

# Adequacy of Communicating Results From Screening Mammograms to African American and White Women

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Breast cancer is the second most common cause of cancer deaths in women in the United States.<sup>1</sup> As a strategy for reducing morbidity and mortality from this disease, current guidelines in the United States recommend routine mammography screening for women aged 40 years and older.<sup>2,3</sup> Despite the widespread availability of mammography screening and relatively high self-reported screening rates reflected in national survey data,<sup>4</sup> racial disparities in outcomes persist, including diagnosis at later stages in African American women when compared with White women.<sup>1</sup> Although several factors have been implicated in the relative disadvantage for African American women,<sup>5,6</sup> the persistent late-stage diagnosis of breast cancer in African American women prompted a closer look at possible race-related differences in the screening mammography process. We examined possible differences in an aspect of the screening process that is likely linked to its efficacy as a screening tool: communication of screening mammography results.<sup>7</sup> Specifically, on the basis of data from a prospective cohort study, we examined whether African American women were as likely as White women to receive the results of a recent mammogram and were as likely to self-report results that matched the mammography radiology report. We also sought to determine whether the results of a screening mammogram either normal or abnormal affected the communication of those results.

## METHODS

### Study Population

Methods for the prospective cohort study are described elsewhere.<sup>8,9</sup> Briefly, the target population included African American and White women aged 40–79 years old who sought a screening mammogram (i.e., the

*Objective.* We examined whether African American women were as likely as White women to receive the results of a recent mammogram and to self-report results that matched the mammography radiology report (i.e., were adequately communicated). We also sought to determine whether the adequacy of communication was the same for normal and abnormal results.

*Methods.* From a prospective cohort study of mammography screening, we compared self-reported mammogram results, which were collected by telephone interview, to results listed in the radiology record of 411 African American and 734 White women who underwent screening in 5 hospital-based facilities in Connecticut between October 1996 and January 1998. Using multivariate logistic regression, we identified independent predictors of inadequate communication of mammography results.

*Results.* It was significantly more common for African American women to experience inadequate communication of screening mammography results compared with White women, after adjustment for sociodemographic, access-to-care, biomedical, and psychosocial factors. Abnormal mammogram results resulted in inadequate communication for African American women but not White women ( $P < .001$ ).

*Conclusions.* African American women may not be receiving the full benefit of screening mammograms, because of inadequate communication of results, particularly when mammography results are abnormal. (*Am J Public Health.* 2007; 97:XXX–XXX. doi:10.2105/AJPH.2005.076349)

index screening) at 1 of 5 urban hospital-based screening facilities in Connecticut between October 1996 and January 1998. A previous statewide survey demonstrated that these facilities served a population comprised of at least 20% African Americans, well above the 9.1% of African Americans living in Connecticut.<sup>10</sup> All eligible African American women who presented for a screening mammogram at these facilities were selected for study. An equal number of White women were randomly selected (using a computerized random-digit generator) and were frequency matched to African American women by the date of mammogram and screening facility. Women were considered ineligible for the study if they had a history of breast malignancy, cyst aspiration, breast biopsy, or were receiving diagnostic mammograms. Approval for the study was obtained from the Yale University School of Medicine Human

Investigation Committee and the institutional review boards of each participating hospital. Participation rates differed significantly across racial groups: 69% African American, 77% White ( $P < .001$ ). Our analysis included the 1145 women (411 [36%] African American and 734 [64%] White,  $P < .001$ ) who returned signed consent forms allowing us access to their mammography records. More than 99% of baseline interviews were conducted within 6 months of the index examination (mean  $\pm$ SD = 1.5  $\pm$ 0.85 months).

### Outcome Measure

A dichotomous outcome variable, communication of the index screening result, was constructed for our analyses. On the basis of the interview question, “as of today, have you received the final results from your mammogram?” responses were coded as “notified” ( $n = 1002$ , 87.5%) or “not notified” ( $n = 143$ ,

12.5%). Women who were notified of the result and for whom the self-reported result agreed with the mammography record ( $n=979$ ) comprised the group for whom communication of the result of the index screening was considered adequate. Because participants who reported that they never received their results might represent a group for whom communication of results is particularly challenging, the inadequate communication group ( $n=166$ ) comprised women who either “did not receive results” ( $n=143$ ) or women who were notified of their results but whose self-reported result disagreed with the mammography record ( $n=23$ ). These 2 groups did not differ significantly with respect to race, age, socioeconomic status (SES), history of benign cysts, number of previous mammograms, or usual care provider.

