Promoting Breast and Cervical Cancer Screening at the Workplace: Results From the Woman to Woman Study

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A B S T R A C T

Objectives. This article reports findings from a peer-delivered intervention designed to increase use of breast and cervical cancer screening.

Methods. Twenty-six worksites were randomly assigned to the intervention or comparison group. The 16-month intervention consisted of group discussions, outreach, and educational campaigns. Data were collected from a random sample of women employees stratified by age (baseline n=2943; final n=2747). Cross-sectional analyses were conducted to evaluate the impact of the intervention on screening behaviors.

Results. Relative to comparison worksites, the intervention group experienced greater increases in the percentage of women who reported a recent mammogram (7.2% vs 5.6%), clinical breast examination (5.8% vs 2.1%), and Papanicolaou (Pap) test (4.7% vs 1.9%). After worksite cluster and age strata were controlled for, the observed increase in Pap tests was significantly greater in the intervention group (odds ratio [OR]=1.28; 95% confidence interval [CI]=1.01, 1.62); however, differences in mammography screening rates (OR=1.14; 95% CI=0.90, 1.44) and clinical breast examination (OR=1.19; 95% CI=0.96, 1.49) were not statistically significant.

Conclusions. Intervention activities produced a modest increase in cervical cancer screening, but they did not accelerate breast cancer screening rates above the observed secular trend. (*Am J Public Health.* 2001;91:584–590)

In 1998, an estimated 43 900 women died from breast cancer and 4900 died from cervical cancer in the United States.[1] For both diseases, effective early detection methods have been identified. Regular mammography screening among women 50 years and older has been shown to reduce breast cancer mortality by as much as 30%.[2] Regular screening with the Papanicolaou (Pap) test may reduce cervical cancer mortality by as much as 98%.[3] In recognition of the efficacy of these screening methods, major organizations currently recommend that women 40 years and older who are at average risk for breast cancer receive annual or biennial mammograms, as well as an annual clinical breast examination.[1,4] Pap tests are recommended every 1 to 3 years for women who are 18 years and older or who are sexually active.[1,5]

Use of these screening modalities has increased substantially in the last decade. Data from the National Health Interview Survey reveal that between 1987 and 1992, the percentage of women 40 years and older who received a mammogram within the previous year doubled, from 14% to 29%.[6] During this time, the percentage of women 18 years and older who received a Pap test within the previous year increased from 38% to 43%.[6] Data from the Behavioral Risk Factor Surveillance System suggest that screening rates have continued to climb. In 1997, the median percentage of women 40 years and older who had had a mammogram in the past year ranged from 58% to 72%, depending on age. Among women 18 years and older, 69% reported having had a Pap test within the previous year.[7] Although these trends are encouraging, there remains a substantial subset of women who do not receive these tests at regular intervals. In particular, those with low levels of education and income are less likely to undergo regular screening.[6,8]

Maximizing participation in breast and cervical cancer screening has become a national priority, with special emphasis on reaching underserved populations.[9] In recent years, numerous efforts have been undertaken to promote screening participation. These initiatives have primarily been based in community settings[10–12] or conducted in health facilities.[13–16] Few studies have investigated the efficacy of breast and cervical cancer education programs based in worksites.

Worksites represent an important venue for such programs, because they provide access to large numbers of women and a setting in which interventions may be offered repeatedly over time. An additional advantage to the worksite setting is the opportunity to collaborate with labor unions, which frequently represent women in lower-paying jobs. Unions afford access to this population, lend credibility to worksite programs, and offer an organizational structure through which programs may be institutionalized. Although a growing number of studies demonstrate the efficacy of worksite health promotion interventions,[17,18] few of these have addressed breast and cervical cancer screening. The purpose of this article is to report the results of the Woman to Woman Study, a 4-year randomized, controlled trial that evaluated the effectiveness of a peer-delivered intervention implemented in worksites in collaboration with a labor union.

