

## A Randomized Intervention to Improve Ongoing Participation in Mammography

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**Objective:** To test the effectiveness of interventions intended to increase rates of regular breast cancer screening, according to recommended guidelines.

**Study Design:** A randomized controlled trial of 2 outreach interventions (a mail reminder and a telephone reminder plus appointment scheduling) compared with a routine publicity campaign to encourage continued participation in mammography screening.

**Participants and Methods:** Participants were 1908 women aged 50 to 75 years continuously enrolled in a large group-model HMO during the study who underwent a bilateral mammogram during the first quarter of 1994 and no subsequent mammogram during the next 18 to 21 months. Data were obtained from health plan administrative data files supplemented by medical chart review. Women were randomly assigned to receive (1) a mail reminder, (2) a telephone reminder, or (3) routine publicity on mammography for all women. The outcome measure was a mammogram received after the intervention period and within 2 years of the initial mammogram date.

**Results:** Bivariate and multivariate statistical analyses showed that participation was significantly higher for women contacted by telephone than through routine publicity. Mail reminders were no more effective than a routine publicity campaign. Primary care physician and gynecologist visits increased the likelihood of a subsequent mammogram for women in all intervention groups.

**Conclusions:** Telephone contact by regular health plan staff was more successful than publicity in encouraging continued participation in mammography screening in women enrolled in a group-model managed health care plan. Because mailings did not influence participation in mammography screening, health plans should be cautious about investing in member mailings without first evaluating their effectiveness in the context of existing outreach efforts.

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Demonstrated reductions in breast cancer mortality rates in women aged 50 or more years who receive regular mammography screening<sup>1,2</sup> have contributed to widespread recognition and endorsement of this service. For many HMOs and other forms of managed care plans, providing screening mammography according to recommended guidelines has become a high priority. Indeed, mammography screening is one of the key performance indicators used by the National Committee for Quality Assurance to measure health plan quality.

Much recent research has focused on how to increase women's knowledge about the need for mammography screening, improve access to such screening, and reduce barriers to screening. Studies have found that telephone counseling interventions<sup>3</sup> or interventions that make mammography more convenient (eg, calling patients to remind them about appointment scheduling or providing trans-

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portation to a mammography facility)<sup>4,5</sup> can increase compliance. A telephone intervention with members of a managed care plan resulted in higher mammography rates in women older than 50 years than in the usual care group<sup>6</sup> or in groups receiving a birthday card reminder or other intervention by mail.<sup>7</sup> Whereas age was not a factor in these studies, other studies<sup>8,9</sup> have indicated that women 70 or more years of age are less likely than younger women to undergo a mammogram. Another demographic factor related to mammography screening is income or insurance coverage. Low-income women and Medicaid recipients are less likely to receive a mammogram than are others.<sup>8,9</sup> More frequent visits to primary care physicians and gynecologists also have been associated with higher mammography rates,<sup>10-13</sup> as has the recency of the medical visit.<sup>14</sup>

Although some interventions increase initial mammography rates, rates for subsequent participation often remain low.<sup>15,16</sup> Because mammography screening must be ongoing, effort is needed to encourage women's continued participation. We agree with Rimer<sup>17</sup> that "the greatest challenge will be to make mammography a habit for the 70% of women who are not getting regular mammograms" (p 324). Our study addresses women in a managed care plan who have had a previous mammogram and compares 2 intervention strategies with the standard outreach to encourage continued mammography screening within the recommended interval.

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... METHODS ...

**Study Design**

This study is a randomized controlled trial of 2 outreach interventions compared with a routine publicity campaign to encourage continued participation in mammography screening. Participants were women aged 50 to 75 years who had bilateral mammography in the first quarter of 1994 but had not obtained a subsequent mammogram 18 to 21 months after this initial mammogram. The study was designed to test whether a telephone reminder with an option for appointment scheduling and a mail reminder are more effective outreach strategies than a routine publicity campaign to encourage women with a previous mammogram to undergo another mammogram within the recommended interval of every 1 to 2 years as specified by the health plan guidelines. Demographic and utilization factors were included to determine their relationship, if any, to ongoing participation in

mammography screening among managed care health plan members.

