Response of women aged 65–74 to invitation for screening for breast cancer by mammography: a pilot study in London, UK

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Abstract

Objective **– To investigate the response and benefits to be gained from mammographic screening for breast cancer in women aged 65–74, who are not normally invited for screening.**

Design **– This was a pilot study comprising women aged 65–74 who are not currently invited for routine screening under the NHS breast screening programme. The results from this study were compared with the results of routinely screened women (aged 50–64) from the same health district.**

Setting **– A mobile breast screening unit in the grounds of the Royal Free Hospital.**

Subjects **– These comprised 5004 women aged 65–74 registered with GPs in the district of Hampstead and on the family health services authority (FHSA) lists. A total of 168 (3·4%) were initially excluded by the general practitioner or FHSA, and 286 (5·9%) of the invitation letters were returned by the Post Office or by other people as not deliverable for some reason.**

Main outcome measures **– Response rates to the invitation were assessed using three indices: crude population coverage rate, crude invited population coverage rate, and corrected invited population coverage rate.**

Results **– With regard to response rates, 1684 women aged 65–74 (37% of all those invited, excluding those who were not available) were screened, compared with 2894 (42%) women aged 50–64. The three response rates were higher for younger women than older: the crude population coverage rate was 37·1%, the crude invited population coverage rate was 38·9%, and the corrected invited population coverage rate was 42·1% for women aged 50–64, compared with 32·9%, 34·4%, and 36·8% respectively for women aged 65–69 and 34·3%, 35·2%, and 37·2% for women aged 70–74. The rate of assessment increased significantly with increasing age, with 3·18% of the 50–64 population screened being assessed, as compared with 4·14% and 4·83% of the women aged 65–69 and 70–74, respectively. Most biopsies done in the older women gave positive results, as did the biopsies from the 50–64 age group. However, the biopsy rate increased significantly with increasing age. The cancer detection rates in the women aged 65–69 and 70–74 were 14·2/1000 and 13·2/1000 compared with an incident screening round rate of 4·5/1000 in women aged 50–64.**

Conclusions **– These results show that there is potential for similar attendance at routine screening by older women if they are invited in the same way as younger women. As the assessment, biopsy, and cancer detection rates in the older women are significantly higher than in the 50–64 year olds, the costs and benefits of including them in the NHS screening programme should be reassessed.**

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Cancer is, to a large extent, mainly a disease of the elderly. Nearly 50% of cancers in women occur in those aged 65 years or older and 73% of all cancer deaths occur in this same age group. In the UK, the population of women aged 65 and over represents only 18% of the total female population, but accounts for 59% of the breast cancer deaths.[1]

The breast cancer incidence increases with advancing age and continues to increase after the age of 65, as does mortality. The incidence rate for women aged 65–74 is 200/100 000, compared with a rate of 160/100 000 for women aged 50–64. Similarly, mortality rates are 125/100 000 in the older age group compared with 100/100 000 in the 50–64 year olds.

In most countries, however, including the UK, no screening provision is made for this age group at high risk of the disease, as some current evidence suggests that their low compliance would not justify their inclusion in a screening programme. It was for this reason that the NHS national breast screening programme opted to exclude those over 64 years from the three-yearly call/recall screening using single view mammography that women aged 50–64 are invited to participate in. (Women aged over 64 can self refer, but are not actively invited.)

Few screening trials have included this older population (for example, the UK trial of early detection of breast cancer did not) and thus little is known about compliance and reasons for non-compliance, let alone mortality reduction, in this age group. In the few trials that have included the older group, the compliance rates have been encouraging. The Nijmegen study found that 70 was the age at which

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non-compliance became significant, with 84% uptake in women aged 50–59, 80% for those aged 60–69, and 35% for women aged 70 and over.[2] The Swedish two-counties study found an uptake of 93% for women 50–59, 91% for those aged 60–69, and 81% for those aged 70–74.

