.44</td>
<td>37.12</td>
<td>34.15</td>
</tr>
<tr>
<td>(32.94, 40.53)</td>
<td>(35.37, 43.51)</td>
<td>(33.26, 40.98)</td>
<td>(30.89, 37.40)</td>
<td></td>
</tr>
<tr>
<td>Control (42)</td>
<td>36.36</td>
<td>33.00</td>
<td>32.48</td>
<td>34.76</td>
</tr>
<tr>
<td>(32.86, 39.85)</td>
<td>(29.46, 36.54)</td>
<td>(28.83, 36.12)</td>
<td>(30.98, 38.54)</td>
<td></td>
</tr>
</tbody>
</table>

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**Figure 1** Spielberger short form State–Trait Anxiety Inventory scores (and 95% CIs) for control and intervention groups over 3 months
the patients’ own GP’s surgery, there may be an element of social desirability bias in their responses. Clearly this has to be balanced against the reasonable loss to follow-up achieved probably for the same reason. Thirdly, the PCQ has not been validated as an instrument to assess concerns about family history. However, in the absence of any suitable validated instrument, then simple modification of the PCQ was considered appropriate. Fourthly, caution should be exercised when extrapolating these results to other populations as cultural and ethnic groups may respond in a heterogeneous manner to a family history questionnaire.

Implications of the study
Mass screening can be considered as either targeted (directed at a population at greater risk) or untargeted. There is evidence that untargeted mass screening can precipitate psychological distress in a significant minority of the screened population.20, 21

Previous research looking into the psychological impact of targeted screening on those families at increased genetic risk for a condition suggests that this also leads to anxiety and that this is associated with pre-test expectations, mood and social support as opposed to the results of the test per se.22 However, in familial breast cancer screening, a number of studies suggest a U-shaped relationship with an optimal amount of anxiety facilitating screening, whilst too much anxiety interferes with adherence to the programme and too little anxiety results in lack of motivation to attend screening appointments.21,23 Due to the lack of research, it is uncertain if this relationship exists for untargeted screening.

It remains unclear if the fall in the STAI score after the second consultation is a temporal effect or attributed to a reassuring effect of the second consultation. It is atypical for a registration medical to involve two consultations. Practice nurse consultations have been estimated to cost up to £28 per hour of patient contact.24 However, if a 20–30 minute second consultation has a role in reassuring the ‘worried well’, then GPs would need to evaluate critically if it is cost-effective to provide this service. Further, if this second consultation has a reassuring effect, then this may suggest that it is not the screening results per se but the process which precipitates anxiety. Marshall has reviewed screening and identifies anticipated discomfort or perceptions of adverse effects of preventive interventions, unpleasant interactions with health workers, time required for preventive programmes and excessive overall awareness of health as possible mechanisms of psychological and social harm of preventive programmes besides the anxieties of a positive screen and the consequences of being labelled at risk.25

Future research
The process of collecting the family history information caused a transient increase in STAI scores. Also, concern about risk of illness compared with 2 years ago was statistically significant at 1 week post-intervention. This may require more exploration using qualitative techniques and other context-specific validated instruments.

Family history recording is an integral part of general practice, despite the fact that untargeted systematic recording of family history has not been evaluated against the strict Wilson and Jungler screening criteria. The sensitivity and specificity of family history screening needs to be evaluated prior to full implementation of such an approach.

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References


