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# Factors Influencing Mammogram Ordering at the Time of the Office Visit

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**Background.** Breast cancer is the second most common cause of cancer death in women, with mammographic screening the only modality shown to decrease the death rate. However, only 17% to 41% of women have ever been screened, and multiple barriers to screening have been identified. This study examined physician and patient factors at a single encounter to explore components influencing mammography ordering.

**Methods.** Ten family physicians in a primary care research network completed daily data cards on encounters with women presenting for annual examinations, chronic problems, or breast-related complaints. Information collected included patient age, personal or family history of breast cancer, physician's perception of expected compliance, previous mammogram results, breast examination, physician's perception of need for a mammogram, whether the mammogram was ordered, and the patient's method of payment for the test.

**Results.** Eight hundred thirty-nine patients were entered into the study, and 277 mammograms were or-

dered. Mammograms were ordered for a greater percentage of patients with insurance (36%) than for those without insurance (26%) ( $P < .001$ ). A multivariate analysis indicated that several factors helped to correctly classify 90% of mammogram ordering: the patient was making a first visit, a breast-related visit, or a visit for an annual examination; the patient had had a previous mammogram; had a breast examination at the current visit or within the past year; and the physician believed the patient would comply and believed that a mammogram was indicated.

**Conclusions.** Factors unique to a physician-patient visit influence the physician with regard to ordering a mammogram, including the type of visit, whether the physician believes a mammogram is indicated, and the cost.

**Key words.** Mammography; breast neoplasms; preventive medicine; health promotion. (*J Fam Pract* 1993; 37:356-360)

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Breast cancer is the leading cause of cancer in women, accounting for 32% of cancers and 19% of cancer-related deaths.<sup>1</sup> The only modality shown in controlled studies to decrease the death rate from breast cancer is mammographic screening.<sup>2-5</sup> Various studies have shown that 17% to 41% of women have ever had a mammogram, and that only 4% to 29% have one annually.<sup>6-9</sup> Among the identified barriers to screening are patient reluctance

(fear, cost, lack of knowledge, too busy), physician reluctance (cost, low yield, radiation exposure, disagreement with the guidelines, belief that patients will not comply with suggestions for a mammogram), availability and accessibility, and cost.<sup>10-16</sup> Study results indicate, however, that 75% to 93% of women would have a mammogram if their physician recommended it.<sup>17,18</sup> Therefore, any national strategy to reduce the breast cancer mortality rate must involve increasing the number of physicians who integrate breast cancer screening guidelines into their routine office practices.

The problem-based nature of primary care practice is often not supportive of prevention activities. Reminder systems, both manual and computer supported, have

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been introduced into primary care offices, yet mammographic screening has not yet reached optimal levels.<sup>19</sup> This may be because the decision to order a mammogram is a result of a complex set of interactions that take place during the physician-patient visit and may include factors other than physician beliefs about screening or office dynamics. Most of what is known about factors influencing mammogram ordering is based on patient or physician surveys, absent the actual dynamics of the physician-patient interaction.

The goal of this study, therefore, was to identify the factors affecting the ordering of mammograms by using information recorded during a patient encounter.

## Methods

The study group consisted of family physicians associated with the Colorado Sentinel Practice Network (COSPN). Established in 1988 by funds from the Comprecare Foundation, COSPN currently includes eight primary care practices and 10 physicians. A general survey was completed by each physician and mailed to the investigators. The survey included physician and practice demographics, and questions about their current mammographic screening practices, their belief in the benefits and risks of mammography, and their estimates of patient compliance.

Patient visit information was collected through the use of a data card carried by the physician in his or her pocket. This data collection procedure has been used successfully in other network studies.<sup>20</sup> Information collected on the card included a patient identifier, patient age, first visit to the practice (yes/no), reason for visit (physical examination, chronic condition, breast-related visit), personal history of breast cancer, family history of breast cancer, physician's perceived expectation for compliance by the patient (will/will not comply), previous mammogram results (normal, abnormal), breast examination (done/not done, normal/abnormal, suggestive of cancer), physician's perception that a mammogram is indicated (yes/no), mammogram ordered (yes/no), and patient's expected method of paying for a mammogram (patient pays/insurance co-pays/do not know).

