
Mammography Rescreening Among Older California Women

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This is the first study to focus on Medicare mammography rescreening using a relatively large population of older women over a long followup period. To assess correlates of regular mammography, we followed all women age 65 or over enrolled continuously in Medicare fee-for-service (FFS) (n=515,746) over a 7-year period. Data were drawn from the CMS claims data for the period 1992-1998. Irregular mammography intervals were more commonly found among vulnerable Medicare subpopulations—women who were older, minority, living in low income and lower education areas, and who were enrolled in both Medicare and Medicaid. Health care providers must communicate clearly to older women the breast cancer rescreening message: Not just once, but for a lifetime.

INTRODUCTION

Breast cancer incidence and mortality increase as women age (Kerlikowske et al., 1996). Women age 65 or over are more likely to be diagnosed with and to die of breast cancer than younger women. Regular mammography screening has been shown to decrease breast cancer mortality by 20 to 30 percent among women ages 50-74 (Harris and Vogel, 1997; Kerlikowske et al., 1995) and has a modest effect on life expectancy for women age 70-79 (Kerlikowske et al., 1999). However,

Medicare women who undergo screening mammography have a decreased risk of developing metastatic breast cancer and a higher rate of early-stage diagnosis (Smith-Bindman et al., 2000).

Although one-time mammography use has increased over the past decade, repeated mammography has not followed this trend (Song and Fletcher, 1998; Phillips et al., 1998; Otero-Sabogal et al., 1999). Little is known about sustaining change over time and promoting continued adherence to periodic mammography screening in Medicare women (Rakowski, Rimer, and Bryant, 1993; Hiatt, 1997).

To our knowledge, this is the first study to focus on mammography rescreening using a relatively large population of older women over a long followup period, while alleviating some of the problems found in earlier rescreening studies. Previous studies of repeat mammography screening have several limitations. Many are based on self-report (Phillips et al., 1998), which is subject to potential reporting biases (Hiatt et al., 1995). Many are cross-sectional retrospective studies based on memory retrieval which may result in recall bias (Warnecke et al., 1997). Many are based on younger age cohorts, small sample sizes, and short followup intervals (e.g., 6 to 18 months) (Burns et al., 1995).

This article explores demographic correlates associated with repeat mammography and identifies opportunities for regular mammography improvement among California Medicare FFS women age 65 or over. We answer two questions: (1) Among older Medicare women (age 65 or over) who obtain mammograms, who do not get

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them regularly? This study estimates the prevalence of women who obtain mammograms at irregular intervals and compares their characteristics with those of women who are regularly screened. (2) Who are the older Medicare women who have never obtained a mammogram? We identify characteristics of women who have not obtained a mammogram and compare them with women who have received one or more mammograms during the study period. Identifying characteristics of older Medicare women who do not obtain regular mammography screening or who have never had a mammogram allows public health programs to better target older women for mammography screening.

We hypothesized that women who are older, non-white, dually eligible beneficiaries (enrolled in both Medicare and Medicaid), and who live in lower income, rural, minority, and lower education areas are less likely to obtain mammography screening regularly, or at all. Our hypothesis is based on previous one-time mammography studies that found that vulnerable, minority, and underserved populations were less likely to comply with initial mammography guidelines (Wells and Horm, 1998; Song and Fletcher, 1998; Otero-Sabogal et al., 1999; Katz, Zemencuk, and Hofer, 2000) and reported more barriers to screening and fewer motivating factors to participate in screening (Roetzheim et al., 1993). In addition, mammography rescreening in vulnerable populations is a national priority in cancer detection and control programs (Hiatt, 1997).

METHODS

Data Sources

This retrospective population study used CMS enrollment data base and Medicare Part B billing data from 1992-1998 to deter-

minate regular mammography screening and some demographic characteristics (age, race, Medicaid coverage). U.S. census data for 1990 were used to examine the effects of community level median income and education, ethnicity and geographical region on regular mammography screening. Screening mammography was determined by the presence of mammography (CPT-4 codes: 76090, 76091, and 76092), which includes both screening and diagnostic mammograms. Medicare claims do not reliably distinguish between these two procedures (Health Care Financing Administration, 1997). Screening and diagnostic mammograms in the CMS mammography data are included because the codes used to bill Medicare for mammograms are not used uniformly by all providers.

