

Differential Effects of Messages for Breast and Cervical Cancer Screening

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Abstract: The aim of this study was to compare responses to two interventions (personalized-form [PF] letter messages versus personalized-tailored [PT] letter messages) using medical record data for promoting appointment scheduling and screening for breast and cervical cancer among urban low-income women from three ethnic groups: African-American, Mexican-American, and non-Hispanic white women. The 1,574 women participating in the randomized controlled trial were assigned to one of three groups: (1) PF letter, (2) PT letter, (3) control (no letter). Logistic regression analyses show that (1) personalized-tailored letters containing individualized references to recipients' cancer risk factors failed to increase rates of recommended cancer screening behaviors, especially among non-Hispanic white women; and that (2) in contrast, a personalized-form letter with general breast and cervical cancer screening messages increased cancer screening rates in this population, especially among non-Hispanic white and Mexican-American women.

Key words: Mammography, Pap test, screening, minority groups, patient prompting.

Eliminating health disparities is one of two overarching goals of the *Healthy People 2010* initiative.¹ Despite improved breast and cervical cancer screening rates and decreases in mortality from these diseases,^{2,3} disparities in screening behaviors and health outcomes persist.³⁻⁵ One approach to improving screening rates involves theory-based tailored print communications (TPC) to foster health-related behavior change.⁶⁻⁹ Tailored messages focus on individual factors important in behavioral change that are typically not included in messages targeting the general population or specific subgroups.^{7,8,10,11} Although data used in message tailoring are generally obtained by developing and administering an assessment questionnaire, tailoring data may be obtained from existing sources, such as medical records.^{12,13}

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Previously, we evaluated the effectiveness of two types of prompting communications to increase use of breast and cervical cancer screening services: personalized form (PF) letters and personalized tailored (PT) letters targeting low-income, African-American, Mexican-American, and non-Hispanic white women served through two community health centers (CHCs) that are part of a large, county health care delivery system (see the previously published article on this project).¹⁴ Development of the prompting letters involved convening focus groups to (1) discern breast and cervical cancer knowledge levels, attitudes, and practices among the targeted patient groups and (2) pilot test prototypes of the PF and PT letters. To avoid contamination of the study population, focus group participants were recruited from a third CHC. The PF letter was addressed personally to the recipient and contained standard information about risks of breast and cervical cancer. It encouraged women to take a specific action (e.g., visit her doctor, undergo mammography). The PT letter was also personally addressed to the recipient and contained the same information plus information retrieved from medical records about the women's individual health status or risk for cancer. Women randomly assigned to the PF letter group were significantly more likely to schedule a screening appointment and to have undergone a Pap test and mammography within 1 year after the intervention than were women randomly assigned to the PT letter group or a control group ($p < 0.001$ for all comparisons). Thus, contrary to our original hypotheses, personalized letters containing cancer risk factor information tailored to the individual failed to increase rates of recommended cancer screening behaviors when compared with screening rates among matched groups of women who received general information about cancer risk or no targeted information. This article further examines the impact of the two prompting communications (PF letters and PT letters) on cancer screening behaviors by considering the consistency of the findings within each of the three ethnic groups in the study.

Methods

As reported previously,¹⁴ a total of 1,574 medically indigent low-income and minority women were randomized to a PF letter group ($n = 494$), a PT letter group ($n = 581$), or control group ($n = 499$). The outcome variables were (1) scheduling an appointment and (2) receiving cancer screening services within 12 months after study group assignment. Data analyses were performed separately for each ethnic group to examine the differential impact of the letters on the screening variables. Rates of appointment making and receipt of screening were reported as percentages for each ethnic group. To estimate the impact of the PT or PF letters on scheduling an appointment for cervical and mammography cancer screening, logistic regression models were specified for each ethnic group, with scheduling and receipt of cancer screening services as dichotomous outcome variables. The control condition served as the reference category in estimating the impact of letter type on the outcomes, and age was used as a categorical covariate. Odds ratios, 95% confidence limits, and significance tests were reported. Post hoc analyses were also conducted wherein the logistic models were respecified so that the PT group served as the reference group and compared to patients in the PF group. Only women aged 40 years and older were included in the breast cancer screening analyses; all women were included in

the cervical cancer screening analyses. SPSS for Windows, Version 11.0,¹⁵ was used for the analyses.

Results

Table 1 summarizes the characteristics of the subjects in each study group. Stratification by age group and race/ethnicity produced nearly equal-sized age groups (<40 and 40 years and older); about 40% of each study group was African American and 40% Mexican American.

