Initial and Repeat Mammography Screening in a Low Income Multi-ethnic Population in Los Angeles

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Abstract

Low income, older, minority women are at high risk for underutilization of screening mammography. One strategy for increasing utilization is to conduct interventions targeting local and state health departments where a majority of these women seek health care. A prerequisite for conducting effective screening programs is to obtain current and accurate information on baseline screening rates to understand the nature and scope of the problem and to plan appropriate intervention strategies. The sample consisted of 3240 women who were 50+ years of age from 2 hospitals and 2 comprehensive health centers operated by the Los Angeles County Department of Health Services. Reviews of medical records indicated that only 21% of the sample had received a mammogram in the 12 months prior to the clinic visit on which they were sampled and 23% of the sample received a mammogram in the following 9 months. Approximately 5% of the total sample received a repeat mammogram in the 21-month period over which they were tracked. Prospective independent predictors of screening were age, number of visits to primary care clinics, number of visits to specialty care clinics, and history of breast abnormalities. The results underscore the importance of implementing programs to increase mammography screening within public facilities serving low income multi-ethnic women. An important finding is that a large number of older women are seen in specialty clinics, which represents an untapped resource for increasing screening in this population. Innovative interventions targeting such specialty clinics could substantially contribute to increasing screening rates. A comprehensive approach targeting system, physician, and patient barriers is recommended.

Introduction

Breast cancer is a leading cause of cancer death in the United States, with over 183,000 reported cases and 46,300 deaths expected in 1994 (1). At the present time, aggressive screening using state-of-the-art mammography followed by appropriate treatment offers the only realistic means of controlling this disease (2). As a result of nationwide efforts to make screening mammography widely available and affordable, there has been a gradual increase in utilization of this procedure over the past decade (3–6). Utilization, however, is not uniform across all segments of the population. Compared to the general population, utilization is much lower in older women, women with low levels of income and education, and minority women (3, 6–8). For example, in a sample of Latino women between the ages of 55 and 92 years residing in a housing project in Los Angeles, only 28% reported ever having had a mammogram (9). Rates of regular usage, in accordance with consensus approved guidelines, are even lower. Whitman et al. (10) reported, for example, that only 14% of women sampled in inner city health centers in Chicago had obtained a mammogram in the past 12 months. This is in sharp contrast to the findings of a county-wide survey conducted in Los Angeles, with a predominantly white upper SES sample, that found a 71% rate of lifetime usage and a 42% rate for usage in the past 12 months (4). Numerous other studies have documented the underutilization of mammography by disadvantaged groups (11, 12).

For the vast majority of poor and uninsured women, their main access to health care is through facilities operated by state and local health departments. Therefore, one strategy for increasing mammography utilization in underserved populations is to conduct interventions targeting health departments. Very few reports are available in the literature describing screening rates or evaluating interventions based in those settings. Lane et al. (13) conducted telephone surveys with women aged 50–75 years, who had visited 5 health centers in Suffolk County, New York and found that 50% of the respondents had ever had a mammogram, and only 29% of the respondents had had one within the past 12 months. A survey of low income women, 65+ years of age, attending a public hospital in New York City disclosed that although 74% had obtained at least 1 mammogram, they reported only an average of 1.5 mammograms in the past 10 years (14). In the Chicago study mentioned above (10) the mammography rate was 14% in the past 12 months. The Rhode Island Department of Health reported that, as the result of an intervention, they increased...
mammography utilization in accordance with the guidelines from 35 to 46% (15).

It is evident that there is considerable variation in the screening rates reported by these different studies. This is likely due to differences in the age, income, education, and ethnicity of the populations targeted, as well as differences in physician referral rates which have been shown to be a strong predictor of mammography utilization. Therefore, before launching large-scale interventions in a particular health department it is important to have current and accurate information concerning base-line screening rates. This information is crucial for understanding the scope and nature of the problem and for designing appropriate intervention strategies to increase mammography utilization.

