

- gen population-based breast cancer screening program: assessment of early indicators of screening effectiveness. *JNCI*. 1994;86:436-441.
20. Collette HJ, Day NE, Rombach JJ, et al. Evaluation of screening for breast cancer in a non-randomized study (the DOM project) by means of a case-control study. *Lancet*. 1984;1:1224-1226.
 21. Palli D, Del Turco MR, Buiatti E, et al. A case-control study of the efficacy of the non-randomized breast cancer screening program in Florence (Italy). *Int J Cancer*. 1986;38:501-504.
 22. *Screening for Breast Cancer*. Bethesda, Md: National Cancer Institute; 1995. Physicians Data Query database.
 23. Dodd GD. American Cancer Society guidelines on screening for breast cancer: an overview. *CA*. 1992;42:177-180.
 24. Eddy D. Guidelines for the cancer related check-up: recommendations and rationale. *CA*. 1980;30:194-240.
 25. Sickles A, Kopans DB. Deficiencies in the analysis of breast cancer screening data. *JNCI*. 1993;85:1621-1624.
 26. Centers for Disease Control Cancer and Steroid Hormone Study. Long-term oral contraceptive use and the risk of breast cancer. *JAMA*. 1983;249:1591-1595.
 27. Sattin RW, Rubin GL, Webster LA, et al. Family history and the risk of breast cancer. *JAMA*. 1985;253:1908-1913.
 28. Ottman R, Pike MC, King MC, Casagrande JT, Henderson BE. Familial breast cancer in a population-based series. *Am J Epidemiol*. 1986;123:15-21.
 29. Mettlin C. The relationship of breast cancer epidemiology to screening recommendations. *Cancer*. 1994;74:228-230.
 30. Kelsey JL. Breast cancer epidemiology: summary and future directions. *Epidemiol Rev*. 1993;15:256-263.
 31. Thompson WD. Genetic epidemiology of breast cancer. *Cancer*. 1994;74:279-287.
 32. Tulinius H, Egilsson V, Olafsdottir G, et al. Risk of prostate, ovarian, and endometrial cancer among relatives of women with breast cancer. *BMJ*. 1991;27:244-248.
 33. Thiessen E. Concerning a familial association between breast cancer and both prostatic and uterine malignancies. *Cancer*. 1974;34:1102-1107.
 34. Kerlikowske K, Grady D, Barclay J, Sickles EA, Eaton A, Ernster V. Positive predictive value of screening mammography by age and family history of breast cancer. *JAMA*. 1993;270:2444-2450.
 35. Adami HO, Mulker B, Meirik O, Persson I, Bergkvist L, Stone B. Age as a prognostic factor in breast cancer. *Cancer*. 1985;56:898-902.
 36. de la Rochefordiere A, Asselain B, Campana F, et al. Age as prognostic factor in premenopausal breast carcinoma. *Lancet*. 1993;341:1039-1043.
 37. Calle EE, Martin LM, Thun MJ, Miracle HL, Heath CW Jr. Family history, age, and risk of fatal breast cancer. *Am J Epidemiol*. 1993;138:675-681.
 38. Smart CR, Hartmann WH, Beahrs OH, Garfinkel L. Insights into breast cancer screening of younger women: evidence from the 14-year follow-up of the Breast Cancer Detection Demonstration Project. *Cancer*. 1993;72(suppl):1449-1456.
 39. Easton D, Ford D, Peto J. Inherited susceptibility to breast cancer. *Cancer Surv*. 1993;18:95-113.

Breast and Cervical Cancer Screening in a Low-Income Managed Care Sample: The Efficacy of Physician Letters and Phone Calls

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ABSTRACT

A randomized trial was conducted to evaluate the combined impact of a physician reminder letter and a telephone contact on the use of Pap tests and mammograms in a low-income managed care program. Women 40 to 79 years of age who were past due for cancer screening were randomly assigned to an intervention or control group. Medical claims were reviewed after 6 months to determine intervention effectiveness. The odds of receiving all needed cancer screening tests during follow-up were four times higher in the intervention group. Women who reported having to take time off from work to see a doctor had lower odds of getting screened. (*Am J Public Health*. 1995;85:834-836)

Introduction

A growing amount of attention is being given to "inreach" strategies as a way to increase the use of clinical preventive services, including breast and cervical cancer screening.¹⁻⁶ Inreach can be defined as offering screening and other preventive services to patients as they come in contact with the health care system for reasons other than preventive care. Inreach interventions can identify appropriate candidates for preventive services through several means (e.g., assessing the screening/counseling needs of patients presenting for acute care or reviewing patient medical record information in a managed care environment).

Research suggests that inreach strategies that emphasize physician recommendations provide a powerful motivator for breast and cervical cancer screening.⁷⁻¹² Previous studies in this area, however,

have been conducted primarily among enrollees of health maintenance organizations or among cross sections of women in large-group practices, neither of which tend to include low-income populations.¹³⁻¹⁶ We conducted a randomized

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trial to evaluate the impact of an inreach intervention on cancer screening among women enrolled in a low-income managed care program.

