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over 70 years old in general practice**

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15 **Promoting early presentation of breast cancer in women over 70 years old in**
16 **general practice**
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Abstract

Background: Delay in presentation contributes to poorer survival of older women with breast cancer. Research has shown the effectiveness of the Promoting Early Presentation [PEP] intervention when delivered by radiographers in the NHS Breast Screening Programme. This paper investigates the effectiveness of the intervention when delivered by practice nurses in general practice.

Methods: The Breast Cancer Awareness Measure was used to compare participants' awareness of breast cancer before, one month after and 12 months after the delivery of the PEP intervention. 556 women aged over 70 years took part, 308 of whom returned all three surveys.

Results: The intervention was associated with increased awareness of non-lump breast symptoms and reported breast check frequency. There was a marked increase in breast cancer awareness which persisted for 12 months. Less than 5% of women were classified as 'breast cancer aware' before the intervention, rising to over 25% one month afterwards. This percentage dropped slightly after one year to just below 20%.

Conclusion: Delivery of the PEP intervention in general practice was very effective at raising the awareness of breast cancer amongst older women. Primary care settings are well placed to enhance the reach of this kind of intervention to at-risk women.

Promoting early presentation of breast cancer in women over 70 years old in general practice

Introduction

Older women have a higher incidence (1) and worse survival rate from breast cancer than younger women (2). In the UK, five-year relative survival from breast cancer is lower than in comparable Western European countries (3). The excess mortality seen in England compared with Norway and Sweden is especially pronounced in the first year after diagnosis, suggesting that late diagnosis is responsible for worse survival. Excess mortality is most marked in the older age groups (4).

Between 17% and 35% of women with breast cancer delay presenting for more than three months after discovering symptoms (5) and these delays in presentation are associated with worse survival (6). Older women are at even higher risk of delay in presentation than younger women (7, 8) and generally have poor knowledge of non-lump symptoms and the increase in breast cancer risk with age (9, 10). About 20% of women aged 67-73 years report that they never look at or feel their breasts (9). In addition to this a breast symptom in older women is highly likely to be associated with breast cancer; previous research has found that about 26% of women aged 70-79 referred to secondary care for investigation of breast symptoms were subsequently diagnosed with breast cancer compared with 7.6% of women aged 50-59 (11).

A systematic review has shown there to be very limited evidence of the efficacy of existing interventions in promoting early presentation in breast cancer (12). Recent studies, however, have shown that the Promoting Early Presentation [PEP] Intervention, an educational intervention developed by Kings College London for use by radiographers in mammography screening programmes, increased awareness of breast cancer to 24% after one year compared with just 4% of those receiving usual care (13, 14). This paper reports a new study which aimed to evaluate the intervention in women aged over 70 years when delivered by practice nurses in a general practice setting.

Materials and methods

Participants and setting

The research was conducted in 18 general practices across Northamptonshire, UK. Female patients of these practices, aged over 70 years, were eligible for participation except where they were not

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3 able to consent or participate due to a significant physical or mental disorder or disability, or had
4 insufficient competence in English language or another language difficulty.
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7 **Intervention**

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9 The PEP Intervention (described in full in (13)) is a script-based one-to-one communication
10 supported by a booklet and was delivered by a trained practice nurse. It takes around 6-10 minutes
11 to deliver. The booklet is given to the woman to take home.
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14 **Measures**

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16 The Breast Cancer Awareness Measure (BCAM) is a validated questionnaire tool and includes scoring
17 details which allows for the classification of women as 'breast cancer aware' as well as awareness on
18 three sub-domains (15). Participants were asked to complete the BCAM on three occasions: during
19 recruitment to the project, one month after they had the intervention and again at 12 months after
20 the intervention.
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23
24 Descriptions of 11 breast cancer symptoms were given in the questionnaire, two of which were lump
25 symptoms. The breast cancer symptom awareness score was calculated as the number of non-lump
26 symptoms identified and selected (maximum score = 9). Participants were categorised as 'breast
27 cancer symptom aware' if they selected 5 or more non-lump symptoms from the list.
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31 The Breast Cancer Awareness Measure questionnaire also asks who is most likely to get breast
32 cancer. Respondents are classified as 'age-related risk aware' if they select the correct answer – a 70
33 year old woman.
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37 Additionally, participants were asked how often they checked their breasts. If they responded 'at
38 least once a month' or 'at least once a week' then they were categorised as 'breast check frequency
39 aware'.
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43 Women were defined as 'breast cancer aware' if they were categorised as 'aware' on all three
44 measures above: breast cancer symptom aware, age-related risk aware and breast check frequency
45 aware.
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49 Demographic and socio-economic information was also collected. Participants who were not initially
50 classified as breast cancer aware and who were also not classified as breast cancer aware at 12
51 month follow up were invited to complete a short telephone interview. A purposive sample (n=15),
52 stratified by geographical location, age group and educational attainment, was drawn from those
53 who consented to being contacted.
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Outcomes