This paper reports the results of such a needs assessment conducted in the Los Angeles County Department of Health Services. This health department serves a low income, multi-ethnic, primarily indigent population through a network of public facilities consisting of 6 hospitals, 5 comprehensive health centers and 42 PHCs. Hospitals offer essentially all inpatient and outpatient services including surgery and emergency care. Comprehensive health centers are large centers providing a wide variety of ambulatory services including limited surgery and emergency care. PHCs are smaller neighborhood clinics providing a more restricted range of outpatient services, heavily concentrated on prenatal care and disease prevention. We randomly sampled 3240 women, over the age of 50 years, from 2 hospitals and 2 comprehensive health centers and reviewed their medical charts for evidence of mammography screening. We report rates of initial and repeat mammography in this population and examine predictors of screening.

Subjects and Methods

Sampling. The sample consisted of 3240 women, 50 years of age or older, randomly selected from 2 hospitals and 2 comprehensive health centers operated by the Department of Health Services in Los Angeles County. PHCs were not included in the study due to the small number of women 50+ years seen at these centers. At each site we selected high-volume clinics in which at least 10% of the patient pool was over the age of 50 years. At both hospitals the selected clinics included: general internal medicine, cardiology, gynecology, dermatology, diabetes, ophthalmology, and podiatry. At both health centers the selected clinics included: urgent care, adult medicine, and dentistry.

At each site, the aim was to accrue approximately 750–1000 subjects who were ≥50 years. Since the health department does not maintain a current list of patients, the only way to randomly sample subjects was through clinic logs. Daily clinic logs are maintained by clinic staff and provide information on the total number of patients seen as well as names, ages, and identification numbers of individual patients. Log are not consolidated over time and are usually discarded after a period of 6 months.

Based on the patient load per clinic day in the selected clinics, we estimated the number of days per year required to achieve the desired sample size. This varied between 12 and 20 days depending on the particular clinic and site. A minimum of 12 days was chosen to assure that we sampled at least 1 day in every month of the year. At each site the total sample size was apportioned among the selected clinics based on the proportion of patients seen at that clinic. The determination of the proportions to be sampled from each type of clinic was made independently for hospitals and health centers. However, within the hospital and the health center level, both sites had identical proportions of the sample allocated to each clinic. At both hospitals the sample was drawn in the following proportions: ophthalmology, 30%; internal medicine and cardiology, 15% each; and dermatology, diabetes, gynecology, and podiatry, 10% each. At the health centers 50% of the sample was drawn from adult medicine; 25% was drawn from walk in/urgent care; and 25% was drawn from dental clinics.

Once the required number of sample days was determined, we constructed a systematic random sample (with a random start) of days for the period February 1, 1990 to January 31, 1991. All female patients, 50 years of age and older, who had visited the clinic on that day for any reason were selected. Where selecting all eligible patients would result in a much larger sample size than desired, we selected a random sample of eligible patients. If a patient was selected on more than one sample date (due to multiple visits) she was counted only once and assigned to the first sample date on which she was selected.

Data Collection. Data were collected from three sources: patient medical charts; records maintained by the mammography clinics; and a system-wide computerized patient data base. The main outcome variable was receipt of a mammogram during a 9-month period following the clinic visit on which the patient was sampled. However, mammography utilization was also assessed for the 12-month period prior to the clinic visit. The primary source for information on mammography utilization was the patient medical chart. The medical chart also provided information on demographics, frequency of use of the medical system, and medical history related to cancer screening and treatment. Because evidence of having received a mammogram (radiology report) is often not available in the chart of the patient, mammography clinic records were used to supplement the information obtained from charts. However, mammography clinic records are also not always complete and therefore a woman was counted as having obtained a mammogram if this information was available either in the medical chart or in the mammography clinic records. In 93% of the cases, an exact match was obtained between the data obtained from the medical records and that obtained from mammography clinic logs. In general, mammography clinic logs tended to indicate a higher screening rate (21%) compared to medical records (18). A probable reason for this is failure in filing mammography reports in patient charts. Demographic information in the chart is also not always complete, and therefore the computerized patient data base was used to supplement chart reviews for these variables. Using the above sampling and data collection procedures, we were able to obtain complete data on 3240 women who were 50+ years of age. The distribution of the sample was: hospital 1, n = 1019; hospital 2, n = 671; health center 1, n = 793; and health center 2, n = 757.