The National Cancer Institute recommends that older women get a mammogram every 1 to 2 years. As of January 1, 1991, Medicare began covering one screening mammography every 2 years. (Since January 1, 1998, Medicare pays for annual screening mammograms.) Therefore, we limited our evaluation of mammography use to biennial screening. The use of biennial screening as an outcome variable may help to alleviate the difficulty in distinguishing diagnostic from screening mammograms.

Study Population

Our study population included all California female residents age 65 or over on January 1, 1992 and alive through December 31, 1998 with Medicare Part A and Part B continuous Medicare coverage throughout the study period. We excluded women enrolled in a health maintenance organization at any time during the 7 years because CMS does not receive bills for services provided under managed care con-

tracts (44.1 percent of the California female Medicare population). CMS Medicare Part B billing data and outpatient claims include only Medicare FFS beneficiaries. Also excluded were ZIP Codes that did not match California Cancer Registry regions codes or were unable to be successfully merged with the 1990 census data (1 percent). A total of 515,746 California Medicare FFS women comprises our study population.

Outcome Measure

Screening status was classified as:

- Non-screeners ($n=167,982$)—women who did not have a mammogram during the period of study, 1992-1998.
- Regular screeners ($n=103,145$)—women who had periodic mammograms without skipping 2 years in a row.
- Irregular screeners ($n=244,619$)—women who had at least one mammogram but were not regular screeners.

Variables

Age was categorized into five groupings (65-69, 70-74, 75-79, 80-84, and over 85) for ease of interpretation (Parker, Sabogal, and Gebretsadik, 1999; Parker et al., 1998).

Race was coded as white, black, and other, which included unknown. Coding for race and ethnic groups other than white and black is considered unreliable in Medicare billing data (Lauderdale and Goldberg, 1996).

Medicaid status was defined as at least 1 year of enrollment in Medicaid during 1992–1998. Extremely high correlations (0.92 to 0.97) for Medicaid status between years indicate that Medicaid enrollment is virtually continuous; once enrolled in Medicaid, women seldom disenroll (data not presented). These women are dually eligible beneficiaries through the State's buy-in program; in California, women with

income levels less than 100 percent of the Federal poverty level are eligible for Medicaid. Annual mammography screening and copayments are covered under Medicaid (Clark and Hulbert, 1998); for women enrolled in both Medicare and Medicaid, Medicare is the primary payer and Medicaid covers the remainder (e.g., copayments).

Geographical region was classified into the 10 regions used by the California Cancer Registry: Bay Area, Central, Inland Empire, Los Angeles, North, Orange, Sacramento, Santa Clara, San Diego, and Tri-County. (Morris and Wright, 1996.)

To provide a broader look at socioeconomic, ethnic, and geographical factors, we matched measures derived from the 1990 U.S. census to each woman's residential ZIP Code. Several community-level variables were created (Burns et al., 1996a; Parker et al., 1998):

Income has been associated with repeat mammography (Makuc, Breen, and Freid, 1998). Median household income by ZIP Code from the 1990 U.S. census was used as a proxy for socioeconomic status, since individual income is not available from Medicare billing data (Burns et al., 1996a, Burns et al., 1996b). Each woman was assigned to an income quintile according to the median income of her residential ZIP Code (Parker, Sabogal, and Gebretsadik, 1999; Parker et al., 1998; Burns et al., 1996a, 1996b).

Education was defined as percent of college degrees among persons over age 25 from the 1990 U.S. census. This data was used as a proxy for education since individual education is not available from Medicare billing data (Burns et al., 1996a, 1996b). Each woman was assigned to an education quintile according to the percent college degree of her residential ZIP Code (Parker, Sabogal, and Gebretsadik, 1999; Parker et al., 1998; Kerlikowske et al., 1995).

Rural ZIP Code was defined as greater than 50 percent rural according to the 1990 U.S. census (Parker et al., 1998).

Percent Mexican and Asian persons were categorized as greater than 50 percent population of ZIP Code area as a proxy for ethnicity in these geographical regions (Parker et al., 1998). Although we hoped to learn from these community-level ethnicity indices, we do not presume that those variables adequately represent either Asian or Mexican groups in California (Parker et al., 1998).