Methods

The study was conducted in a population served by a federally funded community health center that provides an insurance-like package of benefits for individuals at or below 200% of the poverty level. Enrollees pay a monthly premium (based on family size and income) for which they receive primary and specialty care from their choice of approximately 700 physicians at more than 80 clinic sites in an 11-county area of Wisconsin. Screening mammograms and Pap tests are covered benefits.

Computerized medical claims data were reviewed to identify female enrollees 40 to 79 years of age. Those without a claim for a mammogram in the previous 18 months (for those 50 years old or older) or the previous 2 years (for those 40 to 49 years old) and/or those without a claim for a Pap test in the previous 3 years were randomly assigned to an intervention or control group based on the penultimate digit of their medical history number.

Women in the control group received usual care. Women in the intervention group received a two-part intervention. First, each woman received a reminder letter from her primary care physician (or the medical director of the community health center if a primary physician could not be identified) based on which screening test(s) she needed. Second, women received a follow-up telephone call from a health educator (i.e., a nurse or social work intern) within 7 to 10 days after the letter was mailed; the purpose of the call was to offer barriers counseling and/or assistance with appointment scheduling. Women without a telephone received a second letter. Additional information about the study design and intervention has been presented elsewhere.¹⁷

After a 6-month follow-up period, medical claims data were reviewed for Pap test and mammogram use. A survey, mailed to both the intervention and control groups after the follow-up period, collected additional sociodemographic data to augment the limited information in the medical claims database. Chi-square tests and logistic regression were used in conducting analyses. Ten percent ($n = 33$) of women assigned to the intervention group were deemed inappropri-

TABLE 1—Description of the Study Population: Women in a Low-Income Managed Care Program

	Intervention Group ($n = 337$), %	Control Group ($n = 322$), %	<i>P</i>
Screening test needed ^a			
Pap test	19	24	
Mammogram	31	26	
Pap test and mammogram	51	50	.08
Age, y ^a			
40–49	28	26	
50–64	46	47	
65+	26	27	.86
Race: non-Hispanic White ^a	100	100	
Responded to follow-up survey ^b	85	89	.48
Education ^b			
Less than high school	41	33	
High school graduate	38	41	
More than high school	21	26	.11
Self-reported history of mammography prior to study period ^b	65	72	.07
Doctor said Pap tests are no longer needed ^b	15	14	.62
No doctor/doctor > 48 km (30 miles) away ^b	17	21	.12
Does not drive self to doctor ^b	23	25	.48
Must take time off work to go to doctor ^b	33	31	.55

^aFrom medical claims database.

^bFrom mailed survey of study subjects.

TABLE 2—Results of Breast and Cervical Cancer Screening Intervention

Test(s) Needed	Received Needed Test(s) during Follow-Up Period		Odds Ratio (95% Confidence Interval)
	Intervention Group, No. (%)	Control Group, No. (%)	
Pap test only	13 (21.7)	3 (3.8)	6.9 (1.9, 25.6)
Mammogram only	56 (53.8)	17 (20.7)	4.5 (2.3, 8.6)
Pap test and mammogram	32 (18.5)	11 (6.8)	3.1 (1.4, 6.9)
Total	101 (30.0)	31 (9.6)	4.0 (2.6, 6.2)

ate study subjects by their physicians and therefore did not receive the intervention. These women were included in the analysis, however, since similar criteria for exclusion could not be identified among women in the control group.

Results

Of the 1105 women who met the study criteria regarding age and current enrollment, 659 (57%) were in need of one or more screening tests. There were no significant differences ($P < .05$) between the intervention and control groups

in the distribution of screening tests needed, age, or other background characteristics (Table 1). The overall response rate to the follow-up mailed survey was 87% ($n = 573$), with no significant difference between the intervention and control groups.

Intervention letters were signed by 110 primary care physicians at 30 different clinic sites. Thirty-one percent ($n = 103$) of the letters were signed by the medical director of the community health center. No letters were returned as undeliverable, and only 13 women were not reached by telephone. At the time of the telephone

contact, 16% of the women had already made an appointment for screening in direct response to the physician reminder letter.

Women in the intervention group were significantly more likely to receive all needed cancer screening tests during the follow-up period than women in the control group (Table 2). Within the intervention and control groups, screening rates for survey respondents did not vary significantly from those of nonrespondents ($P > .05$). Logistic regression analyses (not shown) suggested that, after intervention status, age, education, and other background characteristics had been controlled, women reporting the need to take time off from work to go to the doctor had significantly lower odds of receiving all needed screening tests during the follow-up period (odds ratio [OR] = 0.49, 95% confidence interval [CI] = 0.28, 0.85).

Discussion

Women with low family incomes have lower rates of breast and cervical cancer screening than the general population.^{7-12,18-20} However, removing cost as a barrier does not ensure screening.^{21,22} Knowledge, attitudinal, and logistical barriers also need to be addressed if screening use rates are to increase.

A mailed reminder letter from a physician combined with telephone contact from a health educator significantly increased the odds of receiving breast and cervical cancer screening. Our results build on previous studies by showing that a reminder intervention can increase both breast and cervical cancer screening in a low-income and geographically dispersed population with benefit coverage for the tests. In addition, an important finding was that women who reported having to take time off from work to go to the doctor had significantly lower odds of getting screened.

