

## Original Investigation

# Access to Breast Reconstruction After Mastectomy and Patient Perspectives on Reconstruction Decision Making

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**IMPORTANCE** Most women undergoing mastectomy for breast cancer do not undergo breast reconstruction.

**OBJECTIVE** To examine correlates of breast reconstruction after mastectomy and to determine if a significant unmet need for reconstruction exists.

**DESIGN, SETTING, AND PARTICIPANTS** We used Surveillance, Epidemiology, and End Results registries from Los Angeles, California, and Detroit, Michigan, for rapid case ascertainment to identify a sample of women aged 20 to 79 years diagnosed as having ductal carcinoma in situ or stages I to III invasive breast cancer. Black and Latina women were oversampled to ensure adequate representation of racial/ethnic minorities. Eligible participants were able to complete a survey in English or Spanish. Of 3252 women sent the initial survey a median of 9 months after diagnosis, 2290 completed it. Those who remained disease free were surveyed 4 years later to determine the frequency of immediate and delayed reconstruction and patient attitudes toward the procedure; 1536 completed the follow-up survey. The 485 who remained disease free at follow-up underwent analysis.

**EXPOSURES** Disease-free survival of breast cancer.

**MAIN OUTCOMES AND MEASURES** Breast reconstruction at any time after mastectomy and patient satisfaction with different aspects of the reconstruction decision-making process.

**RESULTS** Response rates in the initial and follow-up surveys were 73.1% and 67.7%, respectively (overall, 49.4%). Of 485 patients reporting mastectomy at the initial survey and remaining disease free, 24.8% underwent immediate and 16.8% underwent delayed reconstruction (total, 41.6%). Factors significantly associated with not undergoing reconstruction were black race (adjusted odds ratio [AOR], 2.16 [95% CI, 1.11-4.20];  $P = .004$ ), lower educational level (AOR, 4.49 [95% CI, 2.31-8.72];  $P < .001$ ), increased age (AOR in 10-year increments, 2.53 [95% CI, 1.77-3.61];  $P < .001$ ), major comorbidity (AOR, 2.27 [95% CI, 1.01-5.11];  $P = .048$ ), and chemotherapy (AOR, 1.82 [95% CI, 0.99-3.31];  $P = .05$ ). Only 13.3% of women were dissatisfied with the reconstruction decision-making process, but dissatisfaction was higher among nonwhite patients in the sample (AOR, 2.87 [95% CI, 1.27-6.51];  $P = .03$ ). The most common patient-reported reasons for not having reconstruction were the desire to avoid additional surgery (48.5%) and the belief that it was not important (33.8%), but 36.3% expressed fear of implants. Reasons for avoiding reconstruction and systems barriers to care varied by race; barriers were more common among nonwhite participants. Residual demand for reconstruction at 4 years was low, with only 30 of 263 who did not undergo reconstruction still considering the procedure.

**CONCLUSIONS AND RELEVANCE** Reconstruction rates largely reflect patient demand; most patients are satisfied with the decision-making process about reconstruction. Specific approaches are needed to address lingering patient-level and system factors with a negative effect on reconstruction among minority women.

