MAMMOGRAPHY USAGE IN A COMMUNITY-BASED SAMPLE OF OLDER WOMEN[1]

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ABSTRACT

Recent data indicate that less than 39% of women aged 50 and older are compliant with the age-specific guidelines for mammography. Cost has often been identified as the greatest barrier to mammography utilization. This study examined adherence to mammography screening guidelines as well as the motivators and barriers to mammography usage among a community-based sample of 1,134 middle- and upper-middle-class, relatively well-educated women aged 55 and older, all of whom had access to health care. A mailed questionnaire using open-ended (unleading) questions was used to assess motivators and barriers to regular mammography. Women were classified as never-users (11.6%), sporadic-users (38.5%), and annual-users (49.9%). Never-users were significantly older than women in the other two groups. Annual-users were significantly more likely to be current estrogen users, report a history of reproductive cancer, and rate their health as excellent or good. Major motivators for mammography included the recommendation of a health care provider, familiarity with mammography via the media, and belief in its efficacy. This cohort of women who had the advantage of health care access nevertheless reported low annual mammography rates and identified several barriers to seeking the procedure. Important barriers to mammography included fear of pain, fear of radiation, and lack of perceived need. After adjustment for age, estrogen use, cancer history, and personal health, never-users and sporadic-users reported significantly fewer motivators and more barriers than annual-users. Results indicate the importance of health education and outreach for older women in every socioeconomic strata.

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INTRODUCTION

Breast cancer has achieved nearly epidemic status. In 1994, 46,000 women died of breast cancer and another 182,000 cases beyond the *in situ* stage were newly diagnosed (1). Estimates for 1995 cite these same figures (2). In the United States, it is the most commonly occurring cancer among women of all ethnic, age, and socioeconomic groups, and it is second only to lung cancer as the leading cause of cancer deaths among women (1).

While a consensus still does not exist on how to prevent breast cancer and treatment methods for later-stage breast cancer achieve less than optimal success, there is clear evidence that early detection of breast cancer through mammography can prevent a significant number of deaths, particularly in women over the age of 50 (3). Current guidelines from the American Cancer Society and the National Cancer Institute recommend that women 50 years of age and older have a clinical breast exam and a screening mammogram annually (4) or every one to two years, depending on physician recommendation (5).

Nevertheless, recent data from the Behavioral Risk Factor Surveillance System indicates that less than 39% of women age 50 and older are compliant with the age-specific guidelines (6). Numerous studies have been conducted to develop a better understanding of the factors that motivate and deter women from seeking mammograms. Many of these studies indicate that the cost of the procedure is the most widely attributed barrier and the one to which women and physicians may be most attuned (7–12). However, others have shown that simply making mammograms available to women by reducing or removing the cost barrier is insufficient to achieve the compliance rates that are necessary to reduce the breast cancer mortality rate (13–16). Thus, for some women the expense of the procedure may serve as a smoke screen for other, more pressing, but seemingly less socially acceptable barriers to screening. For others the barriers may be additive, with cost being merely the easiest to identify.

This study investigated the barriers and facilitators to mammography screening among a population-based sample of middle and upper-middle-class women, aged 55 years and older. The demographic profile of these women supported the assumption that motivators and barriers to mammography could be studied without the issue of cost as a confounding variable.

METHODS

Sample

Between 1972 and 1974, 6,339 individuals (3,286 women and 2,824 men) representing 82% of the White middle- to upper-middle-class southern California community of Rancho Bernardo were enrolled in a study of heart disease risk factors. These individuals have been followed since then with an annual mailed questionnaire. During the fall of 1992, the 1,948 surviving women of this cohort aged 55 years or older were mailed a survey assessing reproductive history and utilization of mammography. A total of 1,187 women (61%) responded; the 1,134 women who could be classified by frequency of mammography form the basis of this report.

Instruments

The questionnaire asked women whether they had ever had a mammogram, and if yes, their age at the first mammogram, frequency of mammography since age 50, and date of their most recent mammogram. Women were asked to list up to five factors that acted as facilitating factors (motivators) and up to five factors that acted as barriers to the utilization of mammography.

