

Breast screening: a randomised controlled trial in UK general practice of three interventions designed to increase uptake

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Abstract

Study objectives – To determine the relative effectiveness of three interventions designed to increase the uptake of breast screening.

Design – Randomised controlled trial of a nurse visit with health education (group A), nurse visit without health education (group B), and GP letter (group C).

Setting – The area of south east London served by the Butterfly Walk Breast Screening Unit in Camberwell.

Participants – Women aged between 50 and 64 years who were registered with 27 GPs in the Lambeth, Southwark and Lewisham family health services authority and who had not attended for first round screening.

Main results – Altogether 799 women were randomly allocated to the three groups. In general, delivering the nurse based interventions proved difficult. In group A, 11.4% (95% CI 7.9, 14.9%) of women subsequently attended for screening compared with 7.8% (95% CI 5.1, 11.4%) in group B and 13.1% (95% CI 7.9, 18.4%) in group C. The differences between the groups (95% CIs) were not statistically significant: A versus C, -1.7% (-8.0, +4.6%); B versus C, -5.3% (-11.3, +0.7%); A versus B, +3.6% (-1.0, +8.2%).

Conclusions – A personal letter from the GP seems to be at least as effective at increasing the uptake of breast screening in non-attenders as a nurse making a home visit to discuss the issue of breast screening, and is not noticeably less effective than a visit at which a health education intervention is delivered. It is possible that the GP letter is considerably more effective than either of the two interview-based interventions. With regard to implementing strategies which will increase breast screening uptake and are cost effective, further trials of similar minimal interventions in primary care are required.

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Breast cancer is the major public health problem facing women in the UK today. The latest figures show that each year nearly 30 000 women are newly diagnosed with breast cancer and over 15 000 women die from it. Overall, it is estimated that one in 12 women will develop breast cancer at some time in their life.¹

The National Health Service breast screening programme (NHSBSP) is based in primary care, and provides single oblique view mammography for women aged 50 to 64. Eligible women registered with a GP are called for screening every three years by the local screening unit usually on a practice list basis. It is hoped that the screening programme will contribute to a reduction in the mortality from breast cancer of 25% by the year 2000: this aim has now been incorporated as a target in the *Health of the Nation* strategy.² It is estimated that this reduction will require 70% of the population to accept their invitations.³ Unlike cervical screening, also undertaken three yearly on the basis of a GP list, breast screening is undertaken by dedicated health professionals at special screening units and no fee is payable to the GP regardless of uptake. There is some evidence that the introduction of financial incentives for cervical screening, childhood immunisations, and more recently cardiovascular interventions has resulted in GPs concentrating their efforts in these areas with consequently less time and effort being devoted to other preventive programmes such as breast screening.⁴

The most recent results from the NHSBSP⁵ show that 71.3% of women invited for screening in the UK attended. However, the regional variation was large – 39% in parts of London to over 90% in rural counties, with an average uptake for inner city areas of 59%. Furthermore, provisional figures show that there is evidence that uptake in the second round of screening has fallen (Patnick, J, personal communication). In addition, a report by the Comptroller and Auditor General suggested that the breast screening programme might pay more attention to non-attenders.⁶

There seems to be great potential for involving the primary care team in improving the uptake of breast screening, especially if one considers adapting models of intervention from other health promotion activities such as smoking, alcohol consumption, and cervical screening.⁷⁻⁹ A variety of different methods of disseminating health promotion messages has been tried and the involvement of practice nurses and specialist health promotion nurses has become popular since the introduction of the new GP contract.¹⁰⁻¹² The question as to whether nurses are as effective as GPs in changing patient behaviour is unanswered and probably depends on the particular message to be delivered. The issue of cost effectiveness of any health promotion intervention needs to be

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carefully considered. In this respect the use of written material in general practice has often been found to result in increased compliance with treatment and understanding of the issues involved, at relatively low cost.^{13,14}

A study in south London¹⁵ investigated the reasons for non-attendance for breast screening in 288 women. The authors found a low uptake rate of 46% and reported that 35% of women were unlikely to have received their invitation because of inaccuracies in the family health services authority and GP registers. Eleven of 34 (33%) women who were visited at home to ascertain their reasons for non-attendance subsequently attended for screening.