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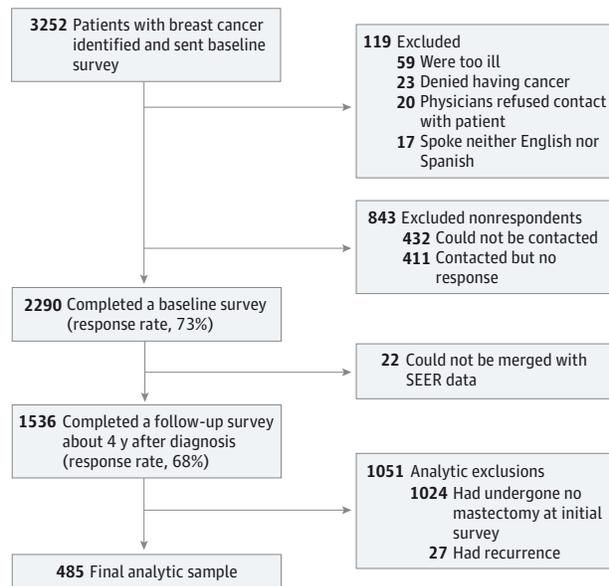
Universal coverage for postmastectomy breast reconstruction was mandated after the enactment of the Women's Health and Cancer Rights Act in the United States in 1998. Despite guaranteed insurance coverage, most women undergoing mastectomy for breast cancer do not undergo breast reconstruction, with rates of reconstruction ranging from 25% to 35% in population-based studies<sup>1,2</sup> of women treated from 2003 through 2007. Even among women treated in National Cancer Institute-designated cancer centers participating in the National Comprehensive Cancer Network, slightly more than 50% of those undergoing mastectomy underwent reconstruction.<sup>3</sup> Variations in rates of reconstruction have been associated with age, insurance status, ethnicity, and supply of reconstructive surgeons.<sup>1-3</sup> This variation, coupled with evidence of significant between-surgeon variation in discussion of reconstruction<sup>4</sup> and rates of mastectomy and breast reconstruction<sup>5</sup> suggests that patients' needs for reconstruction may not be addressed fully. These concerns resulted in the passage of a New York State law in 2010 mandating that surgeons discuss the availability of breast reconstruction with patients before breast cancer treatment, provide information about insurance coverage, and refer them to a hospital where reconstruction is available if necessary.<sup>6</sup> However, little is known about patient perceptions regarding reconstruction, and whether a significant unmet need for breast reconstruction exists remains unknown. In addition, most studies that have examined reconstruction do not include patients who underwent the surgical procedure later (delayed reconstruction). A previous study<sup>7</sup> reported that delayed reconstruction was infrequent in a population-based sample of women diagnosed as having breast cancer in 2002 and found that only 59% of patients in that study who did not undergo reconstruction believed that they were adequately informed about the procedure. The purpose of this study was to examine the rates of immediate and delayed breast reconstruction and correlates of their use in a diverse, population-based sample treated in a more recent period to determine whether significant gaps in awareness regarding breast reconstruction persist. In addition, we sought to examine patient attitudes toward reconstruction and identify whether a significant unmet need for reconstruction after completion of cancer treatment exists.

## Methods

### Study Population and Data Collection

Women in the metropolitan areas of Los Angeles, California, and Detroit, Michigan, who were aged 20 to 79 years; were diagnosed as having ductal carcinoma in situ or invasive breast cancer from June 1, 2005, through February 28, 2007; and were reported to the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program registries in both regions were eligible for initial sample selection. Patients were excluded if they had stage IV breast cancer, died before the initial survey, or could not complete the initial questionnaire in English or Spanish. Asian women in Los Angeles also were excluded because of enrollment in other studies. Latina (in Los Angeles) and black (in Los Angeles and Detroit) patients were

Figure. Study Flow Diagram



SEER indicates Surveillance, Epidemiology, and End Results registry of the National Cancer Institute.

oversampled to ensure sufficient representation of racial/ethnic minorities.<sup>8,9</sup>

Eligible patients were identified via rapid case ascertainment as they were reported monthly to the collaborating SEER registries. Physicians were notified of our intent to contact patients, followed by a patient mailing consisting of a letter, survey materials, and a \$10 cash gift to eligible study participants. All materials were sent in English and Spanish to those with Spanish surnames. Patients were initially interviewed at a mean of 9 months after diagnosis (mean completion window, 9 [range, 5-14] months). A follow-up survey was sent to those who completed the baseline survey approximately 4 years after diagnosis (mean completion window, 50 [range, 36-65] months). The Dillman survey method was used for both surveys to encourage response.<sup>10</sup>