To determine agreement versus nonagreement between self-reported results and mammography records, we categorized the results of screening mammograms on the basis of criteria established by the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS): incomplete (0), negative (1), benign (2), probably benign (3), suspicious (4), or highly suggestive of malignancy (5).<sup>11</sup> Women in this study obtained their index mammograms before the effective date of the Mammography Quality Standards Reauthorization Act of 1998 regulations,<sup>12</sup> which mandated that mammography findings be classified using the BI-RADS assessment categories. Therefore, in most cases the BI-RADS classifications were assigned by the study staff on the basis of the findings and recommended follow-up noted in the record. To facilitate the comparison to self-reported results, we also assigned BI-RADS categories to the self-reported results on the basis of 2 interview questions: (1) “what were you told about your mammogram results?” (e.g., “normal,” “saw something,” “cyst,” “mass”) and (2) “what were you asked to do next?” (e.g., “repeat mammogram,” “ultrasound,” “return in 3 months”). All BI-RADS classifications were assigned by study investigators without access to the participant’s race/ethnicity, and differences were resolved by case conference. The multilevel BI-RADS categories for self-reports and medical records were then classified as either normal or abnormal. Normal

results were defined as mammograms that were negative or benign (BI-RADS categories 1 and 2). Abnormal results were defined as incomplete or inconclusive screenings, probably benign findings, or findings that were suspicious or suggestive of malignancy (BI-RADS categories 0, 3, 4, and 5, respectively).<sup>9</sup>

### Data Analysis

We examined adequacy of communication and understanding of the screening examination result in relation to the main predictor, self-identified race (African American or White). Among the covariates included in descriptive and multivariate analyses were sociodemographic factors: age, SES (years of education, family income, and occupational ranking on the basis of the Duncan Socioeconomic Index adapted for spouse pairs<sup>13,14</sup>), and marital status. We also evaluated biomedical factors we hypothesized would increase contact with the health care system and, thus, affect breast cancer screening patterns: usual care provider, family history of breast cancer, history of benign breast cysts, use of hormone replacement therapy or oral contraceptives, and previous adherence to mammography screening guidelines. Variables that were specific to the index screening examination experience included screening facility, screening result (abnormal vs normal), method of receipt of result (telephone, mail, in person), and person who delivered the result (facility personnel vs primary care provider or office staff). Finally, we evaluated several psychosocial measures that have been shown to either vary by race or influence screening adherence in the study population:<sup>8,15</sup> perceived likelihood of developing breast cancer, perceived control over recovering from breast cancer, and whether friends (or relatives) had ever had breast cancer.

Data analyses were performed using the SAS version 8.2 (SAS Institute, Inc, Cary, NC). Bivariate analyses using the  $\chi^2$  statistic and the  $\chi^2$  Mantel-Haenszel test for linear trend were used to examine characteristics of the study population by race and the outcome variable, adequate communication of results;  $P$  values less than or equal to .05 were considered statistically significant. In keeping with study objectives, multivariate logistic regression was used to evaluate the

relationship of the main predictor (race) and adequacy of communication, adjusted for age at the time of mammogram, mammography facility, and a set of core variables that are known to vary across racial groups. These included 3 measures of SES, marital status, and having a usual care provider. Then, variables associated with either race or communication at the  $P \leq .25$  level in bivariate analyses were examined as potential predictors, explanatory variables, or both. Covariates that changed the estimate of the relationship between race and the outcome by 10% or more and those that were independently associated with the outcome were retained in the final model (in order to maximally explain the observed race–communication association). Possible interactions between race and all variables considered were initially assessed using the Breslow-Day test for homogeneity of the odds ratio (OR) and were tested in the final multivariate logistic regression model. Additional analyses were undertaken to determine if adequacy of communication varied with the result of the index mammogram.