Patients were enrolled in the study if the woman was over the age of 35 years, not lactating, and not pregnant. Women aged 35 to 39 years were included because American Cancer Society (ACS) guidelines at the time of the study recommended that a baseline mammogram be obtained between the ages of 35 and 39 years. Physicians completed the card at the time of the visit and returned the cards weekly to the investigators. Data were collected

Table 1. Patient Visit Variables (N = 839)

Variable	Percent
Patient age (y)	
35-39	18
40-49	31
≥50	51
Reason for visit	
Breast-related	6
Annual examination	48
Chronic condition	46

on all visits involving eligible women from October 1, 1990, through April 30, 1991.

Data were analyzed using SPSS/PC, version 4.0, 1992. Logistic regression and odds ratios were used to determine variables associated with physicians' decisions to order mammograms for eligible women, controlling for patient age.

## Results

Of the 10 physicians participating in the study, the mean physician age was 40 years (range 35 to 66 years); they had been practicing family medicine for an average of 10 years. Nine had completed a family practice residency; all were board certified by the American Board of Family Practice. Two physicians were in solo practice, four practiced as a partnership, and four worked in large, single-specialty groups. The sizes of the communities in which they practiced were 2500 to 4999 (n = 1); 5000 to 9999 (n = 2); 10,000 to 24,999 (n = 5); 25,000 to 99,999 (n = 1); and suburb of a large city (n = 1).

A total of 839 patients were enrolled in the study. The age distribution and the patient's reason for the visit are given in Table 1. Thirteen percent of the patients requested a mammogram at the visit. A mammogram was ordered for 78% of these women. Overall, physicians perceived that 20% of the patients would be reluctant to have a mammogram, but that 66% of the patients would comply if asked to have a mammogram. Physician breast examinations were performed for women making annual visits (97.7%) more often than for women making visits for chronic problems (22.0%),  $P < .001$ . Ninety-six percent of patients presenting with a breast complaint had a clinical breast examination performed; a mammogram was ordered for 38% of these patients. Twenty-eight patients had breast examination results that were suggestive of cancer; surprisingly, mammograms were not ordered for over half (15) of those patients.

A total of 277 mammograms were ordered. Of those for whom a mammogram was ordered, 81% had insurance and 19% did not ( $P = .01$ ). Mammograms were

Table 2. Variables Associated with Physician Ordering a Mammogram for 341 Eligible Patients\*

Variable	P Value	Odds Ratio	95% CI
Physician believes mammogram indicated (yes/no)	<.001	134.80	15.58–1157.30
Patient attitude (reluctant/will comply)	<.001	25.57	8.51–76.58
Reason for visit (annual examination/chronic condition)	<.001	7.61	3.35–17.32
Breast examination in the last year (yes/no)	.017	6.64	1.40–31.28
First visit (yes/no)	.040	4.83	1.07–21.72
Previous mammogram (yes/no)	<.001	4.52	2.17–11.10
Patient pays (yes/no)	NS	1.40	.58–3.37

\*Adjusted for patient age.

CI denotes confidence interval.

eight times as likely to be ordered when the physician thought the patient would comply with a mammogram recommendation (89.2%) than when she or he did not think the patient would comply (10.8%) ( $P < .001$ ). A mammogram was ordered at 60% of visits in which the physician indicated that a mammogram was needed.

For women aged 40 years and over, 341 (49.8%) were eligible for screening mammograms according to ACS guidelines (a mammogram every 2 years between ages 40 and 49 years and annually over the age of 50). Physicians correctly identified 78% of these women. Among women aged 50 years and over who were eligible for a screening mammogram, physicians ordered a mammogram for 36.7% of them.

Univariate analyses identified variables that significantly predicted mammogram ordering. Women visiting a practice for the first time ( $P = .04$ ), either for a breast-related complaint or for an annual examination ( $P = <.001$ ), were more likely to have a mammogram ordered. If a woman had a prior mammogram, she was more likely to have another ordered ( $P < .001$ ). Physicians' impressions of the patient were also important. If physicians believed a patient would comply or that a mammogram was indicated, they were more likely to order a mammogram ( $P < .001$ ). If physicians knew the mammogram would not be covered by insurance, they were less likely to order the test ( $P = .003$ ). Controlling for patient age made no difference in these findings; patient age alone was not an independent predictor of mammogram ordering.