Outcomes were measured using a questionnaire developed and tested in previous studies on which this project is based (13-15).

The primary research question is: does the Promoting Early Presentation (PEP) intervention increase breast cancer awareness in older women (over 70 years) when used in a general practice setting?

The primary outcome of the study was breast cancer awareness which was measured during recruitment to the project and at one and twelve months after receiving the intervention.

Secondary research questions were:

- which, if any, demographic factors are associated with successful PEP intervention in primary care settings?
- what are the barriers to a successful outcome from service user perspectives?

Sample size

The primary research question of the study tested the null hypothesis that there was no relationship between the validated Breast Cancer Awareness Measure outcome (breast cancer aware vs. not aware) and the time at which the outcome was measured (before vs. 12 months after).

Based on population effect sizes from previous research (13), a sample size of 250 (at 12 month follow-up) would have a power of 80.7% to yield a statistically significant result. A total of 556 women were recruited for this study to allow for attrition. 308 were still in the study at 12 months.

Analysis

Demographic factors were examined using descriptive statistics. Differences in responses between the three time points were examined using related-samples Friedman's analysis of variance by ranks for numeric scores and related-samples Cochran's Q test for binary variables. Logistic regression modelling was used to investigate demographic factors associated with being breast cancer aware 12 months after the PEP intervention. Qualitative data were analysed using thematic analysis.

Ethical issues

The research project was given a favourable opinion by NRES Committee East Midlands (Nottingham 2: 12/EM/0081).

Results

Sample characteristics

A total of 556 women aged over 70 years (60% were aged 71-74) registered with 18 practices received the intervention between October 2012 and February 2013. There was a good geographical spread across Northamptonshire covering both urban and rural locations. The Index of Multiple Deprivation (IMD) of participants was skewed towards those less deprived than the national average, with only 9% coming from the most deprived areas (quintile 5) and nearly 35% drawn from quintile 2. More detail on the sample demographics are shown in [Table 1].

[Table 1]

434 (78%) of women responded to the second questionnaire and 364 (65%) to the third. This represents a loss of 22% from pre-intervention to one month follow-up, and a further 16% from one month to twelve month follow-up. 308 (55%) of the recruited participants responded to all three questionnaires.

Age, educational attainment and IMD distributions were compared across the participants responding at each time point and there were no statistically significant differences, indicating that there was no significant attrition bias.

Changes in breast cancer awareness measures after the PEP intervention

The following analysis was done with data from the 308 (55%) participants who returned all three questionnaires and will focus on the difference between participants' pre-intervention scores and their scores at one and 12 month follow-up (repeated measures analyses).

Breast cancer symptom awareness

The median breast cancer symptom awareness score pre-intervention was 5 (IQR 2-7). The two scores at 1 month and 1 year post-intervention both had a median of 7 and IQR of 4-9 (see [Figure 1]).