We explored bivariate associations with mammography screening status by age, race, ethnicity, Medicaid status, geographical region, and community-level variables. Multiple logistic regression was used to compute adjusted odds ratios and 95 percent confidence intervals to evaluate the independent effects of demographic factors associated with screening status (Hosmer and Lemeshow, 1989).

RESULTS

Bivariate Analyses

Table 1 shows the percent distribution of mammography screening status by sociodemographic characteristics. Thirty-three percent of Medicare FFS California women did not have a mammogram during the 7-year period of the study. Only 20 percent were regular screeners. Forty-seven percent of women in the sample had been screened at irregular intervals.

Age was associated with regular mammography use, with older women having fewer regular mammograms than younger women. While 27 percent in the age group 65-69 were regular screeners, only 3 percent age 85 or over adhered to repeat mammography. Forty-nine percent in the age group 80-84 and 70 percent age 85 or over had not had any mammography

screening during the period of the study. The percent of women who had not had a mammogram increased with age from 23 percent in the age group 65-79 to 70 percent in the age group 85 or over.

Race was associated with regular breast cancer screening. About 42 percent of the women classified as either black or other had not received mammogram screening during the study period. White women were more likely to have regular mammograms than were black women or women from other ethnic groups. Forty-seven percent across all race and ethnic groups reported irregular screening practices.

Insurance status was associated with regular mammography. Only 8 percent of dually eligible beneficiary women were considered regular screeners with 24 percent with Medicare only. Forty-seven percent of dually eligible beneficiary women had not had a mammogram during the entire study period.

To identify geographical opportunities for regular mammography improvement, percent distribution of non-screeners by geographical regions in California are described in Table 1. Regular breast cancer screening varies by geographic region. Higher percents of regular screeners were found in Orange County, the North region, and Sacramento. While lower regular screeners were found in the Inland Empire, Los Angeles, San Diego, and the Central region. Overall, women in southern California were more likely to be non-screeners than were women in northern California. Also, Los Angeles, Inland Empire, San Francisco Bay area, Santa Clara, and the Central region presented the highest percent of women without any mammogram during the study period.

Overall, women living in areas with higher average income were screened more often than were women living in poorer areas. Income was associated with regular mammography, with higher levels of regular

Table 1
Percent Distribution of Mammography Rescreening for California Fee-for-Service Medicare Women, by Demographic Characteristic, 1992-1998

Demographic Characteristic	Total (N = 515,746)	Mammography Use		
		Non-Screener (n=167,982)	Irregular Screener (n = 244,619)	Regular Screener (n = 103,145)
Overall Individual Level Factors	—	32.57	Percent Distribution 47.43	20.00
Age				
65-69 Years	172,843	23.45	49.90	26.65
70-74 Years	148,937	26.91	50.06	23.03
75-79 Years	104,460	35.54	48.36	16.10
80-84 Years	58,647	48.79	42.45	8.76
85 Years or Over	30,859	70.09	27.20	2.71
Race				
White	446,049	31.02	47.51	21.47
Black	22,898	42.64	46.68	10.68
Other	46,799	42.43	47.05	10.52
Medicaid				
Medicare-Only	393,921	28.00	48.24	23.76
Medicare and Medicaid	121,825	47.35	44.82	7.83
Region				
Orange	34,300	29.72	44.66	25.63
North	47,167	30.47	47.66	21.87
Sacramento	48,955	29.12	49.58	21.30
Tri-County	26,594	29.51	50.20	20.29
Bay Area	65,402	32.93	46.69	20.38
Central	53,506	31.17	50.17	18.66
San Diego	39,590	32.58	47.42	20.00
Santa Clara	37,471	31.78	49.24	18.97
Los Angeles	131,337	36.58	44.98	18.45
Inland Empire	31,424	32.63	49.39	17.98
Community Level Factors				
Income Quintile				
Lowest	104,055	36.97	47.04	15.98
Low	100,812	33.98	47.78	18.25
Middle	102,401	32.51	47.81	19.68
High	102,884	31.27	47.34	21.39
Highest	105,594	28.22	47.20	24.59
College Education (Quintiles)				
1st (Low)	112,723	37.59	47.23	15.18
2nd	242,460	32.78	47.60	19.62
3rd	134,636	29.35	47.24	23.42
4th	24,777	25.50	47.76	26.74
5th (High)	1,150	26.26	46.96	26.78
Persons in ZIP Code				
Mexican				
Less than or Equal to 50 Percent	483,718	31.99	47.51	20.51
More than 50 Percent	32,028	41.41	46.24	12.34
Asian				
Less than or Equal to 50 Percent	512,772	32.49	47.46	20.05
More than 50 Percent	2,974	45.93	42.27	11.80
Rural				
Less than or Equal to 50 Percent	475,688	32.73	47.34	19.93
More than 50 Percent	40,058	30.65	48.51	20.83