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Methods

Research Design

This study was implemented by a comprehensive cancer center (Dana-Farber Cancer Institute) in partnership with a labor union (Service Employees International Union). Twenty-seven worksites were recruited; 1 site underwent significant downsizing following baseline data collection that rendered the site ineligible for study participation, leaving 26 sites. Following baseline assessments, sites were blocked on industry type (health care, state agency, or university), number of employees, and physical plant (single vs multiple buildings), and they were randomly assigned to intervention or comparison conditions. Intervention worksites received a 16-month intervention aimed at improving adherence to screening guidelines for breast and cervical cancer among women 40 years and older. Comparison sites received a workshop at the conclusion of the study period that provided participants with skills and resources to replicate the program. The evaluation of intervention effectiveness was based on the worksite-wide mean screening rates for mammography, clinical breast examination, and Pap test at baseline and follow-up, and effectiveness was assessed through 2 cross-sectional surveys of the women employees 40 years and older. A process evaluation system was developed to document intervention delivery and program participation.

Setting and Sample

Worksites eligible to participate in the study were those with a minimum of 60 women employees 40 years and older, Service Employees International Union representation among some segment of the workforce, and geographic location within 1½ hours of the study center. Because screening recommendations current at the time of initial data collection differed for women aged 40 to 49 and women 50 years and older, the sample was stratified by age (40–51, ≥52). Fifty-two years was used as the lower age limit for stratum 2, because our goal was to examine a 2-year screening history.

Participating sites included 9 public community hospitals or chronic care facilities, 9 private community hospitals, 6 state agencies, 2 state universities, and 1 private health organization. Worksites ranged in size from approximately 250 to 2800 employees. Worksites were blocked on size of the worksite and type of agency. We had 4 blocks: small health organizations (<800 employees and 1 building)—9 sites; large health organizations (more than 800 employees or multiple buildings)—9 sites; state agencies—6 sites; university campuses—2 sites. Within each block, we used a random-number generator to assign worksites to intervention so that half the worksites in each block were assigned to each condition. Because of the odd number of sites in 2 of the groups, the randomization algorithm also ensured that the total number of worksites was divided equally into intervention and control conditions.

Intervention Methods

The Woman to Woman intervention model emphasized the importance of worker participation in program planning and implementation. This was achieved through 2 primary means. First, volunteer advisory boards were formed at each intervention site. These boards comprised employees and union representatives from various sectors of the workforce and provided a mechanism for employee input into intervention design and program planning. Boards were responsible for recruiting and selecting peer health advisors (PHAs; described below), tailoring the intervention to the needs and interests of each site, and assisting with planning and promoting intervention activities. Boards met on a monthly or bimonthly basis to assess worksite needs, plan program events, and provide feedback regarding employee satisfaction with program events. This process fostered a sense of program "ownership" and provided skills for sustaining the program beyond the period of external funding.

Women employees were recruited to serve as PHAs. These women served as role models for screening behaviors, disseminated breast and cervical cancer information to their coworkers, provided social support, and fostered positive social norms for screening in the workplace. PHAs were recruited through company announcements and worksite events or were nominated by coworkers, union representatives, or supervisors. Volunteer advisory boards oversaw the process of PHA selection, with a goal of recruiting individuals to represent the various cultural groups, job categories, and work shifts present at the worksite. A minimum of 3 PHAs were recruited at each site; thereafter, we attempted to recruit approximately 1 PHA for every additional 150 women employees. PHAs underwent 16 hours of training, which provided basic information regarding cancer epidemiology, early detection methods, screening guidelines, and community resources. The training also provided skills in facilitating small-group education sessions, one-to-one counseling, and program planning.

Over the course of the 16-month intervention period, PHAs organized and facilitated a series of 6 small-group discussion sessions. Following social cognitive theory,[19] these sessions provided opportunities for role modeling and learning through vicarious experience, and they addressed such topics as "how to talk with your health care provider about screening" and "setting goals for your health." Other sessions emphasized the benefits of screening and methods for overcoming barriers to screening, based on the Health Belief model.[20] PHAs also conducted one-to-one outreach to extend the intervention to those who did not attend small-group sessions, and as a means to provide individual counseling and social support. In addition, PHAs and volunteer advisory boards planned and implemented 2 worksite-wide campaigns at each site over the 16-month intervention period. These events were organized around a particular theme (e.g., "Spring Into Action") and featured events and activities targeting individuals in varying stages of readiness for behavior change based on the Transtheoretical Stages of Change model.[21] Other events, such as presentations by guest speakers and health fairs, were initiated and implemented by volunteer advisory boards in accordance with worksite interests. Events were publicized through company and union newsletters, fliers, and posters and through word of mouth.