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TABLE 1

Age-Adjusted Comparisons[a] of Sporadic-Users, Annual-Users, and Those Who Never Had a Mammogram on Demographic Factors and Perceived Health Status; Women Aged 55 and Older; Rancho Bernardo, CA, 1992

	Never-Users (N = 131)	Sporadic-Users (N = 437)	Annual-Users (N = 566)	F or χ^2 Trend
Age (mean years)	77.0	75.5	73.1	21.99***
% by age range				
55–64	17.6	17.6	20.0	
65–74	16.0	28.3	34.6	
75–84	30.5	36.1	38.3	
85+	35.9	18.0	7.1	81.69***
Estrogen status (%)				
Never	61.5	34.7***	22.2***	64.98***
Past	27.2	33.4	29.8	0.01
Current	12.2	31.8***	48.1***	61.34***
Reproductive cancer (% yes)	6.6	7.9	15.1**	16.30***
Health rating (%)				
Excellent	13.2	12.3	14.5	0.59
Very good	33.1	37.5	43.4	4.65*
Good	32.1	36.2	32.3	0.24
Fair	19.0	12.1	8.1**	9.43**
Poor	2.3	2.2	1.9	1.15
Health compared to other (%)				
Better	61.9	61.1	64.5	0.51
Same	31.6	34.3	31.3	0.12
Worse	5.9	4.8	4.2	0.67

[a] Comparisons were performed with analysis of variance for age. Age-adjusted comparisons of sporadic-users and annual-users with never-users were performed with the Mantel-Haenzel Extension Test.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Open-ended questions were used to avoid leading answers (or excuses) for mammography use.

Women were also queried about their past and current use of estrogen replacement therapy, history of cancer, and perceived health status. Women were asked to rate their overall health on a five-point scale ranging from excellent to poor and to rate their health as better, the same, or worse as compared to others their age.

Statistical Analysis

Women were classified into those who reported a yearly mammogram (annual-users), at least one mammogram but not yearly (sporadic-users), and no mammogram ever (never-users). (The definition of sporadic-user was based on the breast cancer screening recommendations that were current at the time of the study, i.e. that women over 50 obtain a mammogram annually.) A history of reproductive cancer included a history of breast, uterine, cervical, or ovarian cancer.

Age-adjusted comparisons of women who were sporadic-users and annual-users of mammography with those who had never had a mammogram were performed using analysis of variance. Age-adjusted tests for trend were performed with the Mantel-Haenzel Extension Test. Comparisons by mammography status of motivators and barriers to mammography after adjustment for age, estrogen use, history of reproductive cancer, and rating of health were performed with analysis of covariance. Analyses were performed with SPSS. All statistical tests are two-tailed.

RESULTS

Age, Education, and Utilization of Mammography

The average age of the 1,134 women who responded to this questionnaire was 75 years, with a range of 55 to 101 years; 52% were over age 75. Of these women, 11.6% were classified as never-users, 38.5% as sporadic-users, and 49.9% as annual-users of mammography.

The educational status of this cohort was high. Of 1,001 women for whom data on educational level were available, two-thirds had completed at least some college. There was no significant difference in mammography status by education level ($\chi^2 = 2.53$, N.S.; 64.5% of never-users, 60.6% of sporadic-users, and 65.7% of annual-users had completed some college or more). Economic status, determined indirectly by occupation of the head of household and census tract data, showed nearly all women to be middle or upper-middle class.

Mammography Use, Reproductive Health History, and Perceived Health Status

Comparisons of age and the other covariates by mammography status are shown in Table 1. Women who never had a mammogram were older than those who were sporadic-users, who were, in turn, older than those who were annual-users of mammography. Women in the oldest age category were significantly more likely never to have obtained a mammogram ($p < .001$).

There were significant differences between the three groups of women on estrogen status, history of reproductive cancer, and self-rating of health. Women who were sporadic-users and annual-users of mammography were significantly more likely to be current estrogen users and less likely to have never used estrogen than women who had never had a mammogram.

Eleven percent of the respondents reported a positive history of reproductive cancer. A significantly greater proportion of annual-users of mammography reported a positive history of reproductive cancer, and there was a significant trend of increasing likelihood of having had a reproductive cancer with increasing usage of mammography. Among the 124 women reporting a positive history of reproductive cancer, there were 56 women (4.9% of all respondents) who reported cancer of the breast. Of these women with breast cancer, 5.4% were never-users, 16.1% were sporadic-users, and 78.5% were annual-users of mammography ($\chi^2 = 19.37$; $p < .001$).

However, women who were annual-users of mammography were also more likely to rate their health as excellent or good and less likely to rate their health as fair or poor than women who were never-users of mammography. There were also significant trends whereby annual-users were more likely than sporadic-users, who were, in turn, more likely than never-users to rate their health as good. There were no differences between the three groups of women in ratings of health as compared to others of the same age.