The two-counties study found a reduction in breast cancer mortality in women up to the age of 74,[3] and the overview of Swedish randomised trials found the greatest reduction in breast cancer mortality in women aged 50–69, with only a marginal impact on women aged 70–74.[4]

The south Manchester study invited 631 women aged 65–79 from one group general practice to come for screening. They found a fairly high crude compliance rate (55%) in the older women compared with the routinely screened women (67%), and a higher cancer detection rate in the older women (11·6/1000) than in the routinely screened younger women (8·1/1000).[5] This high cancer detection rate is typical of older women,[6] as the histology of the breast tissue changes with advancing age from predominantly fibroglandular to fatty tissue, which has a lower *x* ray attenuation than fibroglandular tissue (this low attenuation allows smaller cancers to be detected). The specificity of mammography in women aged 65 and over is very high (99%),[7] resulting in fewer false positive results.[6 9 11] The benign biopsy to cancer rate is lower in older women because of the higher incidence rate and the fewer benign causes of abnormalities found by mammography in older than younger women.[6]

Patients and methods

The population potentially available for screening consisted of all the women aged 65–74 registered with GPs in the district of Hampstead. This population numbered 5004 initially, and 4836 women were subsequently invited (the difference consisted of women ruled ineligible under the NHS breast screening programme exclusion criteria – those women with bilateral mastectomy and those whose GPs considered them medically unsuitable due to terminal illness). The comparison group consisted of those women aged 50–64 from the same health district who were routinely invited for screening. The mobile unit at the Royal Free site was selected for the study as this unit had finished the prevalent round ahead of schedule and thus had the capacity to take on additional screening.

Groups of women were divided into six batches (defined as groups of GPs in geographic areas), using the same GP groupings that were used for the routinely screened women in the district. Prior notification lists of patients and addresses were generated and sent to the GPs for correction of addresses and potential ineligibility of patients, along with a letter of explanation about the study. Approval was sought and obtained from the Royal Free Hospital Ethics Committee, and the Local Medical Committee was informed about the study.

Invitation letters were sent, with a specified screening appointment date and time. A leaflet (in 12 languages) explaining breast screening, and a map showing how to find the mobile mammographic unit were included with the initial invitation. The invitation letter and enclosures were the same as used for the routinely screened women, with the only difference being the inclusion of the following additional sentence, "A study of the effectiveness of screening women aged between 65 and 74 in the district of Hampstead is now being undertaken and you are being invited to take part."

The study women in batches 1–5 were screened between September 1992 and December 1992 at the mobile unit in the grounds of the Royal Free Hospital, where the routinely screened women aged 50–64 were also screened. The study women in batch 6 were screened in April 1993 in the grounds of Whittington Hospital, whereas the women aged 50–64 in batch 6 had been screened at the Royal Free.

The mammographic procedure used for the older women was a single view *x* ray (medio-lateral oblique) as opposed to the two view *x* ray which is local policy for the routinely screened women. The single view was used for the older women, as the Forrest report concluded that ". . . high quality single medio-lateral oblique view mammography has been shown to be an effective method in reducing mortality from breast cancer and is the preferred option for the development of mass population screening",[16] and because of the increased sensitivity and specificity of mammography in older women.[6 7] All of the mammograms (of the women aged 50–64 and the 65–74 study group) were read by the same radiologist (NP), and women with abnormal mammograms or those who were recalled for technical reasons were asked to reattend for assessment or repeat mammography in the usual manner at St Bartholomew's Hospital. Biopsies and all necessary follow up treatment were provided and surgery took place at the Royal Free Hospital (SP).

Calculation of coverage and uptake in the older compared with the younger women was done using three statistical indices. (1) The crude population coverage rate is the number of women who are screened divided by the number of women on the (uncorrected) prior notification list. This measures population coverage *assuming* that the FHSA lists are complete and accurate. (2) The crude invited population coverage rate is the number of women screened divided by the number of women invited to be screened. This crude uptake measures the screening service's ability to capture women in its catchment area who are potentially eligible to come for screening. (3) The corrected invited population coverage rate is the number of women screened divided by the number of women believed to have received an invitation. Thus, the number of letters returned by the Post Office is taken into consideration and the total number "not available" is subtracted from the denominator. This is a measure of the screening service's ability to persuade women to come for screening.[5]