**Study Setting**

The setting was a large, established, group-model HMO in the Northeast. Nearly 10% of members were covered by Medicare, and another 9% were covered by Medicaid; the largest portion of members had commercial coverage through large and small employer groups, unions, and other organizations. Care was delivered by affiliated medical group physicians and ancillary staff through individual medical centers. Mammography was a fully covered benefit provided at radiology sites in selected medical centers. The mammography visit was entered into the health plan's electronic administrative database, which contains information for every medical center encounter. Mammography reports from outside the health plan were sent to the primary care physician and filed in the member's medical chart. This study used administrative encounter data complemented by review of individual member medical records located at the medical centers.

**Study Sample**

In October 1995, using the electronic administrative encounter file, we identified 3034 women aged 50 to 75 years who underwent a bilateral mammogram in the first quarter of 1994 and who had been continuously enrolled in the health plan in the 18 to 21 months since then with no evidence of having had a subsequent mammogram. This age range was used because it corresponds to the age-specific guidelines for mammography screening in this health plan. Members with all types of coverage (ie, Medicaid, Medicare, or commercial) were included. All women who met the selection criteria were randomly assigned to 1 of 3 groups: mail reminder (n = 1011), telephone contact (n = 1011), or routine publicity program (usual care control group) (n = 1012).

Administrative data review and medical chart review were conducted in July and August of 1996 to confirm eligibility (ie, no mammogram between April 1, 1994, and September 30, 1995; continuous enrollment in the health plan from the start of the observation period through March 31, 1996; and age 75 years or less at the start of the study). In all, 1126 members were removed from the sample because of ineligibility. More than half of these women (n = 584) were ineligible because they had a subsequent mammogram before October 1, 1995, that had not been captured in the administrative database at the time of sampling. This misclassification reflects the

time lag required for data entry and the small number of mammograms that appeared only in the medical chart because they occurred outside the health plan. The other ineligible women were older than 75 years ( $n = 364$ ) or were no longer members of the health plan ( $n = 178$ ). A total of 1908 members remained for final analysis: mail reminder ( $n = 630$ ), telephone contact ( $n = 653$ ), and usual care ( $n = 625$ ).

### **Intervention Strategies**

The variety and range of mammography screening interventions that have been reported are grounded in several theoretical approaches<sup>17</sup> to health behavior change. Our interventions reflect several aspects of these approaches. Based on the health belief model,<sup>18</sup> we designed our mail and telephone reminders as cues to action. The reminders took into consideration the similarity of basic enabling factors in this population: they all were members of an HMO with access to mammography through their HMO physician at an HMO mammography center. Furthermore, having the previous mammogram demonstrated knowledge of the system, ability to access the system, and knowledge of the experience of mammography. Consistent with the theory of reasoned action as applied to mammography participation,<sup>19</sup> this past behavior may be an indication of the "habit" for mammography. To address facilitating conditions in this experienced population, the convenience of appointment scheduling was added to the telephone reminder. Whereas all members had equal opportunity for exposure to the health plan's publicity campaign about breast cancer and mammography, the interventions incorporated a cue-to-action reminder designed to increase awareness of the timing and availability of mammography and to reduce access barriers for 1 group.

In the usual care group, women received no intervention other than the routine publicity and educational outreach provided by the health plan and made available to all its members. Among these efforts were sponsorship of the local Breast Cancer Awareness Walk in October 1995 and a lead article in the September 1995 member bulletin discussing breast health and announcing a lottery with prizes for women aged 50 years or older who had a mammogram within the recommended 2-year period. Along with this general publicity, the medical centers displayed posters in the gynecology waiting areas. Although some centers had local mammography outreach programs targeting their members, these efforts were not targeted to the study population, and any potential overlap among the relatively

few women reached would be randomized across the 3 intervention groups.

Women in the mail reminder group received a tri-fold, self-mailer brochure that was addressed to the individual member and mailed from the health plan. The inside messages (1) acknowledged the previous mammogram and that the next mammogram was due; (2) described the health benefit of mammography screening; (3) encouraged the member to telephone her medical center for a physician's examination and mammography appointment; and (4) gave positive reinforcement to continue the health behavior by having another mammogram within the recommended period (ie, 2 years). The messages were depicted with 2 ethnically diverse, middle-aged female healthcare workers.