Motivators and Barriers

Over 80% of the women reported one or more motivators; almost 76% reported no barriers for mammography. The mean

TABLE 2

Distributions of Motivators and Barriers to Mammography among Women Who Were Never-Users, Sporadic-Users, and Annual-Users of Mammography; Women Aged 55 and Older; Rancho Bernardo, CA, 1992

	Never-Users (N = 131)		Sporadic-Users (N = 437)		Annual-Users (N = 566)	
	N	%	N	%	N	%
# Motivators						
0	120	91.6	79	18.1	23	4.1
1	9	6.9	181	41.4	218	38.5
2	1	0.8	104	23.8	142	25.1
3	1	0.8	50	11.4	102	18.2
4	0	0	13	3.0	50	8.8
5	0	0	10	2.3	30	5.3
# Barriers						
0	58	44.3	293	67.0	510	90.1
1	47	35.9	86	19.7	27	4.8
2	18	13.7	35	8.0	15	2.7
3	8	6.1	17	3.9	9	1.6
4	0	0	4	0.9	4	0.7
5	0	0	2	0.5	1	0.2

number of motivators for mammography was 1.6, and the mean number of barriers was 0.4. The distribution of motivators and barriers to mammography among women by mammography status is shown in Table 2. Fifty-four percent of the 222 women who reported no motivators for mammography were never-users, whereas 59% of the 861 women who reported no barriers for mammography were annual-users. The largest proportion of women reporting a high number of motivators and a low number of barriers were the annual-users of mammography.

Table 3 shows the proportion of women reporting the most frequently cited motivators and barriers, by mammography status and by age. Among all respondents, the most frequently cited motivator was the recommendation of a health care provider (39.7% of 1,134 women cited this factor), and this motivator was cited three times more often than the next most frequently cited factor. One in every five annual-users and one in every four sporadic-users cited this particular motivator. Women in each of the age categories were approximately equally likely to cite this factor.

Other frequently cited motivators included media coverage (14.0%), belief in the utility of mammography/preventive health care (12.9%), and personal or family history of cancer (17.9%). These motivators were more frequently cited by women who had ever obtained a mammogram, but women in each age range were approximately equally likely to cite these factors.

Among all respondents, the most frequently cited barrier was the belief that mammography was painful (7.6%). Lack of perceived need was the next most frequently cited factor. Sporadic-users cited pain as a barrier twice as often as women in the two other categories. Never-users and those in the oldest age range were far more likely to state that they had no need for mammogram because they had no symptoms.

The barrier of cost was cited by only 3.8% of these relatively affluent women but ranked third overall. Younger women were more likely to state this factor as a barrier.

As shown in Table 4, for both unadjusted comparisons and comparisons adjusted for age, estrogen use, history of repro-

TABLE 3

Proportions of Women Reporting the Most Commonly Cited Motivators and Barriers by Mammography Status and by Age Range

	Mammography Status			Age Category			
	Never %	Sporadic %	Annual %	55–64 %	65–74 %	75–84 %	85+ %
Motivators							
MD or HMO recommended a mammogram	3.7	26.4	20.4	18.5	20.6	22.8	25.4
Media coverage: Heard about it	0.7	7.3	8.5	5.2	9.8	8.3	2.6
Has breast symptoms, fibrocystic breast, pain, or lump	1.5	4.7	9.6	2.9	6.3	5.7	4.8
Belief that mammography works	1.5	6.7	7.7	10.9	7.3	4.8	5.7
History of cancer in the family	0.7	4.1	8.1	7.1	7.5	5.7	2.2
Fear of cancer	0.0	5.6	5.4	6.7	5.6	4.5	3.1
Gets regular preventive care	0.7	6.0	5.1	3.3	5.6	5.8	4.8
Has personal history of cancer	0.0	1.6	5.0	1.4	2.4	5.4	3.9
Belief that mammography is a good sensible thing to do	0.0	3.2	3.3	5.0	2.6	2.8	1.8
Belief that respondent is at increased risk due to age (perceived susceptibility)	0.7	2.9	2.5	4.5	1.9	2.2	1.8
Barriers							
Mammography is painful	4.0	9.9	4.0	7.2	7.4	6.3	3.5
No need—No breast symptoms	15.0	4.6	0.3	3.2	2.0	4.3	7.7
Cost/No insurance	2.9	4.0	3.4	6.9	3.0	2.1	3.5
Fear of radiation	2.3	4.2	2.2	3.2	5.7	1.3	1.5
No family history of breast cancer	5.8	2.9	0.5	2.9	1.7	0.9	5.0
Inconvenient—Time consuming	1.2	2.6	2.1	4.7	1.5	1.7	1.0
Belief that mammography is an unreliable test	5.2	2.6	1.0	2.5	2.7	1.3	2.5
Forgot/Too lazy/Too much bother	4.6	1.8	0.5	2.5	1.8	1.2	2.0
Belief that one is too old to need mammography	5.2	1.6	0.3	0.0	1.0	1.3	5.0
MD did not recommend	4.6	1.3	0.0	0.7	0.0	1.7	2.5
Does breast self-examination (that is sufficient)	2.9	1.1	0.2	0.7	1.0	0.9	1.0

