The impact of different communication and organizational strategies on mammography screening uptake in women aged 40-45 years

Livia Giordano¹, Valeria Stefanini¹, Carlo Senore¹, Alfonso Frigerio¹, Roberta Castagno¹, Vincenzo Marra², Marco Dalmasso³, Marco Rosselli del Turco⁴, Eugenio Paci⁵, Nereo Segnan¹

1 Unit of Epidemiology – CPO Piemonte, Center for Cancer Prevention, Turin, Italy
2 S. Anna Hospital and Regional Reference Centre for Breast Screening, Turin, Italy
3 Unit of Epidemiology, Azienda Sanitaria 5, Grugliasco, Turin, Italy
4 European Society of Breast Cancer Specialist – EUSOMA, Florence, Italy
5 Institute for the Study and Prevention of Cancer (ISPO), Florence, Italy

Background: Several factors can influence access to population breast cancer screening. The aim of the study was to evaluate the impact of different information approaches, women’s socio-demographic characteristics and organizational factors on mammography screening uptake. Methods: We selected 5744 women aged 40–45 years who were randomly assigned to be given letters with: (i) a pre-fixed appointment plus standard leaflet (Group 1); (ii) a pre-fixed appointment plus a more comprehensive booklet (Group 2); (iii) point (ii) plus the offer of a counselling session (Group 3); and (iv) an invitation to contact the centre to get information and arrange participation (Group 4). Results: Ninety-five women were excluded before the invitation and 5649 were randomized. After excluding undelivered letters (n = 41) and women reporting an exclusion criterion following our invitation (n = 248), the final eligible population was 5360 women. Participation rates following the first contact were 36.5, 39.9, 35.8 and 16.5% for Groups 1–4, respectively. The rates increased to 40.9, 43.6, 40.1 and 35.1% after the reminder letters. Women receiving more complete information had a higher uptake (Group 2), although not statistically significant. Differences among the four groups were maintained by controlling the effect of socio-demographic and attendance determinants. Regardless of intervention, participation was higher among married, higher educated, white-collar women, those born in northern Italy, living closer to the screening unit and with a female-collaborative doctor. Conclusion: Invitation letters with a fixed appointment correlate with a higher attendance rate. Providing women with more information on procedures, risks and benefits of mammography screening does not modify their participation.

Introduction

Participation has been considered an important process measure to evaluate the impact of mammography screening on breast cancer mortality.

In literature, a great number of factors influencing access to population breast cancer screening have been described. Socio-demographic characteristics (age, ethnicity, social class and income level), organizational procedures (recruitment strategies, cancer screening coverage, general practitioners’ (GP’s) involvement, travel distance, location and type of screening unit) and people’s attitudes and beliefs are the most significant. Participants’ knowledge about the disease as well as the strategies used to convey information on the nature of the screening process have been found to affect uptake in screening programmes.¹⁻⁵

Several questions have been raised about the appropriateness of the routine approach to inform population about cancer screening, mainly focusing on the benefits rather than the risks.⁶⁻¹⁸

It has been argued that in order to make an informed decision, individuals should also receive (from the outset) information on side effects and limitations of screening.⁹⁻¹³ On the other hand, it has been suggested that more comprehensive and balanced information might lead to a poorer participation with a consequent reduction in the benefits of the population.¹³⁻¹⁶

The question of how many people would refuse screening if data concerning its risks and side effects were included in the information instruments is an empirical one, as very little work has been carried out in this area.¹⁵⁻¹⁷

In order to address these issues, we performed a randomized trial of different methods of involving and informing women about mammography screening. The aim of the study was to compare the delivering of standard information with additional information, in modifying the participation to breast cancer screening. With the secondary group, we analyse the impact of different socio-demographic and organizational determinants on mammography screening participation.

Although in Turin, an organized breast cancer screening is active since early 1990s and invites all women aged between 50 and 69 years to perform a mammography every 2 years, we decided to include this study as part of a larger study involving younger women. This is because the mammography screening in women under the age of 50 years is still a controversial issue and the balance between its advantages and disadvantages is one of the most critical matters. How to transmit information, the degree of detail and, above all, the effect on women’s participation, are issues that screening operators are debating for a long time. In younger women, the matter of communication becomes even more a priority, still greater if compared with older women, given the uncertainty of the efficacy of mammography screening in this age group.