Members in the telephone contact group were called by a staff person from the member's medical center (eg, a receptionist, medical assistant, or nurse) who was trained to follow a script presenting messages similar to those in the mailed reminder. The caller indicated that the last mammogram was in 1994, nearly 2 years earlier, and that the next mammogram was due. In addition to describing the health benefit of mammography screening, the caller offered the opportunity to schedule an appointment with the primary care physician for a clinical breast examination and mammography referral. Callers were instructed to make up to 3 attempts to reach members on their assigned calling lists; an average of 1.5 calls per member were completed (average duration per call, 5 minutes), reaching 79% of women called (the telephone number was incorrect for 4% of the calls, and 17% yielded no answer to the call). Of completed calls, 35% of women made an appointment for a mammogram; 12% already had an appointment; 26% reported receiving a mammogram recently; 8% did not make an appointment because they were too sick or had a mammogram outside the health plan or for unclear reasons; 3% were no longer health plan members or were dead; and 15% indicated that they would call on their own or refused to make an appointment. The health plan's Health Education Department trained the medical group quality improvement personnel, who then trained their designated callers and ensured compliance with the script and call completion.

### **Measures and Analysis**

The interventions began the last week of October 1995 and continued through November 1995. A bilateral mammogram received after October 24, 1995, and within 2 years of a member's

initial bilateral mammogram was considered a subsequent mammogram for this analysis. The focus of the analysis was the comparison of subsequent mammogram rates between each intervention group and the usual care group. All women randomized to these groups were included in the analysis. Considering other factors previously shown to be related to mammography use, we first conducted bivariate analyses of subsequent mammogram rates using the  $\chi^2$  test for each variable of potential interest.

In addition to intervention group, the variables included age; type of coverage (ie, commercial, Medicare, or Medicaid); number of visits to a primary care physician and to a gynecologist between the initial mammogram and the beginning of the intervention (January 1, 1994, through September 30, 1995); and medical group (to control for local factors). Women with dual Medicare and Medicaid coverage were coded as Medicaid recipients. To control for potential confounding effects of other variables on the intervention effect, all variables that were significantly related to subsequent mammogram rates

were entered into a multivariate logistic regression model. Iterations were performed, and factors that did not retain a significant association with subsequent mammography were eliminated. Odds ratios and corresponding 95% confidence intervals were simultaneously calculated for all factors. Because the outcome of interest was not rare, odds ratios were transformed into relative risk estimates by the method of Zhang and Yu.<sup>20</sup>

... RESULTS ...

Women were similarly distributed in the intervention groups by age, type of coverage, and number of primary care physician and gynecologist visits (Table 1), indicating successful randomization. In each group, approximately two fifths of the women were aged 55 to 64 years. More than two thirds of the women had commercial coverage; more than one fourth were Medicare beneficiaries; and <4% were covered by Medicaid (consistent with the lower proportion of Medicaid members older than 50 years). Approximately one fourth of the women in each group had less than 3 primary care physician visits during the study period, and a similar proportion had 10 or more visits. Almost half had no visits to the gynecologist.

The rate of receiving a subsequent mammogram within 2 years of the initial mammogram was significantly higher overall for women in the telephone contact group (55%) than for those in the mail reminder (43%) or usual care (40%) groups ( $\chi^2 = 33.6$ ,  $df = 2$ ,  $P < .001$ ). The difference between the mail reminder and usual care groups was not statistically significant ( $P = .25$ ).

The significantly higher rate of subsequent mammography for the telephone contact group was found in all age categories (Table 2). Although the rate of subsequent mammography was higher for women in the telephone contact group within each type of coverage, the differences were statistically significant only for mem-