Data Collection

Data collection methods for the Woman to Woman Study have been described elsewhere.[22,23] Briefly, data were collected via self-administered surveys distributed through worksite channels. Women eligible to participate in the survey were those 40 years and older who were employed for more than 15 hours per week on a permanent basis. Independent cross-sectional samples were surveyed at baseline (fall–winter 1995) and follow-up (spring–summer 1998). At sites with more than approximately 100 eligible women per age stratum (40–51, ≥52 years), a random sample was selected from employee rosters. In sites with fewer than 100 women per stratum, a census was taken. Two waves of surveys were sent to nonrespondents. Incentives were provided to survey respondents.

In addition to employee data, a process tracking system was developed to document (1) the number and type of intervention activities (intervention "dose"), (2) the number of employees participating in intervention events (intervention "reach"), and (3) the costs associated with implementing intervention activities. Information regarding intervention dose and reach is presented in this report; cost analyses will be presented separately.

Measures

The Health Habits Questionnaire used in this study has been described previously.[22,23] To assess the primary outcome measures, subjects responded yes or no to whether they had ever undergone each screening examination.

Those who responded in the affirmative were asked to provide the year of the most recent screening examination, as well as the reason for it (routine screening vs screening due to breast or cervical problem or symptom). These items were taken from the National Cancer Institute's Breast Cancer Screening Consortium core survey[24] and the Behavioral Risk Factor Surveillance System survey.[25] Response categories for items assessing screening history were designed to assess adherence with the screening guidelines of the National Cancer Institute and American Cancer Society current at the time of data collection.[1,4,5] Women who had received a mammogram within the previous 1 to 2 years, a clinical breast examination within the previous year, and a Pap test within the previous 3 years were considered to be adherent with screening guidelines. Selected sociodemographic characteristics, including age, educational level, income, race/ethnicity, and job category, were also assessed.

Data Analysis

The unit of randomization and intervention was the worksite, while the unit of measurement was the employee. We computed all analyses by taking into consideration the nesting of employees at worksites. We used mixed-effects linear modeling to test hypotheses about the intervention groups, controlling for the clustering of respondents at worksites. All analyses were conducted with the personal computer version of SAS statistical software.[26] The linear logistic regression analyses were computed with the GLIMMIX macro, which uses iteratively reweighted likelihoods to fit a logistic regression.[27] Statistical significance of fixed effects was tested with F tests based on Wald statistics.

To assess the comparability of study groups, we compared the 2 intervention groups with regard to baseline and final characteristics. Mixed model logistic regression analysis was used to test for comparability of the 2 intervention groups in selected sociodemographic characteristics at the 2 time points. The characteristics were dichotomized, and we estimated the logistic regression model with intervention group and survey as fixed effects and worksite as a random effect. We tested for a group, survey, and group-by-survey effect for each characteristic in each sample stratum.

To test whether the intervention was more effective than the comparison condition in promoting screening, we used the same methodology. Mixed model logistic regression analysis as described above was computed for each screening outcome. Intervention group and time of survey (baseline or follow-up) were included as fixed effects, and worksite was included as a random effect. The 2 sample strata were combined, and stratum was included as a fixed effect. We tested the interaction of intervention by survey to determine whether the difference between baseline and final screening rates was equal in the 2 conditions. Covariates were added to the linear logistic model to evaluate moderating and modifying effects. We report the odds ratio and 95% confidence intervals for each screening test.

Results

Characteristics of the Sample

Across the 26 sites at baseline, 4340 surveys were distributed and 3132 surveys were completed, yielding a mean worksite response rate of 72% (range = 59%–97%). Of these, 130 were from the worksite that withdrew from the study and 59 did not have complete information on age, leaving 2943 surveys for analysis. At follow-up, 4253 surveys were administered and 2795 were completed, for a mean response rate of 66% (range = 33%–86%). Of these, 48 were missing information on age, leaving 2747 for analysis. Mean response rates did not differ significantly between intervention and comparison groups at either time point (72% vs 74% at baseline, $P = .66$; 65% vs 68% at follow-up, $P = .55$).