TABLE 4

Comparisons of Never-Users, Sporadic-Users, and Annual-Users of Mammography on Number of Motivators and Barriers to Mammography; Women Aged 55 and Older; Rancho Bernardo, CA, 1992

	Mammogram Status			
	Never-Users	Sporadic-Users	Annual-Users	F
Number of motivators				
Unadjusted	0.1	1.5	2.1	160.02***
Age-adjusted	0.2	1.5	2.0	141.23***
Age, estrogen,† and cancer†† adjusted	0.2	1.5	2.0	121.83***
Age, estrogen,† cancer,†† and health rating adjusted	0.2	1.5	2.0	120.13***
Number of barriers				
Unadjusted	0.8	0.5	0.2	44.99***
Age-adjusted	0.9	0.5	0.2	51.40***
Age, estrogen,† and cancer†† adjusted	0.9	0.5	0.2	48.55***
Age, estrogen,† cancer,†† and health rating adjusted	0.9	0.6	0.2	47.73***

† Analyses adjusted for current versus not current use of estrogen.
†† Analyses adjusted for history of reproductive cancer (breast, uterine, cervical, or ovarian cancer).
*** $p < 0.001$.

ductive cancer, and health rating, there were significant differences by mammography status for the numbers of motivators and barriers reported. Annual-users reported the most motivators and the fewest barriers, whereas those who never had a mammogram reported the fewest motivators and most barriers. Analyses excluding women with a history of reproductive cancer yielded similar results (data not shown).

DISCUSSION

These relatively well-educated, affluent women were voluntary participants in a long-term observational study of factors associated with healthy aging. They received an annual questionnaire that could have raised their consciousness about health maintenance. They lived in a medically well-served community, and had access to a widely diverse population of physicians in both general and specialty practice. Ninety-seven percent (97%) had seen a physician in the year prior to this study.

Despite these advantages, the women identified several barriers that led to an underutilization of mammography. The important barriers cited in studies of other populations (such as lack of transportation, few available facilities, no time, and prohibitive cost) should have been of lesser importance as behavioral determinants among this cohort. Nevertheless, only 50% reported an annual mammogram, lower than the target number of 80% that is cited in current public health status recommendations.

The total number of motivators and barriers to mammography reported by these women was generally low and may have been limited by the open-ended nature of the data. However, women who selected mammography (both sporadic-users and annual-users) reported more motivators and fewer barriers than women who did not select mammography. Sixty-one percent of women mailed the questionnaire responded. If the non-respondents were also more likely to be never-users of mammography, whether due to age, ill health, or other reasons, it would introduce a conservative bias to our estimates of the frequency of mammography and factors affecting obtaining a mammogram.

The most commonly cited motivator in this study (21.5% of all motivators cited) was recommendation by a health care provider. This is consistent with literature reports that women over age 50 who receive mammograms are more likely to have received a physician's recommendation (12,17,18). Nevertheless, physician recommendation was also the motivator most commonly cited by women who had never had a mammogram. Mah and Bryant found that the proportion of women aged 60 years and older who intended to undergo mammography almost doubled if it was recommended by a doctor (19). Fox and colleagues found that women 65 years of age or older whose physicians brought up the topic of mammography were more than seven times more likely to have had a mammogram in the previous year and 12.5 times more likely to have ever had a mammogram (20). Friedman and colleagues found that physician recommendation was a strong predictor of current screening behaviors (obtaining mammography) and future intentions to obtain both clinical breast examination and mammogram (21). In addition, Fajardo and colleagues (22) found that over 81% of women who had previously had a mammogram also had a regular physician.