## RESULTS

Race differences in the study population are shown in Table 1. As expected from a community sample, African American women were more disadvantaged than their White counterparts on all 3 SES measures and were less likely to be married. In general, observed race differences in factors that were hypothesized to increase contact with the health care system, and thus potentially affect breast cancer screening patterns, were more common in White women (e.g., history of benign breast cysts, use of hormone replacement therapy, previous adherence to mammography screening guidelines). With respect to screening examination results, there was not a significant difference in the proportion of abnormal index screening mammograms between the 2 racial groups according to the radiology records. And although there was not a significant difference in who delivered the results, African American women were more likely than Whites to report that they received their index screening results in person. With respect to psychosocial factors, African American women reported less control over recovery

**TABLE 1—Characteristics of the Study Population for African American (n = 411) and White Women (n = 734): Connecticut, October 1996–January 1998**

Characteristic	African Americans, n (%) <sup>a</sup>	Whites, n (%) <sup>a</sup>	P value <sup>b</sup>
Age, y			.806
40–49	148 (36.0)	259 (35.3)	
50–79	263 (64.0)	475 (64.7)	
Education, y			<.001
≤ 12	263 (64.0)	212 (28.9)	
> 12	148 (36.0)	522 (71.1)	
Family income			<.001
< \$30 000	257 (67.5)	141 (20.3)	
\$30 000 or more	124 (32.5)	554 (79.7)	
Occupational status <sup>c</sup>			<.001 <sup>d</sup>
Lowest quartile	165 (46.5)	58 (8.4)	
Second quartile	99 (27.9)	192 (27.7)	
Third quartile	47 (13.2)	207 (29.8)	
Highest quartile	44 (12.4)	236 (34.1)	
Living as married			<.001
No	281 (68.4)	211 (28.7)	
Yes	130 (31.6)	523 (71.3)	
Usual care provider			.071
No	49 (12.0)	63 (8.6)	
Yes	361 (88.0)	667 (91.4)	
Family history of breast cancer <sup>e</sup>			.094
No	349 (87.9)	609 (84.2)	
Yes	48 (12.1)	114 (15.8)	
History of benign cysts			<.001
No	367 (89.3)	589 (81.0)	
Yes	44 (10.7)	138 (19.0)	
Use of hormone replacement therapy			<.001
Never	268 (65.4)	385 (52.9)	
Ever	142 (34.6)	343 (47.1)	
Use of birth control pills			.264
Never	156 (38.0)	254 (34.7)	
Ever	255 (62.0)	479 (65.3)	
Previous mammography screening			<.001 <sup>d</sup>
Not adherent to guidelines	117 (28.6)	98 (13.4)	
Adherent to guidelines	292 (71.4)	632 (86.6)	
Result of the index screening <sup>f</sup>			.151
Normal	347 (84.4)	642 (87.5)	
Abnormal	64 (15.6)	92 (12.5)	
Result of index screening received			.028
By telephone	62 (18.3)	142 (21.5)	
By mail	243 (71.9)	484 (73.1)	
In person	33 (9.8)	36 (5.4)	
Person who delivered mammogram results			.218
Facility personnel	195 (62.9)	361 (58.7)	
Primary care doctor or office staff	115 (37.1)	254 (41.3)	

Continued

from breast cancer and were more likely to report either very low or very high perceived susceptibility to breast cancer compared with White women; they were also less likely to have a friend who had ever been diagnosed with breast cancer.

Table 2 describes the adequacy of communication of index screening results by characteristics of the study population. Overall, communication of results was problematic for 14.5% of the women in this study. Inadequate communication was more common among African American women than among White women (20.9% vs 10.9%, respectively,  $P < .001$ ). Poor communication was also associated with lower SES and being single as well as a history of nonadherence to mammography guidelines. In addition, women in the inadequate communication group more often reported either that they were “not at all” likely or “very” likely to develop breast cancer. Inadequate communication of the index screening results was also more common among women who received their results in person rather than by telephone or mail. Although there were differences between facilities, inadequate communication did not differ significantly at the bivariate level for the other variables examined.

Inadequate communication was more common among African Americans than among Whites (OR = 1.96; 95% confidence interval [CI] = 1.03, 3.76), after adjustment for age, income, education, occupational status, marital status, facility, usual care provider, history of mammography screening, and the person who provided the index screening result (Table 3). In addition to identifying significant differences in adequacy of communication between facilities, our results showed that receiving mammogram results from the screening facility rather than one’s primary care provider was more likely to result in inadequate communication.