SOURCES: Centers for Medicare & Medicaid Services Enrollment Database and Medicare Part B billing data 1992-1998 and U.S. Census Bureau 1990 data.

screeners among the highest and the high income quintile compared with the lowest and the low-income quintiles. For all levels of income, 47 percent of women were clas-

sified as irregular screeners. About 37 percent of women in the lowest-income quintile did not have a mammogram during the entire study period.

Education was associated with regular screening. Women living in the highest education areas were more likely to be classified as regular screeners than women living in the lowest education areas. About 38 percent of women living in the lowest education areas were classified as non-screeners compared with 26 percent of women living in the highest education areas. Independent of education, 47 percent of women were classified as irregular screeners.

Overall, areas with a higher percentage of Mexican or Asian residents had lower regular mammography proportions than areas with lower percentages of these groups. Non-screeners were more prevalent in the predominantly Mexican and Asian areas than in areas where the Mexican and Asian population comprised less than 50 percent of the total population. A higher proportion of irregular screeners resided in areas in which the population was less than 50 percent Asian than in areas with a high percentage of Asian; there was virtually no difference in irregular screening status based on the Mexican population.

The proportion of women who obtained regular or irregular mammography did not differ by rural status. Likewise, there was little difference in the proportion of women who were never screened when evaluating rural status.

Multivariate Analyses

Table 2 presents the adjusted odds ratios and 95 percent confidence intervals for two separate logistic regression models: non-screeners versus any screener; irregular screeners versus regular screeners. For both models, women with the following characteristics were used as the referent groups: white, age 65-69, residing in Orange County, enrollment in Medicare

only, living in ZIP Codes in the highest income quintile, and with the lesser percentage of the population being Mexican, Asian, or rural. Because socioeconomic variables provide similar information for the most part, results for income are presented. Multiple logistic regression models illustrate relationships similar to those identified in bivariate analysis; older and enrollment in Medicaid showed the strongest effects on being either a non-screener or an irregular screener. The data showed a clear trend of decreasing mammography utilization with increasing age.

Non-Screeners versus Screeners—The first model compares non-screeners to women who had at least one mammogram during the entire study period (women who were regular or irregular screeners). Women who were older, non-white living in low-income areas, and enrolled in Medicaid were significantly less likely to obtain any screening mammography compared with Medicare-only women who were white, age 65-69, and with women living in higher income areas. Women age 85 or over were least likely to have a mammogram compared with women age 65-69. Women residing in Los Angeles, San Diego, San Francisco Bay area, Santa Clara, and Inland Empire regions were less likely to have obtained a mammogram during the study period compared with women living in the Orange region. Areas with a higher percentage of Mexican or Asian population and areas with a higher proportion of rural residents were slightly more likely to be classified as non-screeners than areas with lower percentages of these groups.

Irregular Screener versus Regular Screeners—The second model compares irregular screeners with regular screeners. The likelihood of being an irregular screener increased with age. Women age 85 or over were most likely to be irregular

Table 2

California Fee-for-Service Medicare Women Odds Ratios and 95 Percent Confidence Intervals for Non-Screeners to Screeners and for Irregular Screeners Compared to Regular Screeners, 1992-1998