Comparisons of the demographic characteristics of respondents to the baseline and final surveys are presented in Table 1. Both samples were predominantly White, well educated, and employed in professional occupations. More than half had annual household incomes of $50 000 or more. The vast majority reported having health insurance and a usual source of care. There were no statistically significant differences in demographic characteristics between intervention and comparison groups at baseline, reflecting satisfactory random assignment. Between baseline and follow-up, however, there was a significant increase in the percentage of women who reported annual household incomes of more than $50 000 in both age strata ($P = .003$ for stratum 1, $P = .03$ for stratum 2), and this increase was slightly greater in the intervention group ($P = .05$ for stratum 1, $P = .06$ for stratum 2). Nevertheless, there was a significant decrease in the percentage of respondents in the younger age stratum in the "professional, clinical, managerial, or administrative" job category ($P = .04$), but this increase did not differ significantly by condition.

Primary Outcome Analyses

Between baseline and follow-up, the percentage of women who reported having had a recent mammogram, clinical breast examination, and Pap test increased significantly among women in both intervention and comparison sites (Table 2). Increases in use of mammography and clinical breast examination were greater among women aged 40 to 51, and the increase in Pap test rates was greater among women 52 years and older.

While the absolute increase in use of all 3 screening methods was greater in intervention sites (Table 3), after both worksite cluster and age strata were controlled for, the degree of change observed in screening rates in the intervention worksites was statistically significant only for Pap tests. The odds ratio for the intervention effect was 1.14 (95% confidence interval [CI] = 0.90, 1.44) for mammography, 1.19 (95% CI = 0.96, 1.49) for clinical breast examination, and 1.28 (95% CI = 1.01, 1.62) for Pap tests.

Analyses Controlling for Significant Covariates

Randomization resulted in samples that were similar in characteristics, so although sociodemographic characteristics are associated with screening, presumably differences in these characteristics did not account for differences in screening rates. In fact, controlling for education and marital status did not materially change the odds ratio for the intervention effect for mammography (odds ratio [OR] = 1.16; 95% CI = 0.85, 1.60) or clinical breast examination (OR = 1.19; 95% CI = 0.95, 1.50). The odds ratio for the intervention effect did increase somewhat for Pap tests after education and marital status were controlled for (OR = 1.41; 95% CI = 1.13, 1.75).

Intervention Delivery

Table 4 presents results from analyses of process tracking data. Intervention dose (number of intervention activities) was comparable across the 13 intervention sites. Each site conducted a minimum of 2 campaigns and 6 small-group education sessions. In addition, PHAs conducted one-to-one contacts as their time and work practices allowed.

Discussion

To our knowledge, this is the first randomized trial to evaluate the efficacy of a breast and cervical cancer screening intervention in a worksite setting. Furthermore, we believe that this is the first published report of a peer-delivered intervention in the workplace. Another unique feature of this study is that it was implemented in collaboration with a labor union. Results indicate that the Woman to Woman intervention had a weak positive effect on breast and cervical cancer screening

rates, although the effect size for the intervention was small and the effect was statistically significant only for Pap tests.

Few evaluations of worksite breast or cervical cancer education programs have been conducted. Those that have been published are characterized by nonrandomized designs, small samples, and low response rates, and many lack theoretical frameworks.[28] Mayer and colleagues[29] implemented a mammography education program for women employees 40 years and older within a state university system. Educational strategies, including print media, on-site educational workshops, and incentives, were implemented at 1 worksite, while a second worksite served as a comparison group. Following a 1-year intervention, the mammography use rate at the intervention site was not significantly greater than at the comparison site.