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3 A related-samples Friedman's analysis of variance by ranks showed strong evidence of changed
4 scores between the three questionnaires (test statistic=170.476, $p<0.001$). Paired post-hoc
5 comparisons showed statistically significant difference in the paired scores between the pre-
6 intervention and both the one month and 12 month follow-up (test statistic=-0.833, $p=0.001$ and
7 test statistic=-0.774, $p<0.001$ respectively) but no difference between the scores at one and 12
8 month follow-ups (test statistic=0.058, $p>0.999$). The scores for the post-intervention
9 questionnaires were higher than those for the pre-intervention scores.
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17 [Figure 1]
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21 51% of women were categorised as breast cancer symptom aware in the pre-intervention
22 questionnaire, compared to 74% in the one month and 71% in the 12 month follow-up
23 questionnaires (see [Table 2]). There was strong evidence of changes in the related scores between
24 the three time points ($Q=67.924$, $df=2$, $p<0.001$). Pairwise comparisons showed statistically
25 significant differences between the first (pre-intervention) questionnaire and both the one and 12
26 month follow-ups (test statistic=-0.231, $p<0.001$ and test statistic=-0.201, $p<0.001$ respectively) but
27 not between the one and 12 month follow-ups (test statistic= 0.029, $p>0.999$).
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33 This provides strong evidence that the level of awareness of the non-lump symptoms of breast
34 cancer improved after the intervention, and that this level of awareness was maintained at 12
35 months.
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39 **Awareness of age-related risk**
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41 There was strong evidence of changes in the related scores between the three time points
42 ($Q=81.339$, $df=2$, $p<0.001$). Pairwise comparisons showed statistically significant differences
43 between all of the three questionnaires (test statistic for questionnaires 1 and 2 =-0.258, $p<0.001$;
44 test statistic for questionnaires 2 and 3 =0.078, $p=0.023$ and test statistic for questionnaires 1 and 3
45 = -0.180, $p<0.001$). The proportion of those being age-related risk aware rose from the first (pre-
46 intervention) questionnaire (12.1%) to the second (1 month post-intervention) (37.9%) and then fell
47 between the second and third (12 month post-intervention) (30.1%) (see [Table 2]). However, there
48 was still a statistically significant increase between the pre-intervention proportion and that at 12
49 months follow-up.
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Breast check frequency awareness

There was strong evidence of changes in the related scores between the three time points ($Q=128.274$, $df=2$, $p<0.001$). Pairwise comparisons showed statistically significant differences between the first (pre-intervention) questionnaire and both the one and 12 month follow-ups (test statistic=-0.262, $p<0.001$ and test statistic=-0.302, $p<0.001$ respectively) but not between the one and 12 month follow-ups (test statistic= 0.039, $p=0.523$).

[Table 2 shows the percentages of those women who responded to all three questionnaires and were categorised as breast check frequency aware at each of the three points. 50.8% of the women were breast check frequency aware before the intervention, rising to 81.0% one month afterwards. This only dropped slightly (to 77.0%) at the 12 month follow-up. This drop was not statistically significant.

Breast Cancer Awareness

There was strong evidence of changes in the related scores between all of the three time points ($Q=69.495$, $df=2$, $p<0.001$). Pairwise comparisons showed statistically significant differences between all of the three questionnaires (test statistic for questionnaires 1 and 2 =-0.218, $p<0.001$; test statistic for questionnaires 2 and 3 =0.070, $p=0.025$ and test statistic for questionnaires 1 and 3 = -0.148, $p<0.001$).

The initial (pre-intervention) level of breast cancer awareness was very low (4.7%) but this had increased to 26.5% at the 1 month follow-up. It had dropped to 19.5% at the 12 month follow-up (see Table 2). This was a statistically significant drop compared to that at one month but was still significantly higher than before the intervention.

[Table 2]

Demographic factors associated with being breast cancer aware 12 months after the PEP intervention in primary care settings

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3 A logistic regression was conducted with being breast cancer aware at 12 month follow-up as the
4 outcome variable and demographic factors as the predictors.
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7 Data were available on all of these variables for 313 women (364 questionnaires returned, 51 of
8 which had missing data), 60 of whom were classified as breast cancer aware. Logistic regression
9 requires a minimum of 10 cases of the least likely outcome per predictor variable for model stability
10 (16) and so a maximum of four demographic variables were selected. The demographic factors used
11 were age group, formal education level, ease of travel to GP and index of multiple deprivation.
12 Assumptions of linearity were confirmed by including interaction terms between predictors and
13 their log transforms, none of which were significant.
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17 The binary logistic regression produced only educational level as a significant predictor, with an odds
18 ratio of 1.35 (95% CI: 1.03-1.75). The odds of being breast cancer aware therefore increased by
19 approximately one third for each incremental level of educational attainment.
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27 **Findings from interviews with women who did not become breast cancer aware after the PEP** 28 **intervention** 29