**Table 1.** Demographic and Utilization Variables by Intervention Group

	Intervention Group, No. (%)		
	Mail Reminder (n = 630)	Telephone Reminder (n = 653)	Usual Care (n = 625)
Age, y			
50-54	197 (31.3)	168 (25.7)	188 (30.1)
55-64	258 (41.0)	271 (41.5)	243 (38.9)
65-75	175 (27.8)	214 (32.8)	194 (31.0)
Type of coverage			
Commercial	448 (71.1)	437 (66.9)	421 (67.4)
Medicaid	24 (3.8)	21 (3.2)	24 (3.8)
Medicare	158 (25.1)	195 (29.9)	180 (28.8)
Primary care physician visits, No.*			
0	89 (14.1)	82 (12.6)	86 (13.8)
1-2	50 (7.9)	77 (11.8)	63 (10.1)
3-5	174 (27.6)	160 (24.5)	159 (25.4)
6-9	167 (26.5)	168 (25.7)	154 (24.6)
≥10	150 (23.8)	166 (25.4)	163 (26.1)
Gynecologist visits, No.*			
0	297 (47.1)	305 (46.7)	287 (45.9)
≥1	333 (52.9)	348 (53.3)	338 (54.1)

\*From the start of the observation period to the beginning of the intervention (January 1, 1994, through September 30, 1995).



bers having commercial or Medicare coverage (Table 2). Moreover, in all intervention groups, subsequent mammogram rates were lower for Medicaid recipients than for those with Medicare or commercial coverage ( $\chi^2 = 6.4$ ,  $df = 2$ ,  $P = .04$ ).

The numbers of visits to health plan primary care physicians and gynecologists during the preintervention period (January 1, 1994, through September 30, 1995) were examined in relation to having a subsequent mammogram (Table 3). Mammography rates were significantly higher in the telephone contact group than in the other intervention groups whether the women had no gynecologist visits or 1 or more gynecologist visits. A similar pattern emerged for women who had 3 or more visits to a primary care physician: those in the telephone contact group had a higher subsequent mammography rate than women in the other intervention groups. However, no differences in subsequent mammography rates were found among the intervention groups for women who had fewer than 3 primary care physician visits.

To control for potential confounding with the effect of the interventions, the initial multivariate analyses included all factors: intervention group, age category, type of coverage, number of primary care physician visits, number of gynecologist visits, and medical group. The final model contained only those factors that retained a significant association with subsequent mammography after several iterations through an elimination model: intervention group, type of coverage, number of primary care physician visits, and number of gynecologist visits.

The strongest independent predictor of having a subsequent mammogram during follow-up was the telephone contact intervention: women

in the telephone contact group were 39% more likely to receive a subsequent mammogram than women in the usual care group (Table 4). Women with Medicaid coverage were 31% less likely to have a subsequent mammogram during follow-up than women with commercial coverage. Women with no gynecologist visits were 26% less likely to have a subsequent mammogram than women who had 1 or more gynecologist visits. Similarly, women who had fewer than 3 primary care physician visits were 14% less likely to have a subsequent mammogram than women who had 3 or more visits.

**Table 2.** Percentage of Women Receiving a Subsequent Mammogram by Age, Type of Coverage, and Intervention Group

	Intervention Group, %			Comparison Across Intervention Groups
	Mail Reminder (n = 630)	Telephone Reminder (n = 653)	Usual Care (n = 625)	
Age, y				
50-54	40.0	56.0	42.0	$\chi^2 = 11.1$ , $df = 2$ , $P = .004$
55-64	48.5	55.0	40.3	$\chi^2 = 11.0$ , $df = 2$ , $P = .004$
65-75	40.0	55.6	38.1	$\chi^2 = 15.2$ , $df = 2$ , $P = .001$
Type of coverage				
Commercial	44.4	55.6	39.4	$\chi^2 = 23.8$ , $df = 2$ , $P = .001$
Medicaid	20.8	42.8	33.3	$\chi^2 = 2.5$ , $df = 2$ , $P = .28$
Medicare	43.6	56.4	42.7	$\chi^2 = 8.7$ , $df = 2$ , $P = .01$
Total	43.3	55.4	40.2	

**Table 3.** Percentage of Women Receiving a Subsequent Mammogram by Number of Primary Care Physician and Gynecologist Visits and Intervention Group

	Intervention Group, %			Comparison Across Intervention Groups
	Mail Reminder (n = 630)	Telephone Reminder (n = 653)	Usual Care (n = 625)	
Primary care physician visits, No.				
0-2	36.7	45.3	32.9	$\chi^2 = 5.3$ , $df = 2$ , $P = .07$
$\geq 3$	45.2	58.7	42.4	$\chi^2 = 29.6$ , $df = 2$ , $P = .001$
Gynecologist visits, No.				
0	35.7	46.6	32.8	$\chi^2 = 13.4$ , $df = 2$ , $P = .001$
$\geq 1$	50.1	63.2	46.5	$\chi^2 = 21.5$ , $df = 2$ , $P = .001$
Total	43.3	55.4	40.2	

... DISCUSSION ...