A second study[30] evaluated the impact of mailing educational brochures and community resource information to women employees at 7 worksites. This brief educational intervention resulted in improved attitudes toward mammography, although changes in mammography compliance were not reported. A third study evaluated the impact of mailed reminders and telephone follow-up to women employees who had been invited for mammography screening.[31] While there was a trend for women who received a follow-up letter to be more likely to complete mammography, this was not statistically significant. Other studies have reported positive results for interventions in the workplace that promote breast self-examination in terms of breast self-examination practice and knowledge.[32,33]

Several factors may have contributed to the small effect sizes observed in this study. First, the intervention may have been unsuccessful in reaching those most in need of its message. Women who were not in adherence with screening guidelines ("underutilizers") were not specifically targeted by the intervention. Rather, we aimed to reach women in low-paying jobs and those employed in the service industry, through our collaborations with a labor union and through use of a peer advisor model. Despite our efforts to reach this group of workers, the sample consisted primarily of well-educated women employed in professional jobs in health care settings. The vast majority had health insurance and a usual source of care. These factors have consistently been associated with higher rates of screening participation. Not surprisingly, the baseline rates of screening in this population were high relative to the state average. For example, data from the 1995 Massachusetts Behavioral Risk Factor Surveillance System show that 81% of women 50 years and older had had a mammogram within the previous 2 years,[25] compared with a mean of 86% in our sample during the same year.

Second, characteristics of the intervention and the way it was delivered could have contributed to the small effect sizes. Results from our process tracking system indicate that each

TABLE 1—Characteristics of the Study Sample: The Woman to Woman Study

	Intervention Group, %		Comparison Group, %	
	Baseline	Final	Baseline	Final
Stratum 1 (aged 40–51)	**(n = 837)**	**(n = 830)**	**(n = 789)**	**(n = 757)**
Education	(n = 806)	(n = 816)	(n = 767)	(n = 748)
High school or less	15	14	19	19
Post–high school/some college	27	28	26	27
College	30	28	26	26
Graduate school	28	29	28	27
Job category	(n = 793)	(n = 773)	(n = 730)	(n = 664)
Craft, labor, maintenance, service	4	3	5	4
Clerical, administrative support, sales	21	20	17	20
Technical, paraprofessional	8	11	7	8
Professional, clinical, managerial or administrative	68	66	71	68
Household income, $	(n = 790)	(n = 780)	(n = 743)	(n = 713)
<29 999	14	9	20	17
30 000–49 999	31	27	27	28
≥50 000	55	64	53	55
Marital status	(n = 827)	(n = 815)	(n = 782)	(n = 744)
Married/living as married	64	64	62	62
Other	36	36	38	38
Race/ethnicity	(n = 821)	(n = 691)	(n = 773)	(n = 651)
White/Anglo	84	82	85	84
Other/Hispanic	16	18	15	16
Usual source of care	(n = 672)	(n = 586)	(n = 638)	(n = 566)
Yes	95	97	96	96
No	5	3	4	4
Mammogram covered by insurance[a]	(n = 827)	(n = 822)	(n = 777)	(n = 752)
Yes	84	89	83	89
No	3	2	2	2
Don't know	13	8	15	9
Stratum 2 (aged ≥52)	**(n = 675)**	**(n = 590)**	**(n = 642)**	**(n = 570)**
Education	(n = 632)	(n = 572)	(n = 613)	(n = 557)
High school or less	31	27	32	31
Post–high school/some college	30	31	29	31
College	15	16	18	17
Graduate school	25	26	21	20
Job category	(n = 614)	(n = 541)	(n = 571)	(n = 474)
Craft, labor, maintenance, service	6	6	7	7
Clerical, administrative support, sales	31	30	31	32
Technical, paraprofessional	8	7	6	7
Professional, clinical, managerial or administrative	56	58	56	54
Other				
Household income, $	(n = 625)	(n = 514)	(n = 588)	(n = 511)
<29 999	21	17	26	26
30 000–49 999	35	30	33	31
>50 000	44	53	42	44
Marital status	(n = 664)	(n = 576)	(n = 629)	(n = 563)
Married/living as married	51	53	55	53
Other	49	47	45	47
Race/ethnicity	(n = 647)	(n = 486)	(n = 629)	(n = 487)
White/Anglo	88	89	86	87
Other/Hispanic	12	11	14	13
Usual source of care	(n = 672)	(n = 586)	(n = 638)	(n = 566)
Yes	95	97	96	96
No	5	3	4	4
Mammogram covered by insurance[a]	(n = 827)	(n = 822)	(n = 777)	(n = 752)
Yes	84	89	83	89
No	3	2	2	2
Don't know	13	8	15	9

Note. Columns may not sum to 100% owing to rounding.
[a]Mammogram covered by insurance in the absence of breast symptoms or problems.