Demographic Characteristic	Logistic Regression Models	
	None versus Any Screener	Irregular versus Regular Screener
Individual Level Factors		
	Odds Ratios (95 Percent Confidence Intervals)	
Age	Referent	Referent
65-69 Years	0.82 (0.81 - 0.83)	0.85 (0.83 - 0.86)
70-74 Years	0.55 (0.54 - 0.56)	0.61 (0.60 - 0.62)
75-79 Years	0.32 (0.32 - 0.33)	0.38 (0.37 - 0.39)
80-84 Years	0.14 (0.13 - 0.14)	0.19 (0.18 - 0.20)
85 Years or Over		
Race	Referent	Referent
White	0.88 (0.86 - 0.91)	0.75 (0.71 - 0.78)
Black	0.74 (0.73 - 0.76)	0.65 (0.63 - 0.67)
Other		
Insurance	Referent	Referent
Medicare-Only	0.52 (0.51 - 0.53)	0.42 (0.41 - 0.43)
Medicaid		
Region		
Santa Clara	1.00 (0.97 - 1.04)	0.73 (0.70 - 0.76)
Central	1.25 (1.21 - 1.30)	0.81 (0.78 - 0.85)
Sacramento	1.24 (1.20 - 1.28)	0.87 (0.83 - 0.90)
Tri-County	1.08 (1.04 - 1.12)	0.73 (0.70 - 0.76)
Inland Empire	1.04 (1.00 - 1.08)	0.72 (0.69 - 0.75)
North	1.16 (1.12 - 1.20)	0.91 (0.88 - 0.95)
San Diego	1.01 (0.97 - 1.04)	0.83 (0.80 - 0.86)
Bay Area	1.03 (1.00 - 1.06)	0.88 (0.85 - 0.91)
Los Angeles	0.88 (0.86 - 0.91)	0.83 (0.81 - 0.86)
Orange	Referent	Referent
Community Level Factors Income Quintile		
Lowest	0.79 (0.77 - 0.81)	0.87 (0.85 - 0.90)
Low	0.82 (0.81 - 0.84)	0.89 (0.87 - 0.91)
Middle	0.88 (0.87 - 0.90)	0.91 (0.89 - 0.93)
High	0.91 (0.89 - 0.93)	0.93 (0.91 - 0.95)
Highest	Referent	Referent
Persons in ZIP Code		
Mexican	Referent	Referent
Less than or Equal to 50 Percent	0.89 (0.87 - 0.91)	0.85 (0.82 - 0.89)
More than 50 Percent		
Asian	Referent	Referent
Less than or Equal to 50 Percent	0.86 (0.79 - 0.93)	0.93 (0.82 - 1.05)
More than 50 Percent		
Rural	Referent	Referent
Less than or Equal to 50 Percent	0.92 (0.90 - 0.95)	0.95 (0.92 - 0.98)
More than 50 Percent		

SOURCES: Centers for Medicare & Medicaid Services Enrollment Database and Medicare Part B billing data 1992-1998 and U.S. Census Bureau 1990 data.

screeners compared with women age 65-69. Black women and women classified as other were more likely to be irregular screeners than were white women. Women with Medicaid coverage were more likely to be irregular screeners than were women with Medicare-only coverage. Women who resided in the Inland Empire, Santa Clara, Tri-County, Central Valley, Los Angeles, and San Diego regions were more likely to

be irregular screeners than women who resided in Orange County. Probability of screening at irregular intervals also increased with decreasing median income level. Areas with a higher percentage of population Mexican or Asian or areas with higher proportion of rural residents had slightly higher irregular mammography rates than areas with lower percentages of these groups.

DISCUSSION

Although Medicare covers screening mammograms for early detection of breast cancer, most elderly women do not obtain regular mammograms in California. Repeat mammography screening rates are extremely low, particularly among older, minority, dually eligible beneficiary women, and women living in rural, lower income and education areas. We found that only one out of five California Medicare women were regular screeners. Thirty-three percent of seniors never had a mammogram in the 7 years of the study. A great majority of Medicare FFS women in California do not adhere to regular breast cancer screening recommendations as revealed by this study.

Do Medicare women return for subsequent screening mammograms? Forty-seven percent of Medicare women do not return for a mammogram at a regular interval. Irregular mammography intervals were found more frequently among vulnerable Medicare subpopulations: older, minority, low income, less educated, and dually eligible beneficiary women.