Figure 1 shows rates of scheduling and receipt of cancer screening services for study participants. For each ethnic group, patients in the PF group had the highest rates of appointment making and receipt of cancer screening services (the sole exception was receipt of cervical cancer screening by African-American women, where the control and PF groups were nearly identical). Non-Hispanic white women assigned to the PF group reported the highest rate of appointment making for cervical and breast cancer screening and receipt of services. Non-Hispanic white women assigned to the PT group reported the lowest rate of appointment making and screening.

Results from the multivariate logistic regression models are given in Tables 2 and 3. Table 2 gives the results from regression modeling predicting whether patients scheduled a mammogram. The only significant effect was among non-Hispanic white patients, where patients assigned to the PF group were more likely than control patients to have scheduled a mammogram. In subsequent post hoc analyses comparing the PT and PF groups directly, the only significant effect was observed for non-Hispanic white patients where the PF group had a higher rate of scheduling a mammogram than PT patients (odds ratio [OR] = 5.15, 95% confidence interval [CI] = 2.07, 12.84, $p < 0.01$).

Table 2 also gives the results from models predicting receipt of mammography. Patients assigned to the PT groups did not differ from controls for any ethnic group. Mexican-American and non-Hispanic white women who received the PF letter were more likely than controls to receive screening mammography services. Subsequent post hoc analyses comparing the PT and PF groups directly showed several interesting findings. African-American patients assigned to the PF group were more likely to have received mammography than those assigned to the PT group (OR = 2.51, 95% CI = 1.17, 5.37, $p < 0.02$). Similar effects were found for Mexican-American patients (OR = 2.45, 95% CI = 1.23, 4.88, $p < 0.02$), and non-Hispanic white patients (OR = 6.32, 95% CI = 1.65, 24.16, $p < 0.01$).

Results from regression modeling predicting whether patients scheduled an appointment for cervical cancer screening are given in Table 3. The only significant effect was observed for non-Hispanic white patients assigned to the PF group, who were more likely than control patients to have made an appointment for screening (OR = 2.52, $p < 0.01$). Otherwise, the intervention letters had no effect on the rate of appointment making when compared with the control group. Subsequent post hoc analyses comparing the PT and PF groups directly produced several interesting findings. Mexican-American patients assigned to the PF group were more likely than those in the PT group to schedule an appointment (OR = 1.56, 95% CI = 1.04, 2.33, $p < 0.05$). Similar effects were found for non-Hispanic white patients (OR = 4.13, 95% CI = 2.13, 8.03, $p < 0.01$), but not for African-American patients.

Table 1.
CHARACTERISTICS OF THE STUDY SAMPLE

	African American (<i>n</i> = 604)	Mexican American (<i>n</i> = 618)	Non-Hispanic white (<i>n</i> = 261)
Age (y)			
Mean \pm SD	40.0 \pm 13.8	39.1 \pm 12.9	43.0 \pm 12.4
40	294 (48.7%)	301 (48.7%)	144 (55.2%)

Abbreviation: SD, standard deviation.

Finally, results from models predicting receipt of cervical cancer screening are also given in Table 3. For each of the ethnic groups, increasing age was related to a higher likelihood of being screened for cervical cancer. Patients assigned to the PT group were less likely than controls to have been screened, and this effect was observed for each ethnic group. In addition, among non-Hispanic white patients, those assigned to the PF group were more likely than controls to have been screened. When patients assigned to the PT group were compared with patients assigned to the PF group, a consistent pattern was evident. African-American, Mexican-American, and non-Hispanic white patients assigned to the PF group were more likely than their counterparts in the PT group to have been screened for cervical cancer (OR = 1.84, 95% CI 1.20, 2.81, $p < 0.01$; OR = 2.21, 95% CI 1.43, 3.42, $p < 0.01$; OR = 8.64, 95% CI = 3.91, 19.09, $p < 0.01$, respectively).

Discussion

We found differential effects of the tailored and generic messages for breast and cervical cancer screening among women from the three racial/ethnic groups. Among African-American women, the PT letter was no more effective than the control condition (no prompting letter) in promoting cancer screening services. In fact, the PT letter was less effective than the control condition in cervical cancer screening. The PF letter was superior to the PT letter in promoting receipt of mammography and cervical cancer screening.

