Mammography Screening and Breast Cancer Tumor Size in Female Members of a Managed Care Organization

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Abstract
A study of temporal trends in mammography screening and changes in stage of disease at diagnosis was conducted among Hispanic and non-Hispanic white female members of the Lovelace Health Plan, Flexcare Plan, and Lovelace Senior Plan/Senior Options (LHP), a managed care organization. Two-year screening rates for female members ages 50–74 years were calculated for 1989–1996. From 1989–1996, mammography screening rates for non-Hispanic white female members increased from 65.5 to 71.6%, although this was not a statistically significant increase. Screening rates for Hispanic female members also increased from 50.6 to 62.7%, but they were significantly lower than for non-Hispanic white women. All breast cancers occurring among LHP female members ages 40–74 years were also identified for this same time period. A logistic regression model adjusting for age, year of diagnosis, ethnicity, and duration of enrollment prior to diagnosis found that statistically significant predictors of more advanced stage of disease at diagnosis included young age, diagnosis after 1991 for non-Hispanic white women, and diagnosis prior to 1992 for Hispanic women. Longer duration of enrollment prior to diagnosis was predictive of lower stage of disease, but the odds ratio was not statistically significant. For the time period 1992–1996, Hispanic women with breast cancer were more than twice as likely to have advanced stage breast cancer compared with non-Hispanic white women (odds ratio, 2.12).

Introduction
Studies of Southwest Hispanic women have found that these women have more advanced breast cancer at the time of diagnosis compared with non-Hispanic white women (1,2). In addition, after adjusting for treatment and extent of disease, they experience poorer survival (2). Some studies of ethnic differences in stage of disease at diagnosis and survival have suggested low socioeconomic status as a cause (3–5), whereas other studies have questioned these conclusions (6,7). The prevalence rates of screening mammography are lower in Hispanic women compared with non-Hispanic white women (8,9). Using information from the 1987–1988 National Health Interview Survey, several studies found that Hispanic women were less likely to have had a clinical breast examination in the past year, to have ever had a mammogram, or to have had a mammogram in the past 3 years (8,10). In general, Mexican-American Hispanics are less likely to use preventive services (8).

The shift in focus from patient-based to population-based health care systems presently occurring in the U.S. has resulted in a greater emphasis on delivery of preventive services, such as mammography screening. As more women have become enrolled in MCOs, concerns have been expressed about the need to monitor access to screening mammography (12,13). In response, HEDIS requires participating MCOs to report the use of screening mammography among female MCO members ages 52–65 years who have been continuously enrolled over a 2-year period (14). Many MCOs that have completed the HEDIS version 3.0 calculations report mammography screening rates of ~70% for age-eligible women (15).

Although rates of screening mammography have been estimated for general populations of Hispanic women, very little information is available for Hispanic female MCO members. Few MCOs collect information on the race or ethnicity of their members, and the HEDIS measures are not reported by racial or ethnic group (14). The purposes of this study were: (a) to ascertain temporal trends in mammography screening completeness in Hispanic and non-Hispanic white female members of a large New Mexico MCO; and (b) to relate these trends to temporal changes in stage of breast cancer diagnosis at diagnosis.

Materials and Methods
The study population included members of LHP, a large New Mexico MCO. Members received health care from either a closed panel of ~300 providers or from a network of independent providers. The closed panel operates clinics in Albuquerque, Santa Fe, Los Alamos, Las Cruces, Farmington, and...
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Espanola, New Mexico. The network physicians are located throughout New Mexico. During the period of this study, 1988–1996, ~150,000 members were enrolled in LHP, with the vast majority of care provided by the closed panel providers. The female membership generally reflected the state distribution of Hispanic and non-Hispanic white women, although there was an overrepresentation of elderly non-Hispanic white among LHP members compared with the state population.

Mammography screening rates were calculated using data from the LPD, a research database operated independently of the health care system by the Southwest Center for Managed Care Research. The database includes enrollment information, as well as information on inpatient, outpatient, laboratory, pharmacy, and other services provided to LHP members. Computerized records of both bilateral diagnostic and screening mammograms for female LHP members ages 40–74 years were identified based on CPT4 procedure codes. The inclusion of both diagnostic and screening mammograms was necessary because coding that distinguishes the two was not reliably applied during this time period. The yearly enrollment days for each member was also ascertained. Yearly age-specific and age-adjusted screening mammography rates were calculated for members enrolled for at least 360 days during the calendar year. Some breast cancer screening guidelines suggest that women >50 years have a mammogram every 2 years (16). Thus, age-specific and age-adjusted screening rates for 2-year periods were also calculated for women enrolled at least 360 days for each of 2 consecutive years, e.g., 1989–1990, 1991–1992, 1993–1994, and 1995–1996). Age adjustment was based on the distribution of the population ages 40–74 years in the 1990 United States population.

