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An audit to investigate the impact of false positive breast screening results and diagnostic work-up on re-engagement with subsequent routine screening

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ABSTRACT

Introduction: Women attending breast screening may have suspicious mammographic findings that are subsequently found at assessment clinic to be normal (false positive, FP). A false positive diagnosis is not harmless, with short and long term negative psychosocial consequences reported. Women are at increased relative risk of breast cancer therefore their attendance at subsequent screening is essential.
Aims: To assess the impact of FP breast screening diagnosis and diagnostic work-up on re-attendance rates across four consecutive screening rounds at a typical breast screening centre.
Method: Diagnostic interventions and screening re-attendance rates at one prior and two consecutive rounds were analysed for women receiving an FP diagnosis between 2004 and 2006.
Results: 397 women (5.57%) were referred for further assessment, including 228 (57.43%) false positives. 34 eligible women failed to re-attend routine screening (+3 years), with 17 failing to re-attend subsequently (+6 years). 70.6% (24/34) of non-attenders had attended at least two screening rounds prior to FP assessment. 75% of FP women had an imaging-only assessment with 17.5% (30/171) failing to re-attend, and 25% received a biopsy, with 7% (4/57) failing to re-attend subsequently.
Conclusion: This study is unique as it follows FP women through four consecutive screening rounds. FP non-attendance rates were considerably lower compared to the general screening population, with diagnostic work-up having limited influence. FP non-attendance may appear insignificant in comparison to total screened population, but these women are at greater risk of subsequent cancer so should be actively encouraged to re-engage with the screening programme.

Introduction

Breast cancer is the most common cancer in the UK, with a 1 in 8 lifetime risk of women developing the disease.[1] If breast cancer can be found at an early stage, prognosis is improved, and therefore eligible women in a range of countries are invited to have a mammogram examination within a breast screening programme every 1–3 years. In 2012 the NHS Breast Screening Programme extended the age range of women eligible for 3-yearly breast screening from 47 to 73 years.[2]

5–9% of women attending routine mammography will have suspicious findings on their mammogram,[3] necessitating referral to a breast cancer assessment clinic for further investigation. Following further assessment a significant proportion of these women will be given a 'normal' or 'benign' result, with no requirement for further treatment. This is considered to be a false positive (FP) result, with subsequent referral back into the screening programme (known as routine recall). A retrospective cohort study of 140,387 women identified that false positive women are at greater risk of cancer being detected at the next screen, interval cancer (cancers becoming symptomatic between the screening rounds), and larger cancers at presentation.[3] Von Euler-chelpin et al. also identified an increased relative risk of breast cancer after a false positive test which remained statistically significantly increased six or more years later, although technological improvements have reduced the size of excess risks.[4] Nonetheless both authors stress that it is essential that all false positive women are encouraged to re-attend for their next routine appointment.

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A systematic review and meta-analysis by Brewer et al. of over 340,000 attendances,[5] later updated by Salz,[6] identified that, within Europe, FP women are just as likely to re-attend routine screening 3 years later as those who had a 'normal' mammogram result. FP women in the USA are more likely to re-engage with the screening programme, and women in Canada less likely to re-engage.[5,6] Such differences are likely to reflect the variation in design of screening programmes and intervals, as well as differences in access to health care. While attendance at an assessment clinic is not the only factor to influence a woman's decision to participate in subsequent screening, a systematic review has demonstrated that the assessment clinic experience is intensely stressful, with increases in anxiety, worry and intrusive thoughts occurring in the short and medium term.[7] A more recent study[8] agreed that there were medium term (6 months) negative effects experienced by false positive women that were experienced at a similar level to women who had received a diagnosis of cancer. However when evaluated at three years after being declared free of cancer, these FP women still reported greater negative psychosocial consequences compared to women with normal screening findings.[8] This three year timeframe coincides with an invitation for the next routine screen within the UK – just receiving such an invitation has been shown to increase negative thoughts.[9]

While some published literature suggests that the degree of diagnostic work-up within an assessment clinic does not influence re-attendance rates,[10] the Irish breast screening programme has identified that the more invasive the test, the less likely the client is to re-attend for subsequent screening.[11] The degree of diagnostic work-up may significantly affect the experience of the client and the nature of the staff–client interactions,[12] with potential for anxious clients to receive information overload, insufficient information or even conflicting information.