Burg and colleagues (13) report, on the other hand, that physicians reported recommending screening to a larger proportion of their younger patients (89% of patients younger than 75 years, but only 71% of patients age 75 years and older). These physicians were also less likely to make a referral for an *annual* mammogram for women in the older age group. More than half of the women in this Rancho Bernardo cohort were 75 years and older, the age group at highest risk for breast cancer, and these women were significantly more likely to be never-users or sporadic-users ($\chi^2 = 21.11$, $p < 0.001$).

Younger women with decades of life ahead of them will benefit most from mammography in terms of years of life saved (23). This may be why public health objectives do not target women in the oldest age groups as a priority group for mammography intervention. Reports of primary data or documented evidence for the efficacy of mammography at age 70 years and older are rare (24), making it difficult to arrive at specific recommendations for continued screening beyond that age. However, there is also no evidence that the benefit of mammography decreases with age (25,26), and there is strong evidence that the incidence of breast cancer remains high (27). As a result, most guidelines are silent on this issue, setting no upper age limit. The National Cancer Institute offers the exception, recommending that these women should be screened unless otherwise indicated by their health status (28). Medicare benefits now include biennial mammography, without an upper age limit (29).

In common with other studies of older women, belief that mammography was a reliable diagnostic procedure or having a personal or family history of cancer (20,30) were important motivators. Women in the present study who reported the experience of reproductive cancer were significantly more likely to be classified as annual-users. They also reported more motivators and fewer barriers, even when the analyses were adjusted for this factor.

However, awareness that breast cancer risk increases with age was indicated by only 2.5% of study participants. Other studies (15,18,31) also document that as age increased, the number of women who believed that they would have breast cancer

some day significantly decreased. These observations are particularly disturbing in view of the ranking that breast cancer holds as a cause of death among women of all ages. These findings suggest that breast health awareness could be targeted to older women and improve their preventive health behavior.

Commonly cited barriers in this and other studies were the belief (or possibly the experience) that mammography is painful and a concern about radiation exposure (30,32). The belief that mammography is necessary only if breast symptoms are present was the second most commonly cited barrier in the present study. These results are compatible with those of Rimer and colleagues (15) who found that older women who disagreed with this position were 2.9 times more likely to obtain a mammogram than those who did not disagree. Health education strategies that educate women about the long latency of breast cancer, the radiation risks of mammography, and issues of proper breast positioning are needed to clarify these common misconceptions.

Several motivators were reported far less frequently than in other studies of older women. Perceived susceptibility (the belief that one is at increased personal risk of cancer) is reported to be a motivating factor in two studies by King and colleagues (30,31), but it was only the tenth most commonly cited motivator in the present study. The relatively lower ranking of perceived susceptibility in the present study may have been influenced by health status knowledge and perception. In addition, other studies have used checklists of answers (prompts) while this study did not provide answer options.

The majority of women in all three categories of mammography use rated their overall health as "very good" or "excellent." They also rated their own health as better than others of their own age. These two self-rated measures of health could not be used as predictors of mammography status in this study because there was very little variance among the three categories of mammography users.

The cost of mammography was not the most important barrier among the relatively affluent women in this study, the majority of whom were also eligible to receive mammography as a Medicare benefit. Cost ranked third overall, but was cited by only 4% of the women. This factor was preceded or followed closely by factors relating to the personal experience of mammography, such as fear of pain, fear of radiation, and lack of perceived need for the procedure, highlighting the importance of these factors when the issue of cost is not a primary concern.

Women who reported having a yearly mammogram were more likely to be current users of estrogen. The relationship between estrogen therapy and breast cancer has not been firmly established (33,34). It is likely that women receiving estrogen therapy visited their physician more often and, in turn, were more often referred for mammography. In an earlier study of this cohort, estrogen-treated women were more likely to have obtained a mammogram and to have performed other preventive health behaviors than women not taking estrogens (35).

These data advance the understanding that interventions to reduce cost as a barrier to mammography must be accompanied by other strategies to raise personal awareness about the increased risk of breast cancer and the efficacy of mammography among older women and to promote accurate perceptions of the procedure itself. Education efforts need to address the barriers to mammography, pointing out to women that while mammography may be uncomfortable because of the need to manipulate the breast in order to obtain maximum tissue exposure, it need not be painful. A campaign to give women better understanding of the truly low dose of radiation delivered by today's mammograms might also be tested as a means of reducing barriers.

In conclusion, this study demonstrated that when cost is essentially controlled, barriers continue to exist that differentiate those who do and those who do not have regular mammograms. The present study reinforces the critical role of physician referral and the need for additional education, particularly as women age. Patient education concerning the usefulness of mammography as a screening tool for women of every age is an important health promotion agenda.

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