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31 Ninety six participants consented to be contacted for the interview phase of the project. Eighty one
32 were classified as not breast cancer aware both before and 12 months after the PEP intervention. A
33 purposive sample of 15 participants who were able to undertake the interview was selected,
34 stratified according to geographical location, age group and educational attainment. .
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39 The women's motivations for taking part in the study were varied. The most common was a wish to
40 raise awareness of the topic under consideration and knowing women who had had breast cancer.
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42 "I've always had a fear of getting breast cancer. I had a friend who died at 50 of
43 breast cancer."
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47 Feedback on the intervention delivery was positive. Delivery in a GP surgery was considered
48 convenient. Some women noted the importance of the environment and nurses being known to
49 them. Participants felt that the information had been delivered accessibly. Most had been given an
50 opportunity to ask questions.
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54 Most women felt that they had acquired new knowledge as a result of taking part, although this was
55 not supported by their questionnaire responses.
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3 A common theme across the interview responses was the belief of a high level of awareness of
4 breast cancer related issues.
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7 “Well, I don’t think I learnt, you know, there wasn’t anything much more than what I
8 really knew, actually. What I’d heard and read about in the past, you know, I don’t
9 think I picked up anything different to what I already knew...”
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12 These perceptions of knowledge are particularly interesting given that the sample of interviewees
13 was taken from those who had not met the ‘breast cancer aware’ criterion at either baseline or
14 follow up stages of the study. This may have impacted on the extent to which they were open to
15 assimilating any new information shared via the intervention.
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19 20 **Discussion**

21 22 ***Main findings of this study***

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24 The Promoting Early Presentation (PEP) Intervention delivered by nurses within routine general
25 practice was associated with increased breast cancer awareness among older women.
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29 30 ***What is already known on this topic***

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32 The effect (from 5% breast cancer aware at baseline to 20% at one year) was of a similar size to that
33 achieved in a randomised controlled trial, in which the intervention was delivered by research
34 radiographers in the NHS Breast Screening Programme (13), and in routine clinical practice delivered
35 by NHS radiographers (14). This size of effect was greater than that achieved using more intensive
36 interventions (12). Figure 2 compares our results with those of the randomised controlled trial.
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40 41 ***What this study adds***

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43 This large study suggests that the PEP intervention is effective at raising the awareness of breast
44 cancer amongst women aged over 70 years, who are most at risk of developing breast cancer and
45 least likely to seek early medical help. The sample included those in both urban and rural settings,
46 with a range of levels of deprivation so is likely to be generalizable to other areas in the UK. Practice
47 nurses can easily be trained in effective delivery of this brief intervention. The primary care setting is
48 an effective place to reach the largest group of women at high risk of breast cancer, who are no
49 longer invited for breast screening routinely.
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55 A large part of the difference in breast cancer survival between the UK and other European countries
56 is in older women and in short term survival, suggesting that the stage at diagnosis is more advanced
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3 in the UK (4, 17). To present promptly in primary care with breast symptoms, thereby achieving
4 diagnosis at an earlier stage, older women need to know what to look for, how to look and why.
5 Offering the PEP intervention, which provides this information, in primary care to women over 70, as
6 well as in the NHS Breast Screening Programme, could contribute to the government's target to
7 bring cancer survival in the UK to the level of the best in Europe.
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14 [Figure 2]
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21 ***Limitations of this study***