Although the result of the index mammogram was not associated with race/ethnicity or the outcome variable in bivariate analyses, results of stratified analyses indicate that abnormal results resulted in inadequate communication for African American women but not White women (Table 4). Compared with a normal result, an abnormal

TABLE 1—Continued

Perceived likelihood of developing breast cancer			<.001
Not at all likely	123 (33.4)	152 (21.4)	
A little or somewhat likely	211 (57.3)	538 (75.8)	
Very likely	34 (9.2)	20 (2.8)	
Perceived control over recovering from breast cancer			<.001
A lot or some control	284 (72.8)	584 (82.4)	
A little or no control	106 (27.2)	125 (17.6)	
Friend had breast cancer			<.001
No	249 (61.2)	292 (40.0)	
Yes	158 (38.8)	437 (60.0)	

<sup>a</sup>May not sum to total because of missing data on some variables.

<sup>b</sup>Obtained using the  $\chi^2$  test.

<sup>c</sup>Combined spouse pair score, adapted from the Duncan Socioeconomic Index; missing data include nonrespondents as well as women who reported no occupation for either themselves or a partner.

<sup>d</sup>Obtained using the  $\chi^2$  test for trend.

<sup>e</sup>Breast cancer in first-degree relative (i.e. mother, sister, daughter).

<sup>f</sup>Normal results include the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS)<sup>11</sup> categories 1 or 2; abnormal results include BI-RADS categories 0, 3, 4, 5.

mammogram was more likely to be adequately communicated in the case of White women (not significant). However, the opposite was true for African American women who had abnormal results on their index examination (31.3% of abnormal vs 19% of normal results were inadequately communicated, OR=1.94; 95% CI=1.07, 3.50). Although some numbers are relatively small, which results in a less stable model, there was a statistically significant interaction between race and the result of the index mammogram in the fully adjusted multivariate model ( $P<.001$ , data not shown); no other statistically significant interactions were detected in the final model.

## DISCUSSION

In this community-based sample of healthy women aged 40–79 years old, inadequate communication of screening mammogram results was significantly more common among African American women than among White women, even after adjustment for relevant sociodemographic, access-to-care, biomedical, and psychosocial factors. Although communication of all results is considered an important aspect of mammography screening quality,<sup>11</sup> it would seem particularly important in the case of abnormal or inconclusive screening exams. In fact, abnormal results were

more likely to be inadequately communicated to African American women but not to White women. This statistically significant interaction suggests that the “real world” efficacy of mammography screening is somewhat compromised for African American women.

The result of an index screening mammogram was inadequately communicated or understood by 14.5% of all women in this study. Of these, most (12.5%) reported that they had not received their screening result, whereas a smaller proportion of women (2.0%) reported that they had received their result, but their self-report differed from the mammography record. Although it is reassuring that most of the poor communication is attributable to results that were not received, it is worrisome that of the 23 women who reported incorrect results, most believed that their mammograms were normal ( $n=18$ , 78.3%), despite the fact that their records indicated otherwise. Believing that an abnormal screening was actually normal was a common occurrence (53%) among women who had inadequate follow-up of an abnormal screening mammogram in a study by McCarthy et al.<sup>16</sup> These findings suggest that abnormal or inconclusive results may be less effectively communicated than normal results.

As already noted, most women whose results were not adequately communicated

reported not receiving the result of their screening examination. We cannot exclude the possibility that some women were interviewed too soon after the index mammogram to allow for receipt of the results. However, this is an unlikely explanation for the observed difference in adequacy of communication between the racial groups, because time to interview did not vary significantly by race. Only 12.4% of African American women and 10.3% of White women were interviewed within 3 weeks of the index examination, which allowed adequate time for the results to be delivered by any method. Furthermore, African American women were significantly more likely than were White women to report that results had not been received, regardless of time-to-interview ( $P<.001$ ). Finally, although excluding women who did not receive their results and were interviewed within 3 weeks of their mammogram resulted in a slightly reduced OR for race (1.91,  $P=.052$ ), adjustment for time-to-interview in the multivariate model had little effect on this OR (1.97,  $P=.04$ ). Thus, it is unlikely that systematic differences in time-to-interview are the explanation for the reported race difference in communication of results. Rather, it is likely that for most of these women, there was a true failure in communication.