We report a randomised controlled trial designed to investigate whether a nurse delivered health education intervention was any more or less effective in respect of increasing the uptake of breast screening than simply ascertaining women's reasons for non-attendance or sending women a letter from their GP.

Methods

INTERVENTIONS

The trial formed the second phase of a two phase study. The first phase was a questionnaire survey of women registered with 27 GPs in south east London, who were eligible for first round screening under the new NHSBSP. The survey was designed to elicit information about health beliefs in relation to breast cancer and breast cancer screening, mental health status, and health locus of control and to relate these to subsequent attendance for breast screening.

Information on the attendance status of women sent invitations (n=2481) from the lists of the 27 GPs, was obtained from the local screening unit. Women were designated non-attenders after they had failed to attend, having been offered two appointments. Additional information was obtained from the screening unit about women who had declined screening, had already been screened, or had moved from the area. This information, together with that from the practice, enabled a list of true non-attenders to be compiled for each practice.

The three interventions to be evaluated in this trial were as follows:

- Group A, a nurse delivered interview to ascertain reasons for non-attendance with the addition of a patient specific health education component to encourage the take up of screening;
- Group B, as for group A but without the health education component;
- Group C, a personal letter from the GP. Although the main comparisons of interest were to contrast each of A and B with C, the comparison between the two interview-based interventions were also of interest. Given that this latter difference was likely to be smaller, it was decided to randomise on a 2:2:1 basis to groups A, B and C respectively.

The women in groups A and B were sent a letter by their GP asking if they would agree to a research nurse visiting them at home to discuss the issue of breast screening. Women

in group A were seen in their own home by a research nurse who administered a semi-structured interview which focussed on the woman's reaction to her invitation to attend for breast screening, her reasons for non-attendance, and her knowledge of the local screening unit, as well as information about significant others with whom the issue of breast screening had been discussed. At the end of the first part of the interview, the woman completed two short self report scales on self esteem¹⁶ and locus of control¹⁷ and the nurse then spent about 10 minutes providing an informal health education message about breast screening, concentrating on the areas which were most relevant from the information gathered in the first part of the interview. The women in group B received the same home interview but without the health education component. The women in group C were simply sent a letter from their GP, expressing concern at their failure to attend for breast screening and encouraging them to attend in the near future. The records at the screening unit were reviewed to determine whether or not the women had attended for screening within 12 weeks of the intervention.

SAMPLE SIZE

Assuming that the "letter only" group in the present trial would have a similar effect to the minimal intervention provided by McEwen,¹⁵ a post-intervention attendance rate of 33% would be expected in this series. For a target difference of 13% (that is, 33% *versus* 46%) for either of the two interview based interventions compared with the letter only group, 166 women would be required in group C (and hence 332 for groups A and B utilising a 2:2:1 allocation ratio) to achieve 80% power for a 5% two sided significance level. Such effects could result in a change of about 5% to the overall attendance rate (approximately 46% without intervention). Given these numbers this trial also had 80% power to detect a difference of about 11% between groups A and B with a two sided 5% significance level. A total of 810 women would therefore be required to be randomised. Given that screening invitations were sent to 2481 eligible women (patients of 27 GPs), a recruitment rate of about 30% was required for the trial.

STATISTICAL ANALYSIS

The first step in the analysis was to ascertain that all the women included in the trial were actually eligible for randomisation. This was achieved by checking certain criteria against the date of randomisation. These criteria consisted of the date of attendance for screening and continued residence at the address on the register.