TABLE 2—Unadjusted Frequency of Recent Screening by Intervention and Survey: The Woman to Woman Study

	Intervention				Comparison			
	Baseline		Final		Baseline		Final	
	n	%	n	%	n	%	n	%
Stratum 1 (aged 40–51)								
Mammogram								
Within past 2 years	606	78	709	87	586	80	628	86
More than 2 years ago	120	15	81	10	95	13	64	9
Never	54	7	27	3	54	7	39	5
Clinical breast examination								
Within past year	527	65	581	71	522	68	525	71
More than 1 year ago	286	35	234	29	243	32	212	29
Pap test								
Within past 3 years	732	88	741	91	579	87	663	89
More than 3 years ago	100	12	69	9	104	13	80	11
Stratum 2 (aged ≥52)								
Mammogram								
Within past 2 years	535	87	532	93	514	87	519	93
More than 2 years ago	50	8	31	5	50	9	21	4
Never	28	5	10	2	24	4	20	4
Clinical breast examination								
Within past year	463	71	433	76	440	72	408	73
More than 1 year ago	186	29	135	24	173	28	148	27
Pap test								
Within past 3 years	533	81	489	87	525	84	466	86
More than 3 years ago	124	19	75	13	100	16	79	15

Note. Column totals vary owing to missing data.

TABLE 3—Adjusted Frequency of Recent Screening by Intervention and Survey: The Woman to Woman Study

	Intervention, %		Comparison, %			
	Baseline	Final	Baseline	Final	Difference,[a] %	OR (95% CI)[b]
Mammogram						
Within past 2 years	83.2	90.4	84.3	89.9		
Change		+7.2		+5.6	+1.6	1.14 (0.90, 1.44)
Clinical breast examination						
Within past year	68.2	74.0	70.2	72.3		
Change		+5.8		+2.1	+3.7	1.19 (0.96, 1.49)
Pap test						
Within past 3 years	85.2	89.9	85.8	87.7		
Change		+4.7		+1.9	+2.8	1.28 (1.01, 1.62)

Note. OR = odds ratio; CI = confidence interval.
[a]Difference between change in intervention group and change in comparison group.
[b]Controlled for sample stratum and worksite cluster.

of the intervention worksites received the minimum number of intervention activities specified by the investigators, and that interventions were conducted according to study protocol. However, these activities may not have constituted a sufficient intervention "dose" to produce behavior change among those most resistant to screening. Moreover, because screening is conducted on a periodic basis, interventions of longer duration may be required so that individuals are actively engaged in educational programs at the time screening is due.

We employed a PHA model in this intervention on the assumption that health messages may be better received when they are disseminated by members of existing social networks who are respected by their peers and who understand the social context in which the education is provided.[34,35] It may be, however, that peer-delivered messages are not as effective as those delivered through other information sources, such as health care providers. An extensive literature documents the powerful association between provider recommendation and screening compliance.[36–38] To our knowledge, no study has evaluated the relative efficacy of peer-delivered vs provider-delivered messages. Despite these findings, we believe that the PHA model has merit because of its attention to cultural relevance, emphasis on community empowerment, and potential for sustainability.