Logistic regression was used to analyze these significant variables multivariately, controlling for patient age; the results are presented in Table 2. The only previously significant variable that did not predict ordering was insurance status. If the patient was making a first visit,

had a breast-related complaint, was presenting for an annual examination, had a previous mammogram, had a breast examination done at the current visit or within the last year, and if the physician believed a mammogram was indicated and perceived her as willing to comply, the odds of having a mammogram ordered increased significantly. Using these variables in a classification analysis, the model could correctly classify, with 90% accuracy, whether eligible women had a mammogram ordered at this visit.

## Discussion

Mammography has been shown to be an essential tool for early detection of breast cancer, yet physicians fail to order mammograms for a variety of perceived and real reasons. This study examined the barriers to ordering screening mammograms from the perspective of the physician-patient visit. The present study is unique in that the information was obtained during the time of the office visit rather than from either patient or physician surveys or chart audits. Two of the most important factors in determining whether a mammogram was ordered were the physician's perception of the patient's willingness and the physician's belief that the mammogram was indicated. Neither of these factors could have been elicited from a retrospective chart review. This method of data collection adds essential information to our knowledge about barriers to ordering mammograms.

For women who were eligible for mammographic screening based on ACS guidelines, certain characteristics predicted whether a mammogram was ordered at that visit. As might be expected, presenting with a breast-related complaint, having an annual examination, or hav-

ing a clinical breast examination performed were predictive of a physician ordering a mammogram. These activities focus attention on the breast and prevention, and thus serve as physician reminders to order a mammogram. Women with previous mammograms were also more likely to receive another test, possibly because the mammogram report served as a reminder to the physician or because he or she perceived that the woman was amenable to screening tests. Osborn et al<sup>21</sup> found increased utilization of screening procedures when patients were scheduled for prevention visits.

If physicians perceived patients as unwilling to comply with their recommendations for screening, they rarely ordered mammograms (10.8%). This finding highlights the importance of physician-patient communication about breast cancer screening. During the visit, the patient should be given the opportunity to discuss any concerns including her willingness or unwillingness to undergo screening mammography.

In spite of physicians' willingness to order screening mammograms for their patients at age-appropriate intervals, they were able to identify only 78% of their own patients who were eligible for mammographic screening based on age ( $\geq 40$  years) and date of last mammogram. Physicians may be knowledgeable about screening guidelines, yet have difficulty applying them in their own patient population. Thus, simply improving physicians' awareness of guidelines for screening mammography will not noticeably improve mammography rates. Other cues to a patient's eligibility must be readily available to the physician, such as reminder systems, patient questions about screening mammograms, or readily accessible records of the patient's previous mammograms.

In addition, even when eligibility was recognized, only 45% of patients had mammograms ordered. Factors other than knowledge about the benefits of mammography may account for this discrepancy and merit further study. Clearly, providing office systems to remind physicians to order screening tests will not overcome this problem. McPhee et al<sup>22</sup> found computerized reminders enhanced screening for nine cancer prevention procedures, but not for mammography, suggesting barriers to mammographic screening may have unique characteristics not easily addressed by office systems.

Finally, 13% of women requested a mammogram at the office visit and a mammogram was ordered for 78% of them. This suggests that an effective strategy for increasing mammography rates is to have women actively solicit mammograms from their physicians. How this can best be accomplished within the context of usual physician practice warrants investigation.

Our study has several limitations that need to be considered when interpreting the results. The physicians

were younger and more highly trained than the average family physician in Colorado. They were a self-selected group who were interested in research, participated in the design of the study, and were concerned about the problem of breast cancer. Collecting patient-visit data using a daily return card introduces some biases into the study such as increased physician vigilance about breast cancer screening. However, if this bias were removed, we would expect that even fewer mammograms would have been ordered.

## Conclusions

Factors unique to a physician-patient visit influence the physician's decision to order a mammogram, including the type of visit, whether the physician believes a mammogram is indicated, and the cost. The findings of our study suggest that improving physician compliance with recommendations for mammographic screening is not a straightforward proposition. Further studies are needed to determine what specific aspects of the physician-patient encounter influence the decision to order a mammogram, and how these factors can be minimized or maximized to increase the likelihood of a mammogram being ordered.

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