Results

Table 1 shows the demographic characteristics of the sample presented separately for hospitals and health centers. On average, women at the hospitals were older than the women at the health centers. About 30% of the hospital sample was 65+ years of age, compared to only 20% of the health center sample. The health centers had significantly more hispanic women (67.7%) compared to the hospitals.
Cysts, and dysplasia. Information on education and income was not available. Insurance status was available for a small proportion of subjects, but was not always accurate or reliable, and was therefore not included in the analyses. However, this is a traditionally indigent population which seeks care at public facilities usually due to lack of insurance and/or lack of ability to absorb the out-of-pocket costs for health care.

Table 2 provides information on the history of breast and cervical abnormalities, biopsies, and cancer noted in the medical chart. Only abnormalities and biopsies that occurred in the 5 years prior to the sampled clinic visit were counted. History of breast and cervical cancer, however, were not time limited. Also, abnormalities, biopsies, and cancer were categorized as mutually exclusive, and a woman with an entry in more than one category was placed in the most serious one in the following order: cancer, biopsy, and abnormality. Approximately 14% of the sample had at least one breast abnormality. Most of the abnormalities were classified as benign and included such symptoms as asymmetry, fibroadenoma, nodules, and cysts. About 2% of the sample had at least one cervical abnormality. In addition, 1.6% of the sample had at least 1 breast biopsy, and 4.3% of the sample had at least 1 cervical biopsy in the past 5 years. Also, 1.9% of the sample had a diagnosis of breast cancer, and 0.50% of the sample had a diagnosis of cervical cancer noted in their records. For all subsequent analyses, women with a diagnosis of breast or cervical cancer were eliminated from the sample.

In the 12 months prior to their sampled clinic visit, women at the hospital had a mean of 7.2 (SE = 0.17; median = 5.0) additional visits to the same hospital, of which an average of 1.4 visits (19%) were to primary care clinics such as internal medicine and gynecology. Women at the health centers had a mean of 4.3 additional visits (SE = 0.12; median = 3.0) of which an average of 2.4 visits (56%) were to primary care clinics. Hospitals and health centers were significantly different (P < 0.0001) with respect to both the total number of additional visits and the number and proportion of primary care visits.

Table 3 Mammography screening

<table>
<thead>
<tr>
<th></th>
<th>12 Months prior to sampling date</th>
<th>No prior mammogram</th>
<th>Prior mammogram</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Hospitals</td>
<td>659/3156 (20.9)</td>
<td>549/2497 (22.0)</td>
<td>168/659 (25.5)</td>
</tr>
<tr>
<td>Health center</td>
<td>294/1624 (18.1)</td>
<td>250/1330 (18.8)</td>
<td>91/294 (31.0)</td>
</tr>
<tr>
<td>Total</td>
<td>953/4780 (20.0)</td>
<td>808/3887 (20.7)</td>
<td>269/3358 (25.5)</td>
</tr>
<tr>
<td></td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