In this effort to encourage women who had a mammogram 18 to 21 months earlier but had not yet returned for a subsequent mammogram, telephone reminders with an opportunity to schedule an appointment were more effective than routine publicity alone in promoting timely use of mammography screening by members of a managed care plan. Mailed reminders were no more effective than routine publicity. These results are consistent with other studies in managed care settings, which also showed telephone contact to be significantly more effective than mailed materials in increasing mammography screening in women who were not on schedule for routine mammography,<sup>3,7</sup> even when the mailed intervention involved communication tailored to the woman's assessed readiness to change.<sup>21</sup> However, one pilot study<sup>22</sup> based in mammography facilities showed that postcards were equally as effective as telephone calls with an appointment opportunity in bringing women back for a subsequent mammogram.

Surprisingly, our study showed no statistically significant benefit of the mailed reminder compared with usual care, contrary to prevailing opinion and other evidence that mailed reminders have reasonable value compared with no reminder,<sup>23</sup> especially when more costly approaches are not feasible.<sup>24</sup> This lack of effect might be due, in part, to the extensive publicity campaign addressed to all

members of the usual care condition in our study, in contrast to other studies in which usual care involved little or no outreach efforts. Even the specially designed mailed reminder that was an intervention arm for this study did not motivate women significantly more than these general appeals to all members. Another possibility is that our mail reminder was less effective than reminders used in other studies. Although our mailed reminder was personalized with the member's name, it did not specifically mention the time of the previous mammogram, as did the telephone script (ie, "nearly 2 years ago"). Also, it was sent from the health plan rather than from a specific provider or staff person from the patient's own medical center.

Thus, the mail reminder lacked the personal contact of the telephone call. In addition, the telephone intervention offered the convenient option of scheduling a physician's appointment during the call. The effect of convenience on mammography participation has been noted elsewhere,<sup>5</sup> and having a medical staff member call to encourage mammography and make an appointment at the same time is likely to substantially increase convenience for many women. Furthermore, if a woman was hesitant about needing the mammogram, the caller mentioned that the health plan and national guidelines recommend mammography for women older than 50 years at least every 2 years. Although tailored letters have been found to be more effective than a standard letter,<sup>23,25</sup> even a tailored or personalized mailer was less effective than telephone contact in similar efforts in different managed care settings.<sup>7,21</sup> Thus, convenience and the personal human contact may prove to be the more important factors.

The few women in this study covered by Medicaid (n = 69) limits the interpretation of this study's failure to find a significant benefit of the telephone intervention among Medicaid enrollees. Our results are consistent with other findings of low mammography rates in women with Medicaid coverage<sup>12,26</sup> as well as with the notion that additional special outreach efforts might be needed to achieve success in this population.<sup>9</sup>

**Table 4.** Estimated Relative Risk of Subsequent Mammography\*

Variable (Reference Category)	RR	95% CI
Telephone intervention group (usual care group)	1.39	1.25-1.54
Mail intervention group (usual care group)	1.08	0.94-1.21
Medicaid coverage (commercial coverage)	0.69	0.47-0.96
Medicare coverage (commercial coverage)	1.04	0.93-1.14
<3 Primary care physician visits (≥3 primary care physician visits)	0.86	0.75-0.97
No gynecologist visits (≥1 gynecologist visits)	0.74	0.66-0.83

\*The following variables are included in the model: intervention group, type of coverage, number of primary care physician visits, and number of gynecologist visits. RR indicates relative risk; CI, confidence interval.