Dually eligible beneficiary women had lower rates of mammography utilization compared with women who had Medicare only. Therefore, being enrolled in Medicare and Medicaid does not necessarily translate into higher mammography utilization. Despite mammography reimbursement, dually eligible beneficiaries have additional screening barriers. Compared with other Medicare beneficiaries, dually eligible beneficiary women are more likely to be minority, have greater health and financial concerns, and consume a disproportionately high share of Medicare and Medicaid expenditures (Merrell, Colby, and Hogan, 1997). They are more likely to be poor, unmarried, older, live alone, institutionalized, and have

fewer years of formal education than Medicare-only beneficiaries (Murray and Shatto, 1998). Since the dually eligible beneficiaries are composed of multiple segments (Clark and Hulbert, 1998), mammography screening may not be a priority for some subgroups of this population (e.g. the sickest and most frail). However, breast cancer detection education programs may be of great benefit for other dually eligible subpopulations (e.g., more healthy subgroups).

Need for Intervention

These results suggest the urgent need to design, implement, and evaluate wide-reaching educational programs to promote regular breast cancer detection among older women especially among underserved dually eligible beneficiaries. Given the high proportion of breast cancer diagnosed among women age 65 or over and the persistent misconceptions about breast cancer risk among older women (National Cancer Institute, 1999), efforts to increase breast cancer early detection in Medicare beneficiaries are extremely important.

Stages of mammography rescreening adoption should guide breast cancer interventions. Non-screener women (33 percent) have stronger barriers and may require different intervention strategies and motivational messages than irregular screener women (47 percent). Additional understanding of these distinct segments, using focus groups, individual interviews or surveys, will help to tailor regular mammography interventions. The development of a profile of beneficiaries to be targeted based on differential stages of mammography rescreening adoption and sociogeographical factors may be used for the Medicare peer review organization program in each State to guide interventions and develop health communication strategies.

Educational messages should combat misconceptions that older women do not need mammograms or that just one mammogram is needed (National Cancer Institute, 1999). Messages should emphasize that when a woman is screened on a regular basis, she is more likely to detect breast cancer at an early stage, increasing treatment options, and survival rates. Messages should inform senior women about the new expanded annual Medicare mammography benefit. Outreach strategies such as effective partnerships with elderly support networks are urgently needed to facilitate access and promote consumer navigation skills to obtain breast cancer detection services.

Older women who make a special effort to be screened need to have positive experiences and be encouraged to return for subsequent mammograms. Women who experience painful mammograms, perceive discrimination, encounter language barriers in the health care arena, have difficulties navigating the complex health care system, and do not receive physician recommendation, are less likely to return for subsequent mammography services (Burns et al., 1995; Elwood et al., 1998; Fine, Rimer, and Watts, 1993). In addition, some physicians may have more difficulty establishing rapport and discussing breast cancer screening with their older, lower income, and less-educated patients (MMWR, 1999; National Cancer Institute, 1999; DiMatteo, Hays, and Sherbourne, 1992). In contrast, a physicians' enthusiasm for mammography is one of the most effective ways to increase mammography in older women (Fox, Siu, and Stein, 1994). In fact, older women who perceive their physicians to be enthusiastic about mammography are four and one-half times more likely to have a mammogram than women whose physicians have little or no

enthusiasm when discussing the procedure (Fox, Siu, and Stein, 1994). Interventions to maintain women's adherence to mammography must focus on physician recommendation in addition to encouraging older women to request mammography screening (Hawley et al., 2000).

Working Together

A coordinated multifaceted national Medicare mammography rescreening educational campaign directed toward health care providers and Medicare beneficiaries, in conjunction with community and media support, is urgently needed. Mammography rescreening efforts must be implemented in four areas:

Health Care Provider Interventions—Interventions to improve provider screening behaviors based on reminder systems, audit with feedback, and physician education have shown to increase physicians' referral for mammography (Hiatt, 1997; Saywell et al., 1999).

Community and Family Networks Interventions—Lay health workers, family support, mobile vans, community partnerships, mailed messages, health fairs, and faith networks are potential channels to disseminate mammography rescreening messages among vulnerable populations (Paskett et al., 1999; Clover et al., 1996; Erwin et al., 1999).

Media Interventions—Mass media using credible role models seems to be effective in increasing mammography awareness among the general population and ethnic specific communities (National Cancer Institute, 1999; Jenkins et al., 1999).