Among Mexican-American women, the PT letter was no better than the control condition, and actually showed a lower rate of cervical cancer screening than the control condition. The PF letter was superior to the control condition in fostering mammography, but otherwise did not differ from the control. Yet, the PF letter was more effective than the PT letter for scheduling cervical cancer screening and promoting receipt of mammography and cervical cancer screening.

Among non-Hispanic white women, the PT letter was no more effective than the control condition in promoting mammography screening and scheduling a cervical cancer screening. As with women from the other ethnic groups, non-Hispanic white women who received the PT letter were less likely than controls to

Figure 1. Rates of scheduling and receipt of cancer screening services for women from each of the ethnic groups in this study. Legend: ▲ Personalized form letter, PF; ■ Personalized tailored letter, PT; ◆ Control.

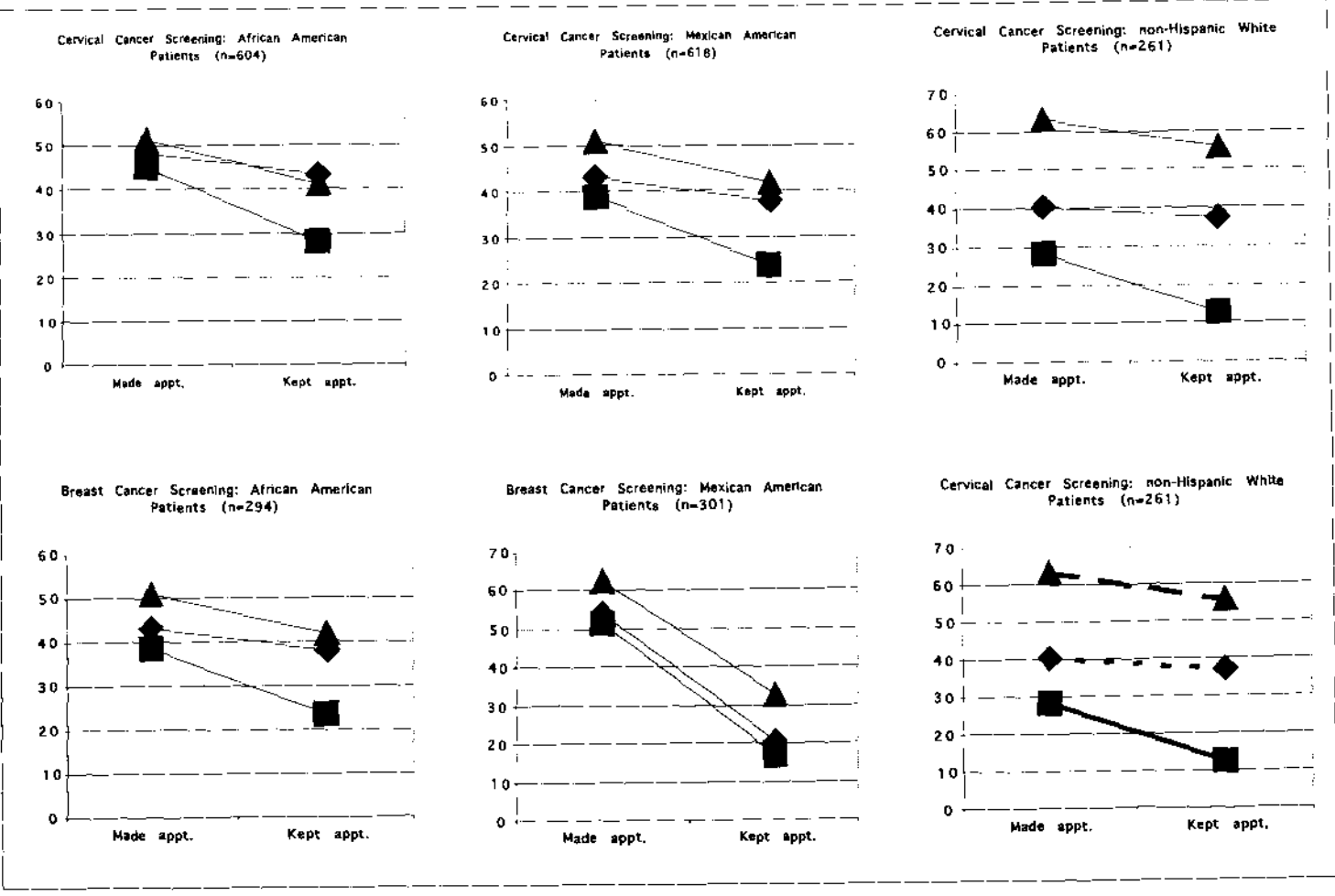


Table 2.