The second and main step in the analysis was to compare the attendance rates across the intervention groups on an intention to treat basis. This was performed by using the maximum likelihood χ^2 ¹⁸ and confidence intervals both for the three attendance rates separately and for the comparisons of interest.¹⁹

Attendance for breast screening up to 12 weeks after randomisation in relation to allocated intervention

Group	Attended	Total	Attendance rate (%)	95% CI
A, Nurse visit + education	36	315	11.4	7.9, 14.9%
B, Nurse visit	24	307	7.8	5.1, 11.4%
C, Letter from GP	21	160	13.1	7.9, 18.4%

$\chi^2 = 3.92$, $df = 2$, $p = 0.14$

The next step of the analysis was a series of secondary analyses whereby the key trial comparison was stratified by a series of variables available from the questionnaires. The variables selected were those which had been shown to be independently related to attendance in the first phase of the study using data from the questionnaires. These subgroup analyses were performed, first by simple stratification and, second, by formally testing interactions within two way multiple logistic regression models. These interactions were those between intervention group and each stratifying factor in turn, with attendance as the outcome variable. As usual the results of these analyses should be interpreted with caution given the large number of exploratory tests which might lead to false positive findings. At the same time the power of these tests across strata is considerably lower than that for the main analysis.

Among those women who were sent a questionnaire in the first phase of the study, the only attribute for inclusion in the trial was that they were true non-attenders for screening (799). As a result, only a proportion of women in the trial had actually returned their questionnaires (447). This raises the question for the secondary analyses of how well represented the total trial participants were by the subset who completed the questionnaires. The only characteristic that was known for both groups was age. A comparison was therefore undertaken of the age distribution of the women who returned their questionnaires with those who did not.

Results

RECRUITMENT AND RANDOMISATION

Of the 2481 women who were sent an invitation for screening, 1126 attended, 1283 were non attenders, and 72 either cancelled their appointment, refused their appointment, or were known to have already been screened. Of the 1283 non-attenders, 481 were found to have moved and were assumed not to have received their invitation.

Of the 802 remaining non-attenders, one was male, one had died, and one had already been screened. The remaining 799 women constituted the group available for randomisation. Of these, 324 were randomised to group A (visit plus education), 313 to group B (visit only), and 162 to group C (letter from GP). However, of the women randomised to groups A, B and C, nine, six, and two respectively should not have been randomised because it was subsequently discovered that before randomisation they had, in fact, already attended for screening or had moved. Since these women should not in retrospect have been randomised it was decided

that they should be consistently excluded across the three groups for all the analyses, leaving a total of 782 women.

COMPLIANCE WITH ALLOCATED INTERVENTION

In general, delivering the interventions proved to be difficult. Firstly, in addition to the above, about a further 14% of women in groups A and B seemed to have moved between randomisation and initial contact by letter. There is no reason to suppose that this figure was any different in group C. Secondly, approximately 20% of women could not be contacted, despite two letters and visits to the house, even though there was no evidence that they were living anywhere other than at the address given on the register. Finally, about 30% of women in both groups A and B declined a visit. This resulted in a compliance rate of between 30 and 35% for the interventions involving a nurse visit.

KEY OUTCOME MEASURE

The key outcome measure was attendance for screening after randomisation. The primary results of the trial are given in the table. For the two main comparisons of interest, the difference in attendance rates (95% CI) between A and C and between B and C were -1.7% ($-8.0, +4.6\%$) and -5.3% ($-11.3, +0.7\%$). The comparison of the two interview based interventions (A versus B) led to a value of $+3.6\%$ ($-1.0, +8.2\%$). From the overall χ^2 test result given in the table, and given that all three comparative CIs include zero, there is no evidence of differences between the individual interventions in terms of their effects on attendance rates. Any adjustment for multiple comparisons would not alter this basic conclusion. Nevertheless, one can with some confidence rule out intervention C being less effective than B and also rule out C being appreciably less effective than A.

The age distribution of the women who returned their questionnaire ($n = 436$) was almost identical to that for the remainder ($n = 346$ including seven women for whom age was unknown). For example, the medians (interquartile ranges) were 57 (53, 61) and 56 (52, 61) respectively.