LHP female members ages 40–74 years diagnosed with breast cancer were identified from the Lovelace Tumor Registry. This tumor registry is a participant in the New Mexico SEER Registry and uses SEER coding and data collection protocols. All tumors diagnosed between 1988 and 1996 were identified. Diagnosis dates were checked against dates of enrollment to ensure that the woman was a LHP member at the time of the diagnosis. The duration of membership between the most recent enrollment and the tumor diagnosis was ascertained. Tumor size, stage at diagnosis, race/ethnicity, and age at diagnosis were extracted from the tumor registry file.

The analysis of tumor size and stage at diagnosis was restricted to cases 40–74 years of age with a known tumor size and stage. Sizes of tumors of stages other than in situ were grouped into six categories: 1–9, 10–14, 20–29, 30–49, and >49 mm. Summary stage of disease at diagnosis and tumor size were compared for non-Hispanic white and Hispanic women diagnosed in 1988–1991 versus 1992–1996. Summary stage of disease and tumor size were also compared for members diagnosed ≤2 years of enrollment and members diagnosed after >2 years of enrollment.

A problem with most MCO enrollment datasets, including the LHP data, is that ethnicity of members is not recorded at the time of enrollment. To ascertain the ethnicity of MCO members, the GUESS computer program was used (17). This program, developed in the mid-1970s, was designed to assign ethnic origins to surnames of individuals living in the United States. Although surnames are grouped into a variety of ethnic classes, the only reliable classifications for New Mexico are Hispanic and non-Hispanic white. Based on the 1980 United States Census-reported ethnicities, the GUESS program was ~90% accurate for designation of Hispanic ethnicity in New Mexico (18). To estimate the accuracy of the GUESS program for this study population, the assigned GUESS ethnicity (non-Hispanic white versus Hispanic) was compared with ethnicity determined by the LHP tumor registry. The tumor registry ethnicity information is collected from a variety of sources and is consistent with the New Mexico SEER Registry race/ethnicity ascertainment protocol. Of 508 women assigned non-Hispanic white ethnicity by the tumor registry, 95.3% were correctly assigned non-Hispanic white ethnicity by the GUESS program. Of 160 women assigned Hispanic ethnicity by the tumor registry, 83.8% were correctly assigned Hispanic ethnicity by the GUESS program. The ethnicity assigned by the GUESS program was used to estimate mammography screening rates for non-Hispanic white and Hispanic members. The race/ethnicity data from the tumor registry were used in the analysis of breast cancers among Hispanic and non-Hispanic white members.

Changes in stage of disease at diagnosis and tumor size were tested using a Mantel-Haenszel χ² test for trend. Logistic regression analysis was used to assess the association between membership duration (≤2 years versus >2 years), age (40–49, 50–59, 60–69 versus 70–75 years), years of diagnosis (1989–1991 versus 1992–1996), and ethnicity (Hispanic versus non-Hispanic white) and the outcome variable of stage of disease at diagnosis (regional or distant versus local or in situ). Results are expressed in terms of odds ratios and 95% confidence intervals. Statistical analyses were completed using SPSS-PC version 5.0 software or PC SAS (Windows version 6.0).

**Results**

Age-adjusted 2-year screening rates of non-Hispanic white female members ages 50–74 years increased from 65.5% in 1989–1990 to 71.6% in 1995–1996. Beginning in 1991–1992, 2-year screening rates remained constant through 1995–1996; (P > 0.10; Table 1). Age-adjusted 2-year screening rates of Hispanic female members also increased during this same time period from 50.6% in 1989–1990 to 61.7% in 1995–1996. In contrast to non-Hispanic white female members, rates of Hispanic female members increased significantly from 56.5% in 1991–1992 to 62.7% in 1995–1996. Age-specific differences in 2-year screening rates between non-Hispanic whites and Hispanics were most apparent for women >55, with significantly fewer Hispanic women in this age group receiving a mammogram (P < 0.01). In 1995–1996, only 53.6% of Hispanic women ages 70–74 years had been screened in the past 2 years, compared with 69.8% of non-Hispanic white women.