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Table 1 Results from routine screening of women aged 50–64 and study screening of women aged 65–74 from a central London health district (percentages are in parentheses)

Age (y)	*No on PNL* & batch*	*No excluded*	*No invited*	*No not available after invitation*	*No screened*	*Crude population coverage rate (%)*	*Crude invited population coverage rate (%)*	*Corrected invited population coverage rate (%)*
50–64	7796 (100·0)	350 (4·5)	7446 (95·5)	573 (7·7)	2894 (37·1)	2894/7796 (37·12)	2894/7446 (38·87)	2894/6873 (42·1)
65–69	2346 (100·0)	96 (4·1)	2250 (95·9)	149 (6·6)	773 (32·9)	773/2346 (32·95)	773/2250 (34·46)	773/2101 (36·8)
70–74	2658 (100·0)	72 (2·7)	2586 (97·3)	137 (5·3)	911 (34·3)	911/2658 (34·27)	911/2586 (35·23)	911/2449 (37·2)

* PNL = prior notification list – lists of patients and addresses which are generated and sent to GPs for correction of addresses and potential ineligibility of their patients.

Results

Compliance ranged from 28·7% of the population invited (this was batch 6 – those women who had to travel to the Whittington Hospital to be screened) to 41·7% of the population screened (for women aged 50–64 *and* 70–74 from batch 4). The mean compliance figures were 38·7%, 34·6%, and 35·1% for the age groups 50–64, 65–69, and 70–74, respectively.

Table 1 shows the record of the screening process, for the younger and older women, from batch specifications and formation of prior notification lists (PNLs) to actual screening. Of the 7796 routinely screened women aged 50–64, 350 (4·5%) were excluded by their GPs or the FHSA, whereas of the 5004 older women, 168 (3·4%) were excluded. The number of younger women "not available" after invitation was 573 (7·7%) compared with 286 (5·9%) of the older women.

Table 1 also shows the three calculations of uptake of screening in relation to age. The uptake is the highest for the routinely screened group and decreases in the age group 65–69 before increasing again (although not significantly) in the age group 70–74.

A three-sample test for equality of proportions without continuity correction showed relative risks (RR) of 0·87 for women aged 65–69 and 0·88 for women aged 70–74 compared with women aged 50–64 (RR = 1·00, $\chi^2 = 29·6795$, df = 2, p = 0). Mantel-Haenszel analysis showed odds ratios (OR) of 0·81 (95% CI 0·736, 0·900) for the uptake of women aged 65–69 and 0·85 (95% CI 0·771, 0·931) for those aged 70–74 years compared with women aged 50–64 ($\chi^2 = 17·642$ and p<0.001). Logistic regression showed a significant effect of fitting age (change 20·99, df 2, p<0·001), batch (change 16·17, df 5, p<0·001), and batch to age model (change 18·90, df 5, p<0·001).

The clinical findings from this study are seen in table 2, where the assessment rate increases significantly (p = 0·009) with increasing age (3·2% in women aged 50–64 (OR 1·00) 4·1% in women 65–69 (OR 1·34), and 4·8% in women 70–74 (OR 1·62)). A three-sample test for equality of proportions without continuity correction showed RRs of 1·30 for women aged 65–69 and 1·51 for women aged 70–74, compared with women aged 50–64 (RR = 1·00, $\chi^2 = 5·923$, df = 2, p = 0·05).

Similarly, the biopsy rate increased significantly (p<0·001) with advancing age. It was 0·48% in women aged 50–64 (OR 1·00), 1·55% in women aged 65–69 (OR 3·59) and 1·54% in women aged 70–74 (OR 3·46). Again using the three-sample test for equality of proportions without continuity correction, the RR for women aged 65–69 was 3·20 and that for women aged 70–74 was 3·17 compared with the value in women aged 50–64 (RR = 1·00, $\chi^2 = 13·816$, df = 2, p = 0·001).