Possible explanations for why some women reported that they never received their screening mammography results include that the mammography facility or health care provider failed to notify these women; the notification was mailed to the wrong address; the respondent could not be reached by phone; or the result was misplaced, forgotten, or not understood by the respondent. A small percentage of women who were not notified (5.6%) had an abnormal result from the screening mammogram and as with women who believed that their abnormal result was normal when it was not, these women may not have received needed follow-up. In fact, among women in our study population who had abnormal results, 44% of those in the inadequate communication group compared with 29% of those in the adequate communication group did not receive adequate follow-up ( $P=.08$ ).<sup>9</sup> Even for cases in which the screening result is normal, lack of notification is a missed opportunity to

**TABLE 2—Characteristics of the Study Population by Communication and Understanding of Results (Inadequate [n = 166; 14.5%] vs Adequate [n = 979; 85.5%]): Connecticut, October 1996–January 1998**

Characteristic	Inadequate, n (%) <sup>a</sup>	Adequate, n (%) <sup>a</sup>	P value <sup>b</sup>
Race/ethnicity			<.001
African American	86 (20.9)	325 (79.1)	
White	80 (10.9)	654 (89.1)	
Age, y			.292
40–49	53 (13.0)	354 (87.0)	
50–79	113 (15.3)	625 (84.7)	
Education, y			.016
≤12	83 (17.5)	392 (82.5)	
>12	83 (12.4)	587 (87.6)	
Income			<.001
<\$30 000	84 (21.1)	314 (78.9)	
≥\$30 000	71 (10.5)	607 (89.5)	
Occupational status <sup>c</sup>			<.001 <sup>d</sup>
Lowest quartile	46 (20.6)	177 (79.4)	
Second quartile	52 (17.9)	239 (82.1)	
Third quartile	24 (9.5)	230 (90.6)	
Highest quartile	27 (9.6)	253 (90.4)	
Living as married			.005
No	88 (17.9)	404 (82.1)	
Yes	78 (11.9)	575 (88.1)	
Usual care provider			.102
No	22 (19.6)	90 (80.4)	
Yes	143 (13.9)	885 (86.1)	
Family history of breast cancer <sup>e</sup>			.786
No	140 (14.6)	818 (85.4)	
Yes	25 (15.4)	137 (84.6)	
History of benign cysts			.750
No	140 (14.6)	816 (85.4)	
Yes	25 (13.7)	157 (86.3)	
Use of hormone replacement therapy			.420
No	100 (15.3)	553 (84.7)	
Yes	66 (13.6)	419 (86.4)	
Use of birth control pills			.096
No	69 (16.8)	341 (83.2)	
Yes	97 (13.2)	637 (86.8)	
Previous mammography screening <sup>f</sup>			<.001
Not adherent to guidelines	47 (21.9)	168 (78.1)	
Adherent to guidelines	117 (12.7)	807 (87.3)	
Result of the index screening			
Normal	140 (14.2)	849 (85.8)	
Abnormal	26 (16.7)	130 (83.3)	
Result of index screening received			<.001
By telephone	8 (3.9)	196 (96.1)	
By mail	5 (0.7)	722 (99.3)	
In person	10 (14.5)	59 (85.5)	

Continued

communicate and reinforce recommended guidelines for regular screening. Regular mammography screening, in accordance with guidelines, is needed to maximize the efficacy of this method of early detection,<sup>17</sup> but according to a recent review, only 46% of women currently avail themselves of regular screening,<sup>18</sup> and some but not all studies show even lower percentages for African American women.<sup>7</sup>

Our study pre-dates the Mammography Quality Standards Reauthorization Act of 1998,<sup>12</sup> which mandates that mammography facilities provide women with written notification, in lay terminology, of the results of their mammography exams. However, lack of receipt or misplacement of a sent letter may remain among possible notification problems, and other strategies to contact women who, for example, lack phone service or frequently change residence, may further improve adherence to mammography guidelines or follow-up for abnormal or inconclusive screening exams. Regarding the adequacy of communication, the observed differences between facilities in this and in our earlier survey (of all facilities in Connecticut<sup>10</sup>) underscores the importance of regulating all aspects of mammography screening, including patient notification.