Methods

This investigation has been carried out in the framework of an Italian multi-centric population-based randomized trial (Eurotrial 4018) whose main aim was to evaluate early outcomes (both in terms of harms and benefits) of annual mammography screening among women aged 40–45 years. In the context of Eurotrial, 40,675 GPs living in Turin, younger than 65 years and with more than 400 patients listed in their rosters were randomly allocated to the intervention group (338) and to the control group (337). Women listed in the GPs’ rosters in the intervention group (n = 11,555) were targeted for recruitment in the study; those listed in the
The present study was embedded in Eurotrial 40 during its first year of the investigation with the aim to compare different communication approaches. During the recruitment period, all women allocated to the intervention group in the main trial were randomly assigned to the following groups:

- **Group 1**: letter with a fixed appointment plus the standard informative leaflet;
- **Group 2**: letter with a fixed appointment plus a more detailed booklet;
- **Group 3**: same as in Group 2 plus the opportunity to arrange a face to face encounter; and
- **Group 4**: letter without any appointment but inviting women to contact the centre to receive additional information.

Table 1 Differences between the leaflet and the booklet: format/layout (A), general information (B), screening procedures (C), advantages/disadvantages (D)

<table>
<thead>
<tr>
<th>A. Format/layout</th>
<th>Leaflet</th>
<th>Booklet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension and colour</td>
<td>6 pages 8.2 in. x 4 in./ full colour</td>
<td>18 pages 8.2 in. x 4 in./3 colours (white, black and blue)</td>
</tr>
<tr>
<td>Illustration</td>
<td>Front cover image</td>
<td>Front cover image and pictures showing the screening procedures in the booklet</td>
</tr>
<tr>
<td>Text structure</td>
<td>Questions/answers</td>
<td>Questions/answers</td>
</tr>
<tr>
<td>B. General information</td>
<td>Yes</td>
<td>Yes (remarks on the importance to provide complete and balanced information)</td>
</tr>
<tr>
<td>Nature and purpose of the study</td>
<td>Yes</td>
<td>Yes (plus the improvement of the quality of life)</td>
</tr>
<tr>
<td>Breast cancer prevention by mammography screening</td>
<td>Yes</td>
<td>Yes, number of new cases and deaths</td>
</tr>
<tr>
<td>Breast cancer incidence/mortality</td>
<td>Yes, number of new cases and deaths</td>
<td>The five most common cancers (bar graphs)</td>
</tr>
<tr>
<td>Incidence rates by age groups (curve)</td>
<td>Yes</td>
<td>Breast cancer incidence and mortality rates (bar graphs)</td>
</tr>
<tr>
<td>Organizational/logistic information</td>
<td>Yes</td>
<td>Incidence rates by age groups (curve)</td>
</tr>
<tr>
<td>Test procedure</td>
<td>Yes</td>
<td>Yes (gratuitousness of the test remarked more times)</td>
</tr>
<tr>
<td>Test safety and side effects</td>
<td>Yes</td>
<td>Yes (plus information on how to prepare and who performs the test)</td>
</tr>
<tr>
<td>Further assessments</td>
<td>Yes (the percentage of recalled women)</td>
<td>Yes (plus advice on menstrual period/pregnancy)</td>
</tr>
<tr>
<td>Key points in bold/underlined</td>
<td>Yes</td>
<td>Yes (the percentage of recalled women plus supplemental information on what they consist of)</td>
</tr>
<tr>
<td>Numerical information marked out in boxes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**D. Advantages/disadvantages**

| Benefit of mammography screening | Yes | Yes |
| Number of deaths prevented in a population of women undergoing regular screening | Yes, number of deaths prevented in a population of women undergoing regular screening |
| False positive | Yes | Yes (plus number of women recalled for further assessments with a negative result) |
| False negative | Yes | Yes (plus number of cases out of 100 breast cancers with a false negative result) |
| Overdiagnosis | Yes | Yes |

Yes means that the information is present; when quantitative information is available or specific remarks are detailed, they are indicated in brackets.