RESULTS OF REGRESSION ANALYSES OF MODELS FOR SCHEDULING AN APPOINTMENT FOR MAMMOGRAPHY AND RECEIPT OF MAMMOGRAPHY

	African American (n = 294)			Mexican American (n = 301)			Non-Hispanic white (n = 144)		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Scheduling an appointment									
Age (y) (40–49 is reference group)									
50–59	1.32	0.77, 2.28	0.32	1.36	0.79, 2.35	0.27	1.61	0.73, 3.56	0.24
60 or more	0.89	0.49, 1.60	0.69	1.77	0.93, 3.36	0.08	1.59	0.64, 3.97	0.32
Treatment group (control is reference group)									
PT letter	0.98	0.57, 1.69	0.94	0.92	0.52, 1.63	0.77	0.61	0.27, 1.38	0.24
PF letter	1.51	0.83, 2.74	0.18	1.48	0.85, 2.58	0.17	3.12	1.33, 7.34	0.01
Receipt of mammogram									
Age (y) (40–49 is reference group)									
50–59	1.03	0.51, 2.07	0.94	1.90	1.02, 3.52	0.04	2.17	0.84, 5.63	0.11
60 or more	1.29	0.62, 2.68	0.49	1.76	0.86, 3.64	0.12	0.85	0.25, 2.90	0.79
Treatment group (control is reference group)									
PT letter	0.56	0.27, 1.20	0.14	0.78	0.37, 1.63	0.51	0.27	0.07, 1.03	0.06
PF letter	1.41	0.71, 2.81	0.33	1.90	1.01, 3.59	0.05	1.90	0.68, 4.21	0.05

Note: Models limited to women ages 40 and older. OR is odds ratio from logistic regression analyses. Higher odds ratio indicates greater likelihood that patient scheduled screening services. 95% CI is confidence limit for odds ratio.

Abbreviations: PF letter, personalized form letter; PT letter, personalized tailored letter.

have received cervical cancer screening. Finally, the PF letter was superior to the control condition and the PT letter for each cancer screening outcome.

Although many studies have shown the advantages of incorporating personalized health assessment data into tailored messages, grounding this work in health behavior theory,^{16–34} our study results suggest that tailoring letters on the basis of limited record-based, risk factor information did not increase the likelihood of appointment scheduling and/or breast and cervical cancer screening among women in the population studied. Although one study by Skinner and others found that

Table 3.

RESULTS OF REGRESSION ANALYSES OF MODELS FOR SCHEDULING AN APPOINTMENT FOR CERVICAL CANCER SCREENING (PAP TEST) AND RECEIPT OF CERVICAL CANCER SCREENING

	African American (n = 604)			Mexican American (n = 618)			Non-Hispanic white (n = 261)		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Scheduling an appointment									
Age (y) (18–39 is reference group)									
40–49	2.17	1.43, 3.29	0.00	2.20	1.50, 3.24	0.00	1.57	0.80, 3.07	0.19
50–59	2.83	1.76, 4.56	0.00	3.01	1.81, 5.00	0.00	2.56	1.27, 5.15	0.01
60 or more	1.95	1.15, 3.31	0.01	3.87	2.10, 7.11	0.00	2.55	1.12, 5.82	0.03
Treatment group (control is reference group)									
PT letter	0.92	0.63, 1.36	0.69	0.88	0.59, 1.32	0.53	0.61	0.33, 1.15	0.13
PF letter	1.12	0.80, 1.83	0.37	1.37	0.92, 2.05	0.13	2.52	1.34, 4.74	0.01
Receipt of cervical cancer screening									
Age (y) (18–39 is reference group)									
40–49	1.69	1.09, 2.60	0.02	2.38	1.58, 3.57	0.00	1.88	0.90, 3.93	0.10
50–59	2.96	1.83, 4.78	0.00	3.04	1.81, 5.11	0.00	3.76	1.78, 7.94	0.01
60 or more	2.08	1.21, 3.57	0.01	3.88	2.12, 7.10	0.00	2.67	1.11, 6.40	0.03
Treatment group (control is reference group)									
PT letter	0.52	0.35, 0.79	0.01	0.53	0.34, 0.82	0.01	0.25	0.11, 0.54	0.00
PF letter	0.96	0.63, 1.46	0.86	1.17	0.78, 1.76	0.46	2.13	1.13, 4.03	0.02

Note: OR is odds ratio from logistic regression analyses. Higher odds ratio indicates greater likelihood that patient scheduled screening services. 95% CI is confidence limit for odds ratio.
Abbreviations: PF letter, personalized form letter; PT letter, personalized tailored letter.

tailored letters were more effective than standardized letters for certain subgroups, including African Americans and those with incomes less than \$26,000 per year,¹⁹ our study did not generate results consistent with such findings.