a Including the sampling date.
Excluding the sampling date.
Significantly different (P < 0.05) between hospitals and health centers.
This was done separately for the following two groups of women: (a) the no prior mammogram group consisting of those who had not had a mammogram in the 12 months prior to their clinic visit; and (b) the prior mammogram group consisting of those who had a mammogram in the 12 months prior to their sampled clinic visit. Approximately 22% of the no prior mammogram group received a mammogram in the 9 months following their sampled clinic visit. Again, health center women in this group were significantly more likely (25.6%) to have had a mammogram compared to hospital women (18.8%; P < 0.0001). In the prior mammogram group, the mammogram obtained in the 9 months following the sample clinic visit represents a repeat mammogram. In this group, 31% of hospital women and 21.1% of the health center women had received a repeat mammogram. This difference was statistically significant (P < 0.004). Therefore, women at hospitals were more likely to receive a repeat mammogram, whereas women at health centers were more likely to receive initial mammograms. A repeat mammogram, if it is obtained every 12 months, is in compliance with screening recommendations for this age group and represents a desirable outcome. However, if a woman is screened too frequently (e.g., every 6 months) then this outcome is not desirable from the point of view of both the health of the woman as well as from a cost-containment perspective. Therefore, we calculated the average time to repeat mammogram for our sample and found that this average was 11.0 months (SE = 0.50) for health center women and 11.4 months (SE = 0.37) for hospital women. Fifty-two % received their repeat mammogram in less than 12 months from their prior mammogram (this was not significantly different between hospital and health center), which may indicate “overscreening.” It is also possible, however, that some of these women received physician recommendations to return for repeat films at an interval of less than 12 months due to suspicious findings on the prior mammogram. Since we had no way of determining whether the shorter screening interval was appropriate or inappropriate, and since the numbers in both groups were small, we made a decision not to perform separate analyses on the basis of time to repeat screening. It is also interesting to note that 66.5% of the hospital sample and 56.7% of the health center sample had not received a mammogram in the entire 21-month period (12 months prior + 9 months following the sampling date) over which we tracked the sample.

Table 4 outlines the characteristics related to having obtained a mammogram in the 9 months following the sampled clinic visit. This is done separately for the no prior mammogram and the prior mammogram groups. In the no prior mammogram group, all the variables listed in Table 4, except ethnicity and number of visits to specialty clinics, were significantly related to screening. Health center women, women who had a breast abnormality, and women who had at least one breast or cervical biopsy were more likely to be screened. Also, age appeared to have a quadratic (curvilinear) relationship with screening such that women between the ages of 55 and 64 years were more likely to be screened than those below 55 years of age or women above 65 years of age. In addition, women who were screened had significantly (P < 0.001) more clinic visits (mean = 5.6; SE = 0.26) than those who did not get screened (mean = 5.01; SE = 0.13).

In the prior mammogram group, only four variables from Table 4 were related to screening: (a) women at hospitals were more likely to be screened than women at health centers. This relationship and its variance from the results for the no prior mammogram group have already been described in the context of Table 3; (b) women who had at least one biopsy (breast or cervical) were more likely to be screened. Also, women who were screened had significantly more primary care and specialty clinic visits in the 12 months prior to the sampling date than women who were not screened. The relationship between age and screening in this group appears to be quadratic (curvilinear), although it did not achieve statistical significance, probably due to the relatively smaller sample size.

Table 5 reports the results of two logistic regression analyses (one each for the prior mammogram group and the no prior mammogram group) predicting receipt of a mammogram in the 9 months following the sampled clinic visit. All variables in Table 4 were entered into the equation. Both the linear and quadratic effects of age were entered. As noted earlier, the particular clinincs from which women were sampled were selected because they saw large proportions of women over the age of 50 years. As a result of
this criterion, the clinics are fairly heterogeneous and include both primary care clinics such as internal medicine and gynecology, as well as specialty clinics such as dentistry and podiatry. It is reasonable to expect that women sampled in primary care clinics have a greater opportunity to receive a referral for screening mammography than women sampled in specialty clinics. Therefore, the sampling clinic should be included as a covariate in any multivariate analyses performed. However, the sampling clinic and other visits to primary care clinics were highly correlated. Women sampled in primary care clinics had significantly (P < 0.0001) more other visits to primary care clinics in the 12 months prior to the sampling date (mean = 1.26). The same was true of other clinic visits in the 9 months following the sampling date. Therefore, two variables representing the total number of visits to primary care clinics and to specialty clinics in the 12 months prior to the sampling date were entered into the logistic regression. Due to the multicollinearity mentioned above, the sampling clinic was not entered into the equation. The decision to perform separate analyses for the prior and no prior mammogram groups was made after a logistic regression using the combined groups resulted in significant interactions between receipt of a mammogram in the 12 months prior to the sampling date (prior mammogram) and several other variables in the equation.