**a**: How to make/to change an appointment, how and when to get the results.

**b**: What a mammography is, how it is performed, how long it takes, who reads the test.
purposes and received by mail the informative brochure. Women randomized in subgroup 4B were informed about the project and invited to schedule a personal encounter with a counsellor to get supplemental information (as in Group 3). Those who declined the invitation for a counselling session were offered an appointment for the mammography. All non-responders were mailed a reminder letter with a scheduled appointment and the standard leaflet so that they had the same chance of getting the mammography as the other women had.

Statistical analysis

The outcome of interest was the compliance at 12 months after the initial invitation. Group 1 was used as reference group, representing the usual invitation approach used by the local screening programme addressed to women aged 50–69 years. Odds ratio (OR) and their 95% confidence limits (CI) were used as a measure of association between the intervention and the outcome in the analysis comparing the attendance rates in the four groups.

We also tested the possible interaction between some organizational and socio-demographic factors (birthplace, marital status, educational level and occupation) performing a logistic regression analysis. For this multivariable analysis we considered the eligible population, excluding women not traced and those mentioning some exclusion criteria after invitation. Approximate 95% confidence intervals (CIs) were computed from Wald-type standard errors of the regression coefficients. The likelihood ratio test was used to assess significance of terms included in the regression model. Data collected were analysed using the SAS System procedure (version 8.2; SAS Institute, Cary, NC, USA).

Results

During the study period, 118 (69.4%) out of 170 GPs contacted for the main trial accepted to collaborate. Out of 5744 eligible women, 95 (1.7%) were excluded before invitation. The remaining 5649 women were allocated to the four intervention groups (figure 1).

As usually performed by the Italian programmes,20,21 the participation rate was calculated considering the true eligible population, excluding from the denominator women whose letters remained undelivered (notwithstanding several attempts) and those who reported to be pregnant, breastfeeding or with a recent mammogram.

As illustrated in table 2, the overall participation rate after the first mailing was 28.3%, increasing to 38.7% after the postal reminders.

Compared with Group 1, the participation after the first mailing was up by 3.4% in Group 2 and down by 20% in Group 4. After the reminders, the participation was up by 2.7% in Group 2 (OR = 1.12; 95% CI 0.94–1.33) and down by 5.8% in Group 4 (OR = 0.78; 95% CI 0.67–0.89). No great differences were observed in Group 3 compared with the reference group, both after first mailings (−0.7%) and reminders (−0.8%; OR = 0.97; 95% CI 0.81–1.15).

A largest impact of the postal reminders has been observed among women allocated in Group 4, where the proportion of compliers after the second mailing was up by 18.6%, whereas in Groups 1, 2 and 3 the increment was 4.4, 3.7 and 4.3%, respectively.

In Group 3, only one woman accepted to fix a personal encounter with a counsellor to get extra information before the test.

Differences in women’s participation associated with the different communication modalities were maintained by control
PLACE OF BIRTH

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of un delivered letters (%)</th>
<th>No. of excluded women (%)</th>
<th>Eligible women</th>
<th>No. of attending women after first contact (%)</th>
<th>No. of attending women after postal reminder (%)</th>
<th>Total attendance</th>
<th>OR (95% CI)</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (n = 1615)</td>
<td>16 (1.0)</td>
<td>68 (4.2)</td>
<td>1531</td>
<td>559 (36.5)</td>
<td>67 (4.4)</td>
<td>626 (40.9)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Group 2 (n = 807)</td>
<td>6 (0.7)</td>
<td>42 (5.2)</td>
<td>759</td>
<td>303 (39.9)</td>
<td>28 (3.7)</td>
<td>331 (43.6)</td>
<td>1.12 (0.94–1.33)</td>
<td>0.23</td>
</tr>
<tr>
<td>Group 3 (n = 807)</td>
<td>4 (0.5)</td>
<td>37 (4.6)</td>
<td>766</td>
<td>274 (35.8)</td>
<td>33 (4.3)</td>
<td>307 (40.1)</td>
<td>0.97 (0.81–1.15)</td>
<td>0.74</td>
</tr>
<tr>
<td>Group 4 (n = 2420)</td>
<td>15 (0.6)</td>
<td>101 (4.2)</td>
<td>2304</td>
<td>381 (16.5)</td>
<td>428 (18.6)</td>
<td>809 (35.1)</td>
<td>0.78 (0.67–0.89)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total (n = 5649)</td>
<td>41 (0.7)</td>
<td>248 (4.4)</td>
<td>5360</td>
<td>1517 (28.3)</td>
<td>556 (10.4)</td>
<td>2073 (38.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