The difference in adequacy of communicating screening mammography results to the 2 racial groups is perhaps a manifestation of well-established communication difficulties between physicians and minority patients.<sup>19,20</sup> Poor communication between health care provider and patient may adversely affect delivery of health care services,<sup>21</sup> and as reviewed by Ashton et al.,<sup>22</sup> there is increasing evidence that providers communicate more effectively with White patients than with racial/ethnic minority patients. Good patient–provider communication was key to timely follow-up for an abnormal screening in another recent study of African-American women,<sup>23</sup> although inadequate communication of results was not associated with inadequate follow-up for abnormal mammograms in our study. Despite these inconsistencies, better communication of screening results, including the opportunity for patients to ask questions,<sup>23</sup> may improve breast cancer outcomes.

**TABLE 2—Continued**

Person who delivered mammogram results			.921
Facility personnel	13 (2.3)	543 (97.7)	
Primary care doctor or office staff	9 (2.4)	360 (97.6)	
Perceived likelihood of developing breast cancer			.030
Not at all likely	50 (18.2)	225 (81.8)	
A little or somewhat likely	91 (12.2)	658 (87.8)	
Very likely	10 (18.5)	44 (81.5)	
Perceived control over recovering from breast cancer			.079
A lot of or some control	118 (13.6)	750 (86.4)	
A little or no control	42 (18.2)	189 (81.8)	
Friend had breast cancer			.182
No	86 (15.9)	455 (84.1)	
Yes	78 (13.1)	517 (86.9)	

<sup>a</sup>Numbers may not sum to total because of missing data on some variables.

<sup>b</sup>Obtained using the  $\chi^2$  test.

<sup>c</sup>Combined spouse pair score, adapted from the Duncan Socioeconomic Index; missing data includes nonrespondents as well as women who reported no occupation for either themselves or a partner.

<sup>d</sup>Obtained using the  $\chi^2$  test for trend.

<sup>e</sup>Breast cancer in first-degree relative (i.e. mother, sister, daughter).

<sup>f</sup>Normal results include the American College of Radiology Breast Imaging Reporting and Data System (BI-RADS)<sup>11</sup> categories 1 or 2; abnormal results include BI-RADS categories 0, 3, 4, 5.

Finally, although it was not measured in our study, it may be that low health literacy contributed to our findings. Although there is certainly a wide range of variability within any population group, having low health literacy is more likely among individuals of lower SES<sup>24</sup> and may affect some racial groups more than others. In addition to ensuring that screening results are clearly and carefully explained, it may be useful to know about culturally relevant issues that could be barriers to obtaining follow-up for an abnormal screening or to adhering to a regular screening schedule. Fatalistic attitudes toward cancer recovery and lack of confidence in cancer treatments, for example, have been observed to be common among African Americans.<sup>25,26</sup> Addressing these cultural issues may increase the likelihood that African American women will experience productive and mutually participatory patient–provider interactions which, in turn, may improve health care outcomes.<sup>19,20</sup>

### Limitations and Strengths

Fewer African Americans than Whites agreed to participate in our study’s baseline interview as well as return the consent forms that allowed us to review medical records. Analysis from a subset of our data showed

that African American women and women who had lower SES were less likely than others to return signed consent forms; there were no differences on other key variables.<sup>9</sup> Although we cannot assess characteristics of women not enrolled at baseline, we can speculate that the observed differences in participation may reflect the historic distrust of the health care system by African American women.<sup>20</sup> If women who declined to participate were more distrustful of the health care system, or were simply less interested in screening for breast cancer than were the participants, they may, in turn, have been more likely than participants to have experienced problems with communication of test results. If so, the true difference between racial groups in adequacy of communication would be larger than that reported. Another possible limitation may be linked to errors in the assignment of BI-RADS categories to self-reported results and mammography records. But any misclassification error was likely nondifferential with respect to race and would have biased these results toward the null hypothesis.