The distributions of the stages of disease at diagnosis for breast cancers among LHP members were compared for the periods 1988–1991 and 1992–1996 (Table 2). For non-Hispanic white women, significantly more tumors were diagnosed as in situ during the more recent time period (P < 0.001). However, for Hispanic women, the distributions of the stage of disease at diagnosis did not statistically significantly change between the two time periods (P = 0.06). Although the sample

<table>
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<tr>
<th>Time period</th>
<th>Non-Hispanic white</th>
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<tr>
<td>1989–1990</td>
<td>65.5</td>
<td>50.6</td>
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<tr>
<td>1991–1992</td>
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<td>56.5</td>
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<td>1993–1994</td>
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<td>1995–1996</td>
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*Age-adjusted to the 1990 United States population, ages 50–74.*
of Hispanic women was small, the percentage of tumors diagnosed at the regional and distant stage in 1992–1996 (32%) was higher than in 1988–1991 (15%).

The distributions of the stages of disease at diagnosis of breast cancers for non-Hispanic white LHP women were compared with those for Hispanic LHP women (Table 2). During both time periods, significant differences in the distribution of the stages of disease were observed between the two ethnic groups. In 1988–1991, a larger percentage of Hispanic women were diagnosed at less advanced stages of disease at diagnosis compared with non-Hispanic white women (P = 0.03), but in 1992–1996, proportionately fewer Hispanic women were diagnosed with less advanced disease compared with non-Hispanic white women (P < 0.001).

Statewide data on the stage of disease at diagnosis of breast cancer were available for comparison with LHP data. Statewide, for non-Hispanic white women, no statistically significant changes were observed in stage of disease for the period 1988–1991 versus 1992–1996 (P = 0.13). For Hispanic women, a linear trend toward less advanced disease at diagnosis was apparent (P = 0.047). For LHP non-Hispanic white members, stage of disease was comparable with New Mexico non-Hispanic white women during 1988–1991 (P = 0.25). However, for 1992–1996, the stage of disease at diagnosis for LHP members was significantly less advanced (P < 0.001). For Hispanic women, LHP members had less advanced disease at diagnosis than did New Mexico Hispanic women during 1988–1991 (P < 0.05) but had comparable stages for the period 1992–1996 (P < 0.61).

Patterns of change in tumor size (excluding in situ tumors) were also examined for LHP women with breast cancers diagnosed in the two time periods, 1988–1991 and 1992–1996 (Table 3). Temporal patterns were similar to those observed for stage at diagnosis. Proportionately more non-Hispanic white women were diagnosed in 1992–1996 with smaller tumors compared with 1988–1991. No statistically significant improvement in tumor size was noted for Hispanic women between the two time periods.

To simultaneously adjust for age, ethnicity, and time period of diagnosis, a logistic regression analysis was performed. Because women enrolled for an extended period of time prior to diagnosis may have benefited more from LHP screening programs, length of enrollment (≤2 years versus >2 years) was also included as a variable in the logistic regression analysis. Younger age at diagnosis was predictive of more advanced stage of disease (Table 4). Although membership in each age group <75 years was predictive of an elevated risk of more advanced disease, only women ages 40–49 years and 50–59 years had statistically significant elevations in risk compared with women ages 70–74 years (P = 0.0001 and P = 0.001). Women with a shorter duration of enrollment had an odds ratio greater than one (odds ratio, 1.46) compared with women with a longer duration of enrollment, but the elevated risk was not statistically significant (P = 0.13). The main effects of both year of diagnosis and ethnicity were statistically significant, and the interactive effects were highly significant (P = 0.001). For Hispanic women, diagnosis in 1988–1991 was protective (odds ratio, 0.33), whereas for non-Hispanic white women, risk
of advanced stage of breast cancer was elevated for this time frame (odds ratio, 2.45). For the time period 1988–1991, Hispanic women were at lower risk of advanced stage of breast cancer compared to non-Hispanic white (odds ratio, 0.29). However, for the time period 1992–1996, Hispanic women with breast cancer were more than twice as likely to have advanced stage of breast cancer compared with non-Hispanic white women (odds ratio, 2.12).

Discussion
There have been few studies of breast cancer stage of disease in female MCO members, although prior studies indicate that the type of health care system may be a predictor of stage of disease at diagnosis. In a study conducted at a Texas clinic, stage of breast cancer was compared between 69 female MCO enrollees and 133 FFS patients diagnosed between 1983 and 1987 (19). Although no overall difference was observed in clinical stage of breast cancer at diagnosis between the two groups of patients, a significantly higher proportion of MCO cases ages 45–55 years were diagnosed at stage I compared with FFS cases. Another study used information from all SEER registries and years were diagnosed at stage I versus cases. This study found that breast cancers were diagnosed at an earlier stage among MCO-enrolled women. However, Medicare coverage of mammography screening for FFS-enrolled Medicare women was not begun until 1991, which was after the study period. Thus, women enrolled in MCOs may have had more frequent and regular screening histories than FFS women, which could account for the earlier stage at diagnosis.