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23 Our study had no control group who did not receive the intervention, and so we cannot be sure that
24 the effect on breast cancer awareness was due to the PEP intervention alone. Local pharmacy-based
25 breast cancer awareness campaigns were carried out in October 2012 (at the very start of our
26 project) and April 2013 (after the intervention was delivered and the one-month questionnaires
27 were received), and involved about 1,800 and 3,500 contacts with women respectively. This
28 campaign promoted breast cancer awareness among all age groups and focussed on breast
29 screening, breast self-examination and what to do if a breast lump is found. It is unlikely that these
30 two short-lived campaigns would have led to the scale of increase in breast cancer awareness that
31 that the women in our study experienced. The breast symptom awareness assessed in this research
32 study was measured by knowledge of non-lump symptoms of breast cancer and is not therefore
33 likely to be affected by the pharmacist intervention.
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42 A national Be Clear on Cancer Campaign directed towards breast cancer was launched in March
43 2014 but our data collection was complete before its start.
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47
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51 Northamptonshire R&D Service.
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6 Action Team through the East Midlands Cancer Network.
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17 Tropical Medicine, Hull York Medical School, Durham University and Peninsula Medical School).
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		number	%
Age group	71-74	329	59.8
	75-79	167	30.4
	80-84	44	8
	85-89	7	1.3
	90+	3	0.5
	Missing data	6	
Ethnicity	White British	524	95.4
	White other	16	2.9
	Other	9	1.7
	Missing data	7	
English as first language	Yes	541	98.2
	No	10	1.8
	Missing data	5	
Educational qualifications	No formal qualifications	255	47.8
	O level/School Cert	155	29.1
	A level/ Higher School Cert	56	10.5
	Degree or above	67	12.6
	Missing data	23	
Deprivation: IMD quintile	1 (Least deprived)	137	27.5
	2	173	34.7
	3	71	14.3
	4	72	14.5
	5 (Most deprived)	45	9
	Missing data	58	
Disability	Yes	91	16.7
	No	455	83.3
	Missing data	10	
Travel to GP appointments	Easy	357	64.9
	OK	180	32.7
	Hard	13	2.4
	Missing data	6	

Table 1: Sample characteristics

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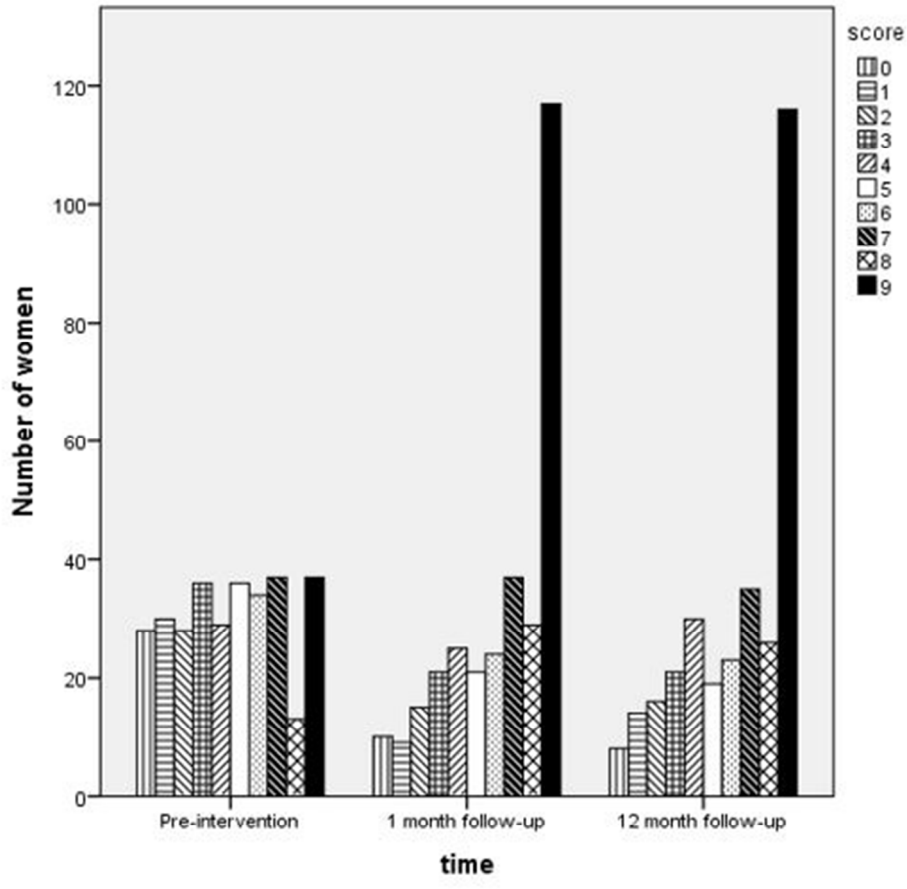


Figure 1: Distribution of breast cancer symptom scores for each of the three questionnaires (only for women completing all three questionnaires)
140x135mm (96 x 96 DPI)



Measure	Total no. responses to all 3 questionnaires *	Number (%) classified as aware		
		Pre-intervention	After 1 month	After 12 months
Breast cancer symptom awareness	308	157 (51.0%)	228 (74.0%)	219 (71.1%)
Age-related risk awareness	306	37 (12.1%)	116 (37.9%)	92 (30.1%)
Breast check frequency awareness	305	155 (50.8%)	247 (81.0%)	235 (77.0%)
Breast cancer awareness	298	14 (4.7%)	79 (26.5%)	58 (19.5%)

Table 1: Frequencies and percentages of breast cancer awareness measures at pre-intervention, one-month and twelve month follow-up.