Our study had several strengths, including the relatively large sample size, a substantial proportion of African American women, and

**TABLE 3—Multivariate Logistic Regression Model (n = 1068): Connecticut, October 1996–January 1998**

	Odds Ratio (95% CI)
Race	
African American	1.96 (1.03, 3.76)
White	1.00
Age, y (continuous variable)	1.05 (0.73, 1.51)
Family income	
< \$30 000	1.27 (0.60, 2.70)
≥ \$30 000	1.00
Education, y	
≤ 12	0.59 (0.30, 1.14)
> 12	1.00
Occupation <sup>a</sup>	
Lowest quartile	1.27 (0.53, 3.00)
Second quartile	2.28 (1.00, 5.23)
Third quartile	1.80 (0.63, 5.14)
Highest quartile	1.00
Marital status	
Single	1.79 (0.91, 3.51)
Living as married	1.00
Facility <sup>b</sup>	0.45 (0.33, 0.61)
Usual care provider	
No	1.42 (0.62, 3.26)
Yes	1.00
Previous mammography screening	
Not adherent to guidelines	1.72 (0.86, 3.46)
Adherent to guidelines	1.00
Person who delivered results	
Facility personnel	2.89 (1.05, 7.99)
Primary care doctor or office staff	1.00

<sup>a</sup>Combined spouse pair score on the Duncan Socioeconomic Index; missing category also modeled (not shown).

<sup>b</sup>Five hospital-based mammography facilities; referent category was arbitrarily chosen.

detailed patient information, which was incorporated into the analysis. Moreover, incorporating several conceptual frameworks (e.g., the Health Belief Model),<sup>27,28</sup> the study questionnaire was designed a priori to explore why African American women in particular may not receive the full benefit of mammography screening. As such, most of the variables, including many considered in preliminary analyses but dropped from the final model, were specific to breast cancer and

**TABLE 4—Association of Mammogram Result to Inadequate Communication, Stratified by Race/Ethnicity (N = 1145): Connecticut, October 1996–January 1998**

	African Americans (n = 411)			Whites (n = 734)			P value
	n	% Inadequate	OR <sup>a</sup> (95% CI)	n	% Inadequate	OR <sup>a</sup> (95% CI)	
Communication of results	86/411	20.9		80/734	10.9		
Abnormal mammogram							
Yes	20/64	31.3	1.94	6/92	6.5	0.54	.13 <sup>b</sup>
No	66/347	19.0	(1.07, 3.50)	74/642	11.5	(0.23, 1.27)	<.001 <sup>c</sup>

Note. OR = odds ratio; CI = confidence interval.

<sup>a</sup>ORs and 95% CIs obtained using the  $\chi^2$  test.

<sup>b</sup>P value for the Breslow-Day Test for Homogeneity of the OR across race/ethnicity strata (unadjusted).

<sup>c</sup>P value for interaction term when tested in multivariate logistic regression model.

mammography, as well as the relevant health disparities literature. Although our study was not population-based, it was likely representative of the general population that receives screening mammograms in large facilities in Connecticut. On the basis of our own statewide survey of mammography facilities, in which we collected information on volume of screening mammography and racial composition of the population served in each facility,<sup>10</sup> we were able to enroll from 5 of 6 major screening facilities that provided mammograms to African American women. Because White women also receive mammograms in smaller, private facilities, limiting our comparison to larger, hospital-based mammography facilities may have attenuated differences across racial groups. That said, the race differences in the sociodemographic variables are very similar to those observed in the general population<sup>29</sup> and in our own population-based study of breast cancer cases in African American and White women in Connecticut.<sup>30</sup>

## Conclusions

As a next step, a more detailed investigation of racial differences in interactions with the health care system may provide insight into why communication of mammography results is more likely to be problematic for African American women than for White women, particularly in the case of abnormal results. In addition to logistical difficulties associated with lack of notification, it is likely that communication problems are tied to cultural and social dynamics that should be

addressed to minimize racial disparities in mammography screening benefit. ■

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## Contributors

B. A. Jones originated the study, supervised all aspects of its implementation, and supervised preparation of the article. K. Reams synthesized the analysis and prepared the first draft of the article. L. Calvocoressi assisted with data collection, data analysis, and editing. A. Dailey participated in data management and the interpretation of findings. S. Kasl helped conceptualize ideas, interpret findings, and reviewed drafts of the article. N. Liston assisted with data collection, data management, and preliminary data analysis.

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## Human Participant Protection

Approval was obtained from the Yale University School of Medicine Human Investigation Committee and the institutional review boards of each participating

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