STRATIFIED AND LOGISTIC REGRESSION ANALYSES

Out of the 21 tests for first order interactions between intervention group and stratifying factor, only that for age group ($<55, 55-59, 60+$) was significant at the 5% level. With regard to the nature of this interaction, the differences between the interventions were greatest in the middle age group; specifically, the visit with education seemed to be particularly effective in this group.

Discussion

This trial has compared the effectiveness of three different interventions designed to increase the uptake of breast screening in an inner city area. The trial was originally prompted by concern about the low uptake of breast screening in south

east London, the relative lack of involvement of primary care teams and the paucity of arrangements for following up non-attenders. Since it was anticipated that non-attenders for breast screening might be among those women who do not frequently consult in general practice, an intervention to be delivered at their home was designed. In the event, it proved difficult to get women who had already declined two invitations for screening to agree to be interviewed about their reasons for making this decision. In addition, the very high mobility of an inner city population meant that a large proportion of women were not at the address on the register, and those who were contacted often moved on before completing the study. The inadequacy of population registers in inner city areas for screening purposes has been highlighted²¹ and suggestions as to how this problem might be overcome have been made, such as using the electoral register as well as the FHSA register.²²

The results show that sending a personal letter from the GP seems to be at least as effective as a nurse making a home visit at which in addition to discussing the woman's response to the invitation (that is non-attendance), a brief health education intervention either was or was not delivered. If a nurse visit takes place then the addition of an educational element is certainly not detrimental and may be of considerable benefit (up to about 8%). Perhaps what is of more interest though is that the letter only intervention seems to be at least as good as the nurse visit alone and is not appreciably less effective than the visit with the educational element. It is possible that the GP letter is considerably more effective than either of the two interview based interventions. Even without a formal economic evaluation, it is reasonable to conclude that when considering implementing such interventions, the most cost effective in this instance would seem to be a letter from the GP. It remains that a full economic evaluation should be incorporated in any future trial of primary care based interventions involving comparisons of different health promotion models – for instance, a systematic approach such as sending a letter compared with an opportunistic approach such as flagging the notes. A comparison of systematic and opportunistic methods of improving cervical screening uptake found that both were superior to routine service provision.⁹ In addition, since the results of the secondary analyses did not detect a larger number of interactions than would be expected by chance, there is no indication of a need to either target such a trial to particular subgroups of women, or to stratify the randomisation.

Involving the primary care team in the breast screening programme seems to be an appropriate aspiration. The programme is based in primary care but suffers from the fact that it is not delivered on the GPs' premises. Fallowfield found that only 7% of women attending for breast screening had discussed their invitation with their GP.²² However, as with other health promotion messages it seems that GPs are instrumental in determining whether women accept their invitation for screening. In the US,

one study found that the key factor determining whether women attended for mammography was whether their GP had discussed mammography with them.²³ This observation has also been reported by many others.^{24,25}

At the same time there is evidence that the attitudes of GPs to breast screening may be critical in influencing women to attend,^{26,27} although this was not confirmed by Kee in a survey of GPs in Northern Ireland.²⁸ A study in Australia²⁹ found that a simple recommendation from the GP was equally effective as an intensive health education intervention in increasing uptake, and Schofield *et al*, also in Australia, found that a personal invitation in addition to a community promotion campaign improved attendance for screening.³⁰ A study in Scotland investigating second round screening uptake found that sending a personal letter from the GP to those women who had failed to attend after their first invitation was effective and feasible.¹⁴

There is, nevertheless, continued debate about the overall worth of the breast screening programme. The issues relate to the chances of the programme delivering the desired reduction in mortality and, if it does, to the economic and personal costs incurred by doctors and patients in achieving the target.^{31–34} Specifically, one group has argued that efficiency rather than compliance ought to be the goal of a screening programme and that the benefits foregone in increasing compliance may be greater than those achieved by the increased compliance.³⁸ Notwithstanding this, the unenviable position of the UK at the top of the breast cancer league table makes it likely that, at least in the foreseeable future, efforts to maximise uptake of screening should be pursued since the breast screening programme offers the best available means of early detection of breast cancer and an associated reduction in morbidity and mortality.

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