Finally, there has been a strong secular trend toward increased participation in breast and cervical cancer screening, which may have contributed to changes in the control group. As noted earlier, the percentage of women 40 years and older who had a mammogram in the prior year doubled between 1987 and 1992.[6] Pap test rates have also increased, although at a slower pace.[8] These secular trends may have been boosted by efforts by the state Department of Public Health in response to the Breast and Cervical Cancer Mortality Prevention Act of 1990,[9] initiated simultaneously with this intervention. This program provides intensive outreach and education efforts to promote breast and cervical cancer screening, and it includes a statewide

TABLE 4—Results From Process Tracking System: The Woman to Woman Study

Type of Event	No. of Events/Worksite		No. of Participants/Event	
	Mean	Range	Mean	Range
Small-group education sessions	10.9	6–17	7.6	1–22
Worksite campaigns	2	NA	107.2	35–295
One-to-one outreach contacts[a]	102	17–267	1	NA
Other events[b]	3.3	1–5	42	7–300

Note. NA = not applicable.
[a]Defined as event in which a peer health advisor provided a coworker with screening messages.
[b]Includes events such as health fairs, guest speaker presentations, and project presentations.

media campaign. Furthermore, the potential for "contamination" of the control group was heightened by the fact that several of the comparison sites initiated education efforts in response to increased employee awareness and concern regarding breast and cervical cancer following the baseline survey. Other researchers have reported similar challenges.[10–12,29]

There were several limitations of this study, including self-reported screening practices, a low response rate at some study sites, and differential response rates among some demographic groups between baseline and follow-up. In addition, this study was conducted with women employed in unionized state agencies and health care settings. As a result, women in this study had higher rates of insurance coverage, were more likely to have a usual source of care, and probably had greater access to health information than the general public. Therefore, caution must be taken when generalizing these results to other populations. However, the credibility of the study findings is bolstered by the fact that this was a randomized, controlled trial that included a large number of relatively diverse worksites. The worksite was used as the unit of analysis, and there was sufficient statistical power to detect meaningful changes in screening rates.

In spite of the modest impact of interventions on Pap screening and the lack of a significant intervention effect for mammography and clinical breast examination, this study provides important information for the development of future breast and cervical cancer screening interventions. These results suggest that screening interventions need to be better targeted to those who have been resistant to or inadequately reached by previous efforts. A common assumption of community-based trials has been that providing a wide range of intervention activities to a broad cross section of individuals may produce small changes among a large segment of the population. From an epidemiologic perspective, this strategy could produce substantial shifts in the distribution of risk, resulting in meaningful reductions in mortality and morbidity. However, results from recent community-based trials suggest that a more efficient strategy may be to target "pockets of prevalence"—those segments of the population that have heightened risks.[39,40]

Woman to Woman did not systematically identify and subsequently intervene among underutilizers. Indeed, the identification of individuals who are not regularly screened presents some difficulties in a workplace setting, where health behaviors are considered private and not commonly discussed with coworkers outside of one's social network. The high baseline screening rate observed in this population of insured and employed women, coupled with difficulties in identifying underutilizers in the workplace, suggests that worksites may not be an ideal setting for breast and cervical screening interventions. Other settings, such as churches or housing developments, may be better locations for reaching underserved populations (i.e., those who are uninsured or underinsured or who lack a usual source of care or access to health information and services) with this type of intervention approach. These environments offer natural settings where social networks congregate and may be more conducive to the sharing of personal health information.

Results from this study also suggest that more intensive intervention strategies may be required to effect behavior change within "pockets of prevalence." The relatively high prevalence of breast and cervical cancer screening has been the result of concerted efforts over the last 10 years, including emerging consensus on screening guidelines, increased Medicare coverage of screening examinations, and increased public funding for education and screening services, as well as national and statewide media campaigns. However, there remains a small subset of the population that has been resistant to or inadequately reached by these events. The promotion of regular screening among these individuals may require more intensive interventions. Although the PHA model used in Woman to Woman serves as one means for providing information and support, additional strategies, such as barrier-specific counseling[41,42] or tailored materials,[43,44] may be needed to augment the intervention "dose" delivered by PHAs. Moreover, we believe it will be necessary to implement more comprehensive strategies, such as those that attempt to effect change in multiple levels of influence (families, health care settings, communities, health care policy), to reach women who do not participate in regular screening. □

Contributors

J. D. Allen planned and designed the study, interpreted the data, and wrote the paper. A. M. Stoddard planned and designed the study, analyzed and interpreted the data, and approved the final version to be published. J. Mays planned and designed the study and approved the final version to be published. G. Sorensen planned and designed the study, interpreted the data, and approved the final version to be published.

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