Because eligible study women did not seek mammography on their own within 18 months of the previous mammogram they might have constituted a hard-to-motivate group for whom the personal telephone call with appointment opportunity was most effective. The same factors related to this delay might also explain the association between few physician visits and low subsequent mammography rates. More frequent primary care physician and gynecologist visits increased the likelihood of having a mammogram within the recommended 2-year interval. It seems likely that this finding is due to the opportunities for additional reminders at these office visits. Indeed, a recent analysis of the 1992 National Health Interview Survey found that recency of a medical visit was the factor that discriminated best among women who did or did not have a mammogram in the previous 2 years.<sup>14</sup> Although the telephone intervention increased subsequent mammography rates in women who had no gynecologist visits, it was not effective in women who had fewer than 3 primary care physician visits, suggesting that these women may be low users of healthcare in general. For women who infrequently visit physicians, primary care visits might provide the only opportunity to encourage preventive services and to refer a woman for a mammogram. Managed care organizations with a defined physician network are in a strong position to implement physician-based interventions,<sup>27</sup> such as notification about patients nearly overdue for screening, so that opportunities for outreach efforts are not overlooked.

Despite the comparative success of the telephone outreach, nearly half the women in that intervention group who had not had their subsequent mammogram still did not obtain one during the recommended interval. The reasons for this inaction were not documented in this study but could include failure to reach women by telephone, not wanting to take time off work,<sup>6</sup> lack of readiness to change,<sup>7</sup> or the absence of a personal recommendation from their physician.<sup>28</sup>

It must be acknowledged that this study is limited to data available in the health plan encounter system and medical charts. Therefore, rates might be underestimated to the extent that members had mammograms outside the health plan that were not recorded in the data file or medical charts; however, any such underestimation would not be expected to differ across the 3 groups and therefore should not materially affect our findings. Like many other studies, ours lacks information on

patient beliefs or intentions,<sup>7,16</sup> factors such as income and race,<sup>9,14</sup> and information on other barriers (eg, travel time and work-loss time) that are of considerable interest. Such data might help explain why some women still did not have a mammogram despite these interventions. A further limitation is the lack of an independent measure of whether the interventions actually reached the target population as well as how the telephone call was conducted. It is possible that medical group differences in mammography rates for the telephone intervention group could be attributed to unintended variations in calling and reaching the members. However, no such variation was observed in the telephone logs that tracked the calls made from each center.

Strengths of this study include the randomization of members to the 3 groups with an intention-to-treat analysis, the addition of medical chart review to supplement encounter data, and the inclusion of appointment scheduling during the telephone intervention. Because women who had returned for a subsequent mammogram before the intervention period were excluded from the study, the rates reported in this paper do not reflect the overall health plan mammography rates. Thus, the interventions were tested in the less-motivated members who, nonetheless, had had an initial mammogram. Furthermore, the interventions were timed to allow these women to obtain a mammogram before the end of the recommended 2-year interval rather than after they were already overdue. It should be noted that regular health plan staff were used to deliver the intervention rather than specially hired researchers, demonstrating the effectiveness of this approach in a real world setting.

Because managed care organizations now devote substantial resources to member mailings in an effort to increase delivery of preventive services such as mammography, our failure to find any benefit of the mailed reminder over the routine publicity campaign is of concern. Careful evaluation of the effectiveness of such performance improvement efforts before they are widely implemented should be a high priority of health plans to ensure rational use of scarce resources. Our findings suggest the possibility that publicity may suffice for many women and that targeted telephone contact to those who are nearly overdue for services might be a more effective adjunct than direct mailing of reminders. Whether this combination is most effective and cost-effective in a variety of settings deserves further investigation.<sup>28-30</sup>

**Note**

To assess the potential effects of local factors on the telephone intervention, subsequent mammography rates were compared among medical groups. In two-thirds of the medical groups, the telephone intervention yielded significantly higher ( $P < .05$ ) differences in subsequent mammography rates compared with the other intervention and usual care groups (data not shown). The variation by medical group in rates of subsequent mammography for the telephone intervention group points to the importance of considering local factors when designing interventions. Despite the standard methodology for the telephone reminders and the corporate oversight of the program's overall implementation, variation by local conditions and populations can be expected. Moreover, some medical groups had implemented other outreach activities (eg, appointment reminder calls) that could have affected any of the interventions, although it is unlikely that such activities would have differentially affected the 3 groups. The effectiveness of individual local outreach activities has not been evaluated.

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