This study aimed to identify the potential links between false positive diagnoses and diagnostic work-up on breast screening re-attendance rates at a typical breast screening unit in England. While previous studies have followed FP women for one screening round (3 years), this study aimed to correlate attendance both three years before the FP diagnosis, and then at two subsequent screening rounds (3 years and 6 years post FP diagnosis). The study received both ethical approval [11/NW/0741] and local R+D approval.

Methodology

The screening re-attendance rates for false positive (FP) women attending a typical breast screening unit over a 3 year period (2004–2006) were analysed via a retrospective study. This period was selected for data collection to enable follow up of these women through two further screening rounds (additional 6 years) with the later women being invited to their second screen in 2012. All women called back to assessment following routine screening attendance were reviewed. Those women who went on to be referred to a breast surgeon for further investigations and treatment were discounted and only those who were referred back to routine screening (FP) were considered further.

For all eligible FP women attending an assessment clinic (2004–2006), the diagnostic tests that they underwent were noted and correlated with subsequent screening attendance. Diagnostic tests received within the assessment clinic visit were categorised as either imaging-only (mammograms and ultrasound) or biopsies.

The audit data was collated into the following categories:

a) Number of women referred to assessment clinic between 1st April 2004 and 31st March 2007
b) Number of women designated as 'normal' following assessment (FP)
c) Assessment clinic interventions received by FP women
d) Number of eligible women who returned for subsequent routine screening three years later and of those women failing to re-attend the number who returned for routine screening six years later
e) Number of FP women failing to re-attend 3 years later who had previously attended for breast screening before their false positive assessment

Results

Following invitations to attend a breast screening appointment, the attendance rates at the study centre were 70.2% (2007); 72.67% (2008); 70.93% (2009). The breast screening unit screened a total of 7124 women during the 3 year period.

The audit considered women called back to assessment in 2004–6 and the subsequent screening re-attendance in 2007–9 and again in 2010–12. 397 women were referred for further assessment, equating to an overall 5.57% assessment referral rate. Within the three year period (2004–6), a total of 228 women (57.43%) who had been referred for further assessment were subsequently referred back to routine recall. These women were categorised as false positive (FP) results (see Table 1).

The 228 FP women were tracked to identify subsequent re-engagement with routine screening mammography three years later. In total 25.89% ($n = 59$) of false positive women failed to re-attend their subsequent screening round in 2007–9. It should be noted, however, that not all the women with false positive results, were eligible for subsequent routine recall for various reasons including being under consultant care ($n = 5$), over 70 years of age ($n = 19$) or moved away from the screening area ($n = 1$).

Of those women eligible for subsequent screening 14.91% ($n = 34$) did not re-attend the following (+3 years) screening round. Of these 34 women, 79.41% ($n = 27$) did not attend for screening six years later. It should again be noted, however, that not all women were eligible for subsequent routine recall for various reasons including deceased ($n = 3$), under consultant care ($n = 2$), over 70 years ($n = 8$) and moved away from screening area ($n = 4$). See Table 2 and Fig. 1.

The eligible women who failed to attend for subsequent screening were investigated to identify whether they had previously engaged with the screening programme (attending at least one screening round prior to their false positive assessment in 2004–6). The majority of the non-attenders at subsequent screening (24/34; 70.6%) had attended at least one screening round prior to their false positive result. See Table 3.

75% of the 228 FP women ($n = 171$) had received an imaging-only assessment before being referred back to routine screening.

Table 1
Screening unit activity: number of women screened, referred for assessment and subsequently categorised as false positive.

	2004	2005	2006	Total
No. women screened annually	2595	2266	2263	**7124**
No. screened women referred for further assessment	115	145	137	**397**
Assessment referral rate (%)	4.43	6.40	6.05	**5.57**
No. women with a false positive diagnosis	69	70	89	**228**
Percentage (%) of assessed women classified false positive	60.00	48.28	64.96	**57.43**