The cancer detection rates for the three age groups were 4·49/1000, 14·23/1000, and 13·17/1000, respectively. The three-sample test for equality of proportions showed RRs of 3·16 for women aged 65–69 and 2·93 for women aged 70–74 compared with women aged 50–64 (RR = 1·00, $\chi^2 = 11·523$, df = 2, p = 0·0031). The cancer detection rate in the 50–64 year age group is the incident round screening rate, meaning that most women should have been screened once before. For the sake of comparison, the rate over the prevalent round of screening for women aged 50–64 was 10/1000, therefore the older women still have much higher cancer detection rates.

Table 2 Results from screening younger and older women

Age (y)	*No screened*	*No of assessments*	*No of biopsies*	*No of cancers*
50–64	2894	92 (3·17)	14 (0·48)	13 (0·45)
65–69	773	32 (4·13)	12 (1·55)	11 (1·42)
70–74	911	44 (4·83)	14 (1·54)	12 (1·32)

Discussion

Fewer older women were both excluded by their GPs and/or the FHSA and found not available after invitation to screening than their younger counterparts. This may reflect the fact that older women represent a more static population, both in terms of residence and practice lists.

Uptake in cities is always lower than in rural screening districts,[9] and London is no different. In fact, uptake in inner London is far lower than the UK average. The mean acceptance in inner London (NE Thames and NW Thames Regions combined) was 59·4%.[8] There is even a marked difference in uptake between inner and outer London districts, with outer London reporting better performance, and a large variation between inner (25%) and outer (60%) mean uptakes.[8] European experience shows that this low uptake is typical of major cities, as rural areas have a much higher uptake in general (74% uptake in rural areas *versus* 60% in inner city areas).[9]

Possible reasons for poor uptake include FHSA inaccuracy,[10] women not receiving their invitations, ethnicity/language, anxiety, and work/time considerations. Furthermore, symp-

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tomatic and private services are widely available in inner London. Thus a number of women might already have been screened, but are counted as "not screened" as they did not participate in this screening.

Although this study found a decrease in uptake with increasing age, it was not large. In the previous year, only 53 women aged 65–74 were self- or GP referred for screening, while the number screened escalated to 1684 women aged 65–74 during the study. Also, no additional publicity was used to encourage the older women to come for screening, whereas local advertisements and posters are routinely used to promote screening for women routinely screened in the national programme.

This study found lower crude population coverage rates than those in the south Manchester study (37·12% *versus* 66·5% for women aged 50–64, 32·95% *versus* 57·9% for women aged 65–69, and 34·27 *versus* 52·4% in women aged 70–74). However, this study had far larger numbers (4578 *versus* 727 in Manchester) and less assiduous identification of the women at risk.

The clinical findings of this study agree with published reports with regard to higher assessment, biopsy and cancer detection rates in the older as opposed to younger women screened.[11]

In addition, studies have found that older women can respond as well as, if not better, than their younger counterparts to treatment for both localised and metastatic breast cancer.[12,13] This can be explained by the fact that the likelihood of a tumour containing high levels of oestrogen (ER) and progesterone (PR) receptor protein increases with age. Thus, older women are more likely to be hormone receptor positive, with a better stage for stage prognosis than those who are ER and/or PR negative.[14] It has also been noted that older women have fewer interval cancers than the younger women, indicating perhaps that the interval between screening episodes could be longer without reducing efficacy (that is, slow growing tumours).[2,15]

A further consideration is that life expectancy is increasing: the present average life expectancy for a 65 year old woman in the UK is 17·8 years.[1] In addition, these ageing women have fewer episodes of disease as they age.[11]

Although mortality is the only conclusive outcome on which a screening programme's effectiveness can be judged, interim measures such as uptake and cancer detection rates can be valuable in themselves as indicators of the success of screening. Uptake in this district is low in all the age groups, but what is important to note is that even though the older women had significantly lower uptake than the younger women, the cancer detection rate was far higher. Thus, the statement that older women are less compliant than younger women, and therefore their inclusion in a screening programme is not merited is not enough.[16] Nor is the statement that they will die of something else even if they are included. Perhaps older women would get more benefit out of inclusion in a breast cancer screening programme than the younger women. This study should be repeated in a district with a higher uptake rate in the nationally screened women to see if the older women's uptake and cancer detection rates are similar.

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