The main strengths of this study are its design (i.e., a randomized controlled trial), the quality of medical claims data used to identify eligible subjects and assess screening behavior, and the fact that both breast and cervical cancer screening were addressed. A limitation of the study design is that it did not allow for an assessment of the relative impact of the physician reminder letter vs the telephone contact. In addition, the results may not

be generalizable to populations whose cancer screening benefit coverage requires a copayment.

As the number of managed care programs that include low-income populations increases, clinical inreach strategies are a promising method for meeting Year 2000 breast and cervical cancer screening objectives for low-income women.²³ The study results presented here suggest that a physician reminder letter, combined with telephone contact, is one such effective strategy. Additional research is needed to guide the design and evaluation of culturally appropriate inreach interventions for women's cancer screening in underserved populations. □

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References

- Fulton JP, Buechner JS, Scott HD, et al. A study guided by the health belief model of the predictors of breast cancer screening of women ages 40 and older. *Public Health Rep.* 1991;106:410-420.
- McDowell I, Newell C, Rosser W. A randomized trial of computerized reminders for blood pressure screening in primary care. *Med Care.* 1989;27:297-305.
- Garr DR, Ornstein SM, Jenkins RG, Zemp LD. The effect of routine use of computer-generated preventive reminders in a clinical practice. *Am J Prev Med.* 1993;9:55-61.
- Murrey KO, Gottlieb LK, Schoenbaum SC. Implementing clinical guidelines: a quality management approach to reminder systems. *QRB Qual Rev Bull.* 1992;18:423-433.
- Ornstein SM, Garr DR, Jenkins RG, Rust PF, Arnon A. Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services. *J Fam Pract.* 1991;32:82-90.
- Frame PS. Can computerized reminder systems have an impact on preventive services in practice? *J Gen Intern Med.* 1990;5(suppl 5):S112-S115.
- National Cancer Institute Breast Cancer Screening Consortium. Screening mammography: a missed clinical opportunity? *JAMA.* 1990;264:54-58.
- Zapka JG, Stoddard AM, Costanza ME, Greene HL. Breast cancer screening by mammography: utilization and associated factors. *Am J Public Health.* 1989;79:1499-1502.
- Rimer BK, Keintz MK, Kessler HB, Engstrom PF, Rosan JR. Why women resist screening mammography: patient related barriers. *Radiology.* 1989;172:243-246.
- Grady KE, Lemkau JP, McVay JM, Teisine ST. The importance of physician encouragement in breast cancer screening of older women. *Prev Med.* 1992;21:766-780.
- Wilcox LS, Mosher WD. Factors associated with obtaining health screening among women of reproductive age. *Public Health Rep.* 1993;108:76-85.
- Harlan LC, Bernstein AB, Kessler LG. Cervical cancer screening: who is not screened and why? *Am J Public Health.* 1991;81:885-890.
- Taplin SH, Anderman C, Grothaus L, Curry S, Montano D. Using physician correspondence and postcard reminders to promote mammography use. *Am J Public Health.* 1994;84:571-574.
- Trock B, Rimer BK, King E, Balshem A, Cistinzi CS, Engstrom PF. Impact of an HMO-based intervention to increase mammography utilization. *Cancer Epidemiol Biomarkers Prev.* 1993;2:151-156.
- King ES, Rimer BK, Seay J, Balshem A, Engstrom PF. Promoting mammography use through progressive interventions: is it effective? *Am J Public Health.* 1994;84:104-106.
- McDowell I, Newell C, Rosser W. Computerized reminders to encourage cervical cancer screening in family practice. *J Fam Pract.* 1989;28:420-424.
- Lantz PL, Stencil D, Lippert MTL, Jaros L. *A Breast and Cervical Cancer Screening Intervention in a Community Health Center Population: Results from a Randomized Trial.* Marshfield, Wis: Marshfield Medical Research Foundation; 1994. Wisconsin Rural Health Research Center working paper.
- Special focus: behavioral risk factor surveillance—United States, 1991. *MMWR Morb Mortal Wkly Rep.* 1993;SS-4(42):1-30.
- Calle EE, Flanders WD, Thun MJ, Martin LM. Demographic predictors of mammography and Pap smear screening in US women. *Am J Public Health.* 1993;83:53-60.
- Kirkman-Liff B, Knonenfeld JJ. Access to cancer screening services for women. *Am J Public Health.* 1992;82:733-735.
- Zapka JG, Hosmer O, Costanza ME, Harris DR, Stoddard A. Changes in mammography use: economic, need and service factors. *Am J Public Health.* 1992;82:1345-1351.
- Costanza ME, D'Orsi CJ, Greene HL, Gaw VP, Karellas A, Zapka JG. Feasibility of universal screening mammography: lessons from a community intervention. *Arch Intern Med.* 1991;151:1851-1856.
- Healthy People 2000: National Health Promotion and Disease Prevention Objectives.* Washington, DC: US Dept of Health and Human Services; 1990. DHHS publication 91-50212.