What deterred non-Hispanic white women who were assigned to the PT group in this study from seeking cancer screening? A possible explanation might be that the risk information and customization level communicated to each woman in the PT letters was too limited.¹⁰ Although personal risk factors for breast and cervical cancer (e.g., having a family history) were included in the PT letters, no information about absolute risks of getting cancer or dying from cancer, about comparative risks (self versus others), or about the objective risk reduction associated with the screening recommendations was provided. Another explanation for the low cancer screening rates observed among women receiving the PT letter may relate to recipients' perceptions that the letter was too alarming, perhaps making women anxious about performing the protective behavior.³⁶ However, previous research suggests that breast cancer worries lead to protective behaviors, rather than avoidance behaviors, and thus facilitates screening.³⁷ At present, we have no conclusive explanation for the discrepancy between the results of our study and results reported in the literature. One aspect of the study that merits further attention relates to education and literacy levels of study participants. We had no effective way, apart from random assignment to intervention and control groups, to control for variations in educational level and literacy skills that may have influenced understanding of information obtained by women in the study. This may have been an important confounding variable affecting our results.

Women in the three ethnic groups were more likely to receive breast and cervical cancer screening if they were assigned to the PF group than if they were assigned to the PT group. Because the PF letters were easier to develop and implement than were the PT letters, it was valuable to find that the PF letter was more effective than the PT letter in increasing appointment scheduling and receipt of breast and cervical cancer screening among all three ethnic groups. Tailoring based on existing data (i.e., medical records) is of necessity limited by the fact that researchers have little control over the kinds of data that are routinely collected for service documentation. Medical records data are also difficult to rely on because the currency and accuracy of such data are inconsistent.

Another problem concerns the currency and accuracy of the medical record data. If the information is outdated or inaccurate, the specific tailored message might be inappropriate.¹² The problem of unreliability of medical record data is particularly relevant to this study, because we did not verify the quality or timeliness of the data included in the medical records, and the patients whom we targeted had not received breast and cervical cancer screening in the 2 years prior to the study. For some study participants, the medical records on which the PT letters were based may not have been up to date. Furthermore, it is unclear if some of the women who did schedule screening services did so simply because they were reminded of an overdue follow-up appointment rather than by some information included in the prompting letter. It is impossible to know if the prompting letters motivated all of the subjects who scheduled appointments. Lacking a practical way to retrieve data on performance of clinical breast examinations, we could not determine the impact of the interventions in this regard.

The study is limited by the sample size for the subgroup analyses, in particular for non-Hispanic white women 40 years of age and older ($n = 144$). Yet, despite the

lower sample size, the observed effects for non-Hispanic white patients were large and many reached statistical significance.

Conclusion

Recent reports suggesting that cancer death rates in women have stabilized since 2000 after a number of years of decline, alongside reported ongoing declines in cancer death rates for men,³⁸ suggest that aggressive and effective efforts to control cancer risk in women are still needed. TPC focusing on individual factors important in behavioral change has been a strategy used to improve the relevancy of a message for a specific person. From a practice perspective, the findings of the present study suggest that physicians and others involved in cancer screening services may want to be cautious about including risk-related information gleaned from medical records in prompting messages sent to patients for the purposes of promoting compliance with screening recommendations. Attention to individual preferences, needs, and comprehension levels may be the critical factor in cancer-related risk messaging. As emerging literature in the area of motivational interviewing suggests, a key factor in eliciting behavioral change in patients at risk involves helping patients explore the information being provided and resolve ambivalence that they may feel regarding the relevance of the information for them.³⁹⁻⁴¹ Reliance on print communication that contains personalized and potentially alarming information that is not balanced by opportunities to examine and explore the implications of the information provided may in fact contribute to patients' resistance to behavioral change. Further studies are needed to confirm and explain the findings of this study, in particular the role of qualitative data collection in understanding the greater efficacy of standardized messages, especially among non-Hispanic white and Mexican-American women.

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