In the no prior mammogram group, three variables emerged as significant. Women with breast abnormalities were more likely to be screened, as were women with a greater number of visits to primary care clinics. Interestingly, both the linear and quadratic effects of age were significant. The linear effect indicates that on average, older women were more likely to be screened than younger women. However, the significant quadratic effect indicates that women below 55 years of age and above 64 years of age were less likely to be screened compared to women between the ages of 55 and 64 years.

In the prior mammogram group, only two variables significantly predicted repeat screening. Women with more primary care and specialty clinic visits were screened at higher rates than other women. Apparently prior behavior (having had a mammogram in the 12 months prior to the sampled clinic visit) accounts for most of the variance in future behavior (having a mammogram in the 9 months following the sampled clinic visit).

Discussion
The results of this study indicate that mammography rates in our sample of older, medically uninsured women attending county health facilities are much lower than general population norms might suggest. Only 21% of our sample had received a mammogram in the 12 months prior to the clinic visit on which they were sampled, despite the fact that on average these women had made 4–7 visits to the same hospital or health center during that period. These clinic visits may represent missed opportunities that could have been used to promote screening. Screening rates were not much higher (23%) in the 9 months following the clinic visit on which the woman was sampled. Approximately 25% of women with a prior mammogram (5% of the total sample) received a repeat mammogram in the 21-month period over which we tracked them. The average period between an initial and a repeat mammogram was 11 months, which is very close to the recommended yearly interval for women 50+ years of age. As indicated earlier, our estimates of screening rates in county clinics are likely to be inflated due to the fact that some proportion of mammograms will have been obtained for diagnostic purposes. Also, caution must be exercised in applying the findings of this study to the general population of low income, minority women. We sampled women who were already seeking care in county facilities and therefore had the knowledge and skills to negotiate the system. Screening rates are likely to be considerably lower among women who, by choice or circumstance, do not have regular access to a health care system.

In general, screening rates were higher at health centers compared to hospitals. This can probably be attributed to differences in the organizational missions and service offerings of the two types of institutions. Compared to hospitals, health centers place a greater emphasis on primary care, including prevention, early detection, and health promotion. Hospitals typically concentrate on tertiary care and are referral sites for problems that cannot be handled within the limited range of service options available to health centers. A related explanation is that hospital patients tend to be sicker than health center patients and are thus more likely to have health conditions that contraindicate a mammogram. Also, the proportion of women sampled from primary care clinics was greater in the health center sample compared to the hospital sample. Thus, as noted earlier, health center women probably had more opportunities to receive a referral for a screening mammogram.

Although initial mammograms were performed with greater frequency at health centers, hospitals had higher rates of repeat mammograms. One possible explanation is that this finding may be the result of differences in charting behavior between hospitals and health centers. Because hospitals see more complex health problems requiring intensive follow-up and multiple visits by patients to a variety of clinics, a greater emphasis may be placed on accurate charting. Physicians may also be more likely to examine the chart more carefully for past and concomitant comorbid conditions. This could be expected to apply to mammography-charting behavior as well. The note of a previous mammogram in a chart of a patient could then act as a trigger for future referral by the physician or nurse. Another possibility is that the higher rate of repeat mammograms at hospitals is a function of how breast problems are handled at hospitals as compared to health centers. At hospitals, women with any breast symptom are referred to the breast clinic which