In the past, few studies investigated the effect of offering different types of information on intended or actual uptake in screening. In three studies assessing the effect of amount and content of information delivered to the target population on their decision to undergo screening for prostate cancer, two found that intervention-reduced uptake, while in the third there was no effect. A study measuring the effect of evidence-based information on women’s willingness to participate in cervical cancer screening, found that providing women with more information on risks, uncertainties, as well as benefits, was likely to deter some, but not differentially those at higher risk. In our study, women receiving a brochure with more complete information had a higher uptake (+2.7%), although not statistically significant. These results suggest that providing a larger amount of written information, broadening on screening procedures, benefits and limits of the test, does not influence participation.

Of course, how, giving a great amount of information affected women’s knowledge and their decision-making process cannot be drawn from our results. The provision of written information can be considered a reasonably inexpensive way to deliver information and improve knowledge about screening even if an increased knowledge cannot be assumed to lead necessarily to informed choices. Agreement to perform the screening test is a complex process that is influenced not only by the communication strategy. Factors related to the individual and the context may strongly affect the decision and change over time.

The presence of an organized screening programme in the study area, targeting women aged 50–69 years, active for a long time, well known by the population and supported by a public campaign focused on the efficacy of biennial mammography in women >50 years, may partly justify the lack of a significant difference between the different communication strategies. Nevertheless, the higher participation rate in Group 2 (with more information) compared with the other groups (where the informative material can be considered similar) in some way indicates that more information do not impact on participation. Having achieved these results in a group of women where the efficacy of screening is still
controversial and communication problems are more difficult to manage seems to reinforce rather than weaken these conclusions.

Compared with the local screening programme, where the mean overall participation rate is 60%, the observed compliance in this trial was lower (38.7%). This can be partly attributed to the opening times of the centre and its location out of the urban area. The centre was open twice a week and not easily reachable by public transport (>74% of the target population lived farther than 20 min by bus from the screening centre). Although women received a reduction for the cost of transportation, the additional time required to reach the screening centre likely represented a more important barrier than transportation costs. An inverse relationship between attendance and geographical distance from the screening unit was also reported in many other experiences.26–29

Furthermore, the presence of an opportunistic screening activity in this target group can have strongly reduced the final uptake.

Women in Groups 2 and 3 received the same informational approach except for the suggestion of contacting the centre to get further information for women in Group 3. To offer a personal counselling session in addition to written information, as observed in Group 3 compared with Group 2, has no effect on behaviours. This suggests that even if in certain situations, i.e. in a clinical setting after a diagnosis of cancer, women may prefer interpersonal sources of information because they find them more trustworthy than printed material, this is not the case of screening.30

Considering the young age and the high employment proportion (80%) of women involved in the study, the lack of time could be seen as a barrier in accepting an individual discussion.

The results achieved in Group 4 seem to substantiate such a hypothesis. Although all women contacting the centre in Group 4 were more likely highly selected and probably more aware about breast cancer prevention, among those randomized to receive a face to face discussion (subgroup 4b), 4.4% refused any proposal and 23% accepted the test but declined further personal involvement. In this subgroup, little more than half of women attended counselling session.

Also the request of a more active role in this latter group, where women were supposed to personally make arrangements for getting the appointment, might have induced women to suspend the final decision with a higher risk of removing or forgetting the invitation.

This hypothesis is supported by the finding of a significantly higher screening rate in the groups where women received an invitation letter with a specific time and date for the test and it is consistent with other previous reports from studies conducted among women targeted for population-based screening programmes.19 The response rate to the first invitation (without appointment) in group 4 is indeed ~20% lower as compared with group one, while in this group the response rate to the reminder (containing a pre-fixed appointment) was significantly higher if compared with the response rate to the reminder in the other groups where no appointments was included.