Although HEDIS reporting requirements have made available more information on the delivery of preventive health services to MCO members, this information is not available by race or ethnic status. Very little information is available on racial and ethnic minorities who are members of MCOs. Our study suggests that Hispanic female members of a MCO are not obtaining screening mammograms at rates comparable to non-Hispanic white female members and are at a 2-fold risk of advanced breast cancer. However, the reduction in stage of disease at diagnosis for non-Hispanic white MCO members is encouraging. The similarity of disease stage prior to 1992 for MCO members and New Mexico non-Hispanic white women suggests that population characteristics of MCO members are unlikely to account for their favorable stage of disease at diagnosis for the period 1992–1996. Why the stage of disease in Hispanic women has not declined with increased mammography screening is unclear and merits further investigation.

Our estimates of 2-year mammography screening rates were based on information in the LPD and may be underestimates of the true screening rates for these groups of women. Other estimates reported for HEDIS by the Lovelace MCO are 4–6% higher than our estimates. This discrepancy may be due to mammography screenings provided by outside providers recorded in the medical chart and which are counted by the health plan for HEDIS reporting purposes. Women with dual health care coverage may seek mammograms outside of the Lovelace system; these mammograms would not be included in the LPD. Thus, estimates of screening based solely on LPD data would be low. If such dual coverage is more common for non-Hispanic white than Hispanic women, the actual differential in mammography screening between the two groups could be larger than that documented in this study. Presumably, an area-wide mammography registry is being developed that could provide the necessary information on mammograms completed by providers outside the LHP.

This study did not attempt to gather critical information on why Hispanic women who are members of LHP are not complying with the recommended frequency of screening mammograms. Other studies have shown that Hispanic women frequently report that they did not need a mammogram or that their physicians did not recommend mammography to them (9, 21, 23). Fulton et al. (23) have suggested that Hispanic women in Rhode Island were less likely to have screening mammography because they were less likely to have received relevant primary care. This suggests that culturally appropriate patient and physician education should be developed to address the importance of early detection of breast cancer using mammography in MCO populations. Cost and lack of insurance coverage also have been cited as potential barriers to mammography for Hispanic women (22–24). Women with no insurance coverage are less likely to have had a mammogram in the past year (22).

| Table 4 | Logistic regression analysis of factors affecting primary tumor stage at diagnosis: regional or distant versus local or in situ |
| Factor | Comparison group | Odds ratio | 95% CI | P |
| Enrollment duration | ≤ 2 years | 1.46 | (0.89, 2.40) | 0.131 |
| | >2 years | 1.00 |
| Age at dx | 40–49 | 4.18 | (2.04, 8.56) | <0.001 |
| | 50–59 | 3.35 | (1.61, 6.94) | 0.001 |
| | 60–69 | 1.67 | (0.78, 3.56) | 0.188 |
| | 70–75 | 1.00 |
| Year of dx | 1988–1991 vs. 1992–1996 | Non-Hispanic white 1988–1991 | 0.33 | (0.11, 0.97) | 0.044 |
| Ethnicity | Hispanic 1988–1991 | 1.00 |
| | Non-Hispanic white 1992–1996 | 2.45 | (1.47, 4.07) |
| Gender | Female 1988–1991 Hispanic | 0.29 | (0.10, 0.81) |
| | 1992–1996 Hispanic | 1.00 |
| | 1992–1996 Non-Hispanic white | 2.12 | (1.20, 3.74) |
| Interaction: year of dx vs. ethnicity | 1.00 | 0.001 |

a CI, confidence interval.

b dx, diagnosis.
However, in our study, all women were members of the LHP, and mammography is one of the benefits covered by the plan.

The failure of MCOs to gather racial and ethnic information on enrollees precludes this type of study in most other MCOs. Although the GUESS program could be useful for Southwest MCOs to assign Hispanic ethnicity, gathering racial/ethnic information on other racial/ethnic groups is also critical. Unfortunately, as more intermarriage occurs between Hispanic and other racial groups, the validity of GUESS assignments will decline. National HEDIS reporting requirements for information on the delivery of preventive services to racial/ethnic minorities should be developed and would encourage MCOs to begin collecting the needed race/ethnicity information. Initiation of race/ethnicity data collection, however, even if begun soon, would not result in useful information on delivery of health care to these population groups for several years. It is, therefore, essential that this effort begin soon.

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References

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