Table 5 Logistic regression predicting receipt of mammogram

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>OR</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast abnormalities</td>
<td>0.7795</td>
<td>2.180</td>
<td>1.563-3.041</td>
</tr>
<tr>
<td>Age</td>
<td>0.3128</td>
<td>1.367</td>
<td>1.125-1.660</td>
</tr>
<tr>
<td>Age²</td>
<td>-0.0027</td>
<td>0.997</td>
<td>0.996-0.999</td>
</tr>
<tr>
<td>Number of visits to primary care clinics</td>
<td>0.1451</td>
<td>1.156</td>
<td>1.110-1.204</td>
</tr>
<tr>
<td>Number of visits to specialty clinics</td>
<td>0.0575</td>
<td>1.059</td>
<td>1.022-1.098</td>
</tr>
</tbody>
</table>

*Only significant variables are included in the table.*
assumes all responsibility for follow up. This establishes continuity of care in a clinic that deals exclusively with breast problems. After resolution of the initial problem, the probability of receiving a mammography referral from such a specialized clinic is much higher compared to a clinic that provides a wider range of services such as gynecology or internal medicine. Health centers do not operate breast clinics and therefore follow-up care after an abnormality is handled by the primary care provider.

We were able to prospectively examine a limited set of predictors of mammography that were available in existing medical records. Among the women who had not been screened in the prior 12 months, several variables were univariately and multivariately related to receipt of a mammogram in the subsequent 9 months. Univariately, health center women and women who had a history of breast abnormalities or breast or cervical biopsies were more likely to be screened. A possible explanation for the higher screening rate at health centers was already provided above. The fact that women with breast or cervical abnormalities on biopsies were more likely to be screened is quite consistent with other reports in the literature that women with prior medical histories related to the breast are more sensitized to the need for regular screening and are therefore more likely to obtain mammograms (16). Additionally, physicians may also exercise greater vigilance with women who they perceive to be at higher risk due to prior histories, and they may consider these women to be especially good candidates for screening. Contradicting findings of other studies (11, 17), ethnicity was not related to screening. However, ethnicity is often a proxy for SES. All women in our study were of relatively low SES, resulting in very small variability. This could account for the lack of predictive power of this variable. Multivariately, women with a greater number of primary care clinic visits were more likely to be screened. This is understandable if we consider that each visit represents an opportunity to receive a referral for a mammogram. Age was also related to screening such that both the linear and quadratic terms were significant in the multivariate analysis. On average, older women were more likely to be screened. However, the significant quadratic term indicates that there was a curvilinear relationship superimposed on the linear trend. Screening increased steadily between the ages of 50 and 64, after which there was a sharp decline. These findings are consistent with many reports in the literature that show that women over the age of 65 years are the least likely to be screened (4, 18, 19).

We also examined the predictors of repeat-screening mammography. In the univariate analysis, hospital women, women with prior biopsies, and women with a greater number of visits to both primary care and specialty clinics were more likely to be screened. In the multivariate analysis only the number of primary and specialty clinic visits were significant. The significant bivariate correlations between hospital or health center status and biopsies and number of clinic visits probably explains why the level of care variable was not significant multivariately.

In summary, the results of this study underscore the importance of implementing programs to increase mammography screening within public facilities serving low-income multiethnic women. About two-thirds of the women in our sample had not received a mammogram during the entire 21-month period over which they were tracked. Although we found significant differences in screening (based on characteristics such as age and number of clinic visits) these differences were relatively small, and screening rates were uniformly low. Therefore, all women attending county clinics are at risk for underutilization of this potentially lifesaving screening procedure. In this county health department, older women are seen in a variety of primary care and specialty clinics. Women who visit primary care clinics are more likely to receive mammography screening, although screening rates even for these women are very low. However, a large number of older women are seen in specialty clinics, which represent an untapped resource for increasing screening in this low-income, indigent population. Innovative interventions targeting such specialty clinics could substantially contribute to increasing screening rates. At this time, a comprehensive approach, targeting system barriers, physician barriers, and patient barriers, is likely to have the greatest payoff in closing the utilization gap between county clients and women who have access through private health insurance.

Acknowledgments

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