The relationship between attendance and the analysed socio-demographic and organizational factors is in agreement with results from other studies.26,27, 31–33 Married women were more likely to attend for mammography than singles or divorced women or widows, reflecting a higher degree of social support and interaction from family members, a feeling of responsibility and a greater concern with health.34 In accordance with our results, employed women have been found to be more likely to attend than non-employed women (housewives). Employment status may serve as a proxy for interaction with other people, and degree of social integration.

Our study had of course some strengths and weaknesses. The weaknesses lie in the impossibility to analyse how the provided information really improved women’s knowledge and affected their awareness in choosing to participate (or not) in mammography screening. Furthermore our study included younger women not yet involved in the local routine breast cancer screening programme. Even if we assumed that providing detailed information about risks and benefits of screening does not have a negative effect on participation how this can be shifted to older women needs further research. Baseline knowledge of the disease and screening can be different in different age groups as well as breast cancer awareness.35,36

Against this, one of the main strengths of our study is to try to answer some basic and practical questions like the effect of a more in-depth information on participation.

Furthermore, our results corroborate previous outcomes on how organizational models run better than others in inviting women to take a mammography, also outside a routinely screening system. Furthermore, they show how face to face communication is not well accepted by women because of the need of time availability.

We can conclude that organizational barriers are much stronger deterrent in participation compared with the different levels of information delivered (both qualitatively and quantitatively) during the invitation phase. Similarly, consolidated organizational models (such as the pre-fixed appointment and the GPs’ involvement) are confirmed to be correlated with higher rates of participation, while the demand for a more active role of women or the request for a greater time availability decreases the attendance rate.

Additional efforts should be directed towards the development of appropriate instruments to improve on informed choices (i.e. tailored information and web-based decision aids) and this is even more pressing in a context where the extension of screening below 50 is still under debate and the need for accurate and understandable information is emphasized from many sources.37–39

Funding

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Conflicts of interest: None declared.

Key points

- Organizational barriers like the distance from the screening centre and a time-limited access can play an important role in discouraging screening participation.
- Socio-demographic characteristics (to be married, higher educated, white collar worker and born in North-Centre Italy) are confirmed to be associated with higher attendance.
- Providing detailed information about harms and benefits of mammography screening does not influence participation.
- The invitation letter with a fixed appointment correlates with a higher attendance rate.
- Further research is needed to develop new tools to improve informed choice about mammography screening and to investigate the impact of organizational features in breast cancer screening compliance.

References

Socio-economic inequalities in survival from screen-detected breast cancer in South West England: population-based cohort study

Fiona McKenzie¹, Alexander Ives², Mona Jeffreys³

1 Centre for Public Health Research, Massey University, Wellington, New Zealand
2 Cancer Intelligence Service, South West Public Health Observatory, Grosvenor House, Bristol, UK
3 School of Social and Community Medicine, University of Bristol, Canyenge Hall, Bristol, UK

Correspondence: Fiona McKenzie, Centre for Public Health Research, Massey University, PO Box 756, Wellington, New Zealand, tel: +64 4 3800615, fax: +64 4 3800600, e-mail: f.j.mckenzie@massey.ac.nz

Background: Socio-economic inequalities in breast cancer survival have been reported worldwide, but whether these exist in screen detected as well as symptomatic women has not been established. Making this distinction will allow inferences about the relative contributions of pre- and post-diagnostic delay to these inequalities. Methods: Screening-eligible women diagnosed with breast cancer in South West England (2002–06) were followed-up to 2007. Five-year relative survival ratios (RSRs) were calculated for each deprivation quintile, using deprivation-specific life-tables and a period approach. The ‘deprivation gap’ in survival was calculated as the slope index of inequality between least and most deprived women. Results: The study included 11 018 women, of whom 1176 died during follow-up. Screening status of 54% of women was missing. A clear gradient in survival across deprivation groups ranged from 83.6% [95% confidence interval (CI) 80.0, 86.2] in the least deprived quintile to 76.1% [95% CI 73.1, 79.0] in the most deprived quintile. Conclusions: Socio-economic disparities in survival from screen-detected breast cancer exist and can be partially explained by differences in uptake and symptomatic presentation.