Medicare Beneficiaries—Breast cancer screening educational interventions that use personalized reminders, tailored telephone counseling, health care access, and that reduce negative attitudes to breast

cancer screening, have the potential to promote maintenance screening for breast cancer (Saywell, 1999; Lipkus, Rimer, Halabi, et al., 2000; Hiatt, 1997).

A synchronized mammography rescreening effort across governmental agencies in partnership with voluntary breast cancer organizations needs to be coordinated at the national, State, and local levels. Federal coordinating committees on breast cancer should facilitate the development, implementation, and evaluation of mammography rescreening interventions across Federal agencies, presenting a unified national strategy to promote regular mammography. Successful steps in the right direction are the joint CMS National Medicare Mammography Campaign-National Cancer Institute (NCI) effort to develop effective beneficiary outreach mammography rescreening materials, and the U.S. Public Health Service's Office on Women's Health Federal Coordinating Committee on breast cancer. Also, the extension of the CMS and NCI partnership, using the extensive Cancer Information Service network across the different U.S. regions and the recently funded Special Population Networks for cancer control and research, will help to disseminate mammography rescreening messages.

CMS's National Medicare Mammography Campaign, in collaboration with regional offices and peer review organizations, must continue to expand national breast cancer partnerships with the Center for Disease Control National Breast and Cervical Early Detection Program. This landmark program brings critical breast and cervical cancer screening services to underserved women and can assist in better coordinating breast health services for Medicare women. In addition, effective partnerships with national advocacy and voluntary

breast cancer organizations including the American Cancer Society and ethnic breast cancer advocacy groups ought to be established and maintained. Medicaid and Medicare programs can develop a joint social marketing outreach strategy to target dually eligible Medicare beneficiaries who have one of the lowest mammography rescreening rates.

Study Limitations

Our study is limited by the use of Medicare mammography claims data that tend to underreport mammography use, and does not include system and personal barrier information. Free or unbilled mammograms may have been provided by hospitals, clinics, mobile vans, or mammography organizations. Women in our sample may have received free mammograms, have participated in unbilled community mammography programs, or have paid for them out of pocket. However, it is unlikely that many mammograms are unreported given the relatively high cost of mammography (Parker, Sabogal, and Gebretsadik, 1999; Parker et al., 1998).

Medicare mammography claims data tend to underreport rescreening utilization while self-reported survey data tend to over report. Data from the California 1997 Behavioral Risk Factor Surveillance Surveys suggest much higher rates for women (78.5 percent had a mammogram within the previous 2 years) for Medicare beneficiaries age 65 or over (Blackman et al., 1999). Surveys may over report due to recall bias and sample selection—missing the poorest and sickest survey respondents who are less likely to have had a mammogram. Most likely, the true mammography rescreening utilization rates lies somewhere between the self-report and the claims data.

We used some community-level race/ethnicity variables in an exploratory manner to augment our information of these populations. However, these indices do not represent adequately the Asian, Mexican, or rural populations in California (Parker, Sabogal, and Gebretsadik, 1999). The Medicare billing data represent only Medicare FFS women who may have lower mammography rates compared with women in Medicare managed care (Potosky et al., 1998). A followup study that compares Medicare managed care organizations and FFS in mammography rescreening is imperative (Riley et al., 1999). We did not include women in Medicare managed care because CMS does not receive bills for services provided under managed care contracts. We did not distinguish those at high risk of breast cancer who may receive several mammograms in a 2-year period from low-risk women who would receive only 1 every 2 years. These concerns do not affect the central message of this article—the necessity for a coordinated national, State, and local intervention effort to promote regular mammography rescreening among elderly women.

CONCLUSION

Vulnerable Medicare subpopulations—older, minority, dually eligible beneficiaries, and women living in rural, low income, less educated areas—are less likely to have been screened at all or to have been screened at regular intervals. The disproportionate lack of breast cancer rescreening among the poor, the medically underserved and among certain ethnic minorities requires the development of a coordinated, culturally appropriate national mammography rescreening intervention program directed to these Medicare sub-

populations. Women with previously normal mammography results are still at risk for breast cancer during subsequent years, and therefore, should be screened on a regular basis. As this study suggests, governmental and voluntary agencies, health care providers and public health programs, in conjunction with community and media support, must communicate clearly to older women about the importance of mammography rescreening.

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