* Some respondents did not answer all questions. Only complete data are analysed.

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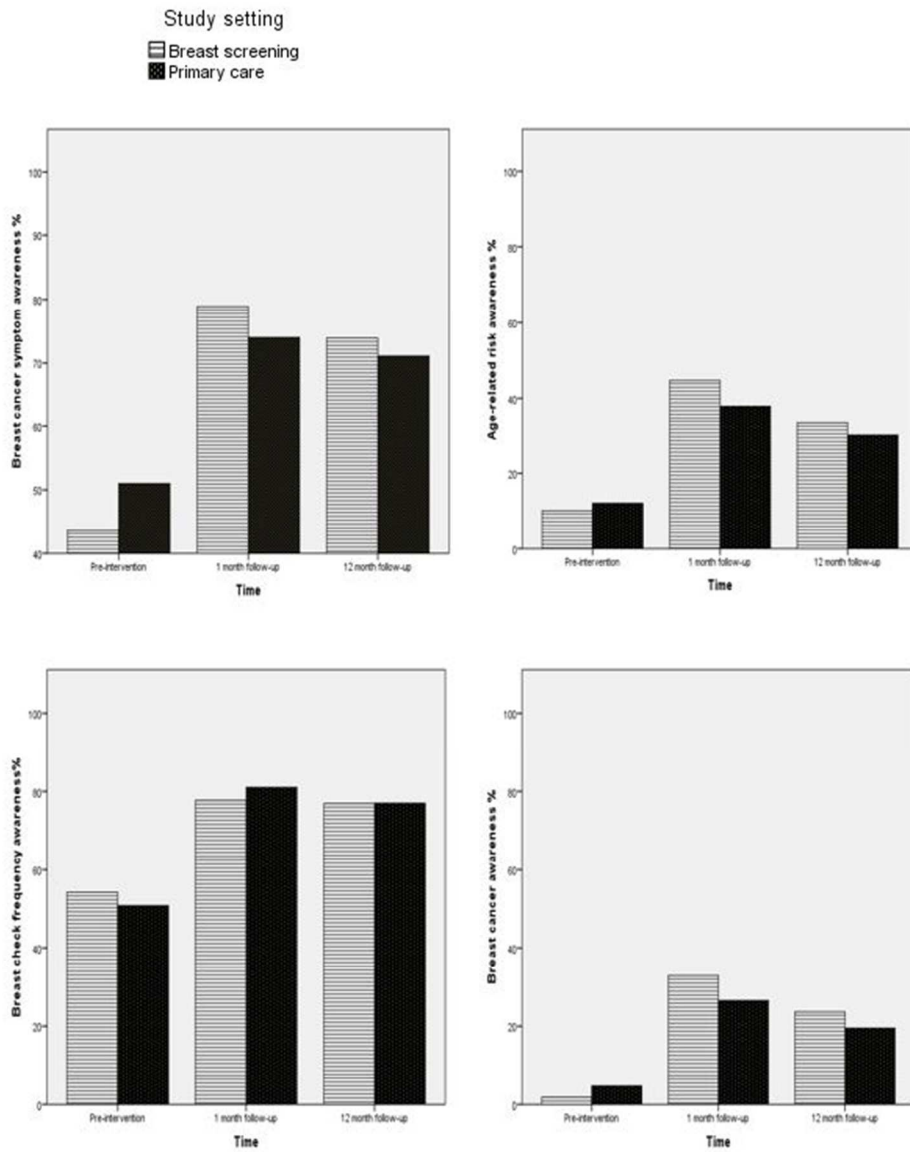


Figure 2: Comparison of PEP intervention results: breast screening and primary care settings
158x203mm (96 x 96 DPI)