The Figure shows the decay in the sample from the initial accrual of patients through the selection of the sample for the analysis in this study. Of 3252 patients initially identified and sent a baseline survey, 2290 (73.1%) completed that survey; and 1536 patients (67.7%) completed the follow-up survey. The overall response rate was 49.4% (1536 of 3111 [3252 initially identified patients minus 119 who were excluded and 22 whose baseline survey could not be merged with SEER data]). The analytic sample for this study consists of the 485 patients who reported undergoing mastectomy at the initial survey, completed the follow-up survey, and indicated that they did not have a recurrence of breast cancer. The study protocol was approved by the institutional review boards of the University of Michigan in Ann Arbor, University of Southern California, and Wayne State University, Detroit. Informed consent was waived because completion of the survey was believed to indicate consent.

## Measures

A primary outcome of interest was a binary variable that indicated whether or not a patient underwent breast reconstruction at any time since the mastectomy, obtained from both surveys. The second outcome of interest was patient satisfaction with different aspects of the reconstruction decision-making process, obtained from the follow-up survey. Patients were asked to agree/disagree with statements regarding their satisfaction with the following aspects of the decision-making process: (1) being satisfied with the decision about whether to have reconstruction; (2) not regretting the choice they made regarding whether to have breast reconstruction; and (3) being satisfied about the information given about the issues important to breast reconstruction. The response category format was a Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree). The items were recoded to obtain congruent valence, and a mean was calculated to make a scale. We dichotomized the scale score as low satisfaction (<3) or higher satisfaction ( $\geq 3$ ). In addition, we examined the reasons why patients did not undergo breast reconstruction or delayed reconstruction across the following 2 dimensions: (1) patient factors, such as their attitudes toward reconstruction (ie, worry, too much time off work or away from family) or clinical reasons; and (2) systems factors. Patients were asked to what extent each reason contributed to their decision, ranging from 1 (“not at all”) to 5 (“a lot”) using a Likert scale.

The independent variables considered in this study included patient demographics, patient clinical/treatment factors, and site (Detroit vs Los Angeles). Patient demographics included age, educational level, race/ethnicity, partner status, income, insurance types, and smoking status. Patient clinical factors included cancer stage, presence of key medical comorbidities (ie, chronic obstructive pulmonary disease, heart disease, diabetes mellitus, or stroke), and breast size. Treatment factors included chemotherapy, radiotherapy, and timing of reconstruction (delayed or immediate reconstruction after mastectomy). All these variables were self-reported except cancer stage. We used the American Joint Committee on Cancer staging system<sup>11</sup> to classify cancer stage, which was obtained from the SEER registry.

## Statistical Analysis

We first conducted an analysis comparing key baseline categorical variables between responders (those who completed the baseline and follow-up surveys) and nonresponders using  $\chi^2$  tests. We then calculated summary statistics on our sample population using percentages for categorical variables and means and standard deviations for continuous variables. Logistic regression was used to assess the odds of patients not undergoing reconstruction after mastectomy. The independent variables for this model included age, partner status, educational level, race/ethnicity, income, insurance types, comorbidities, prediagnosis brassiere cup size, cancer stage, radiotherapy, chemotherapy, contralateral prophylactic mastectomy, and SEER site. Similarly, we used logistic regression to model the odds of being dissatisfied with the decision-making process. The independent variables for this model included the status of reconstruction (yes vs no), age, educa-

tional level, race/ethnicity, marriage/partner status, income, insurance type, cancer stage, and SEER site. To achieve parsimony of the regression models, we used a backward variable selection method to eliminate the variables that did not reach the statistical significance level of .10. Finally, we described the distribution of responses on a list of reasons why women did not receive reconstruction or delayed the procedure. This list was based on the percentages of patients who reported that a given issue contributed to their decision to omit or delay reconstruction (“quite a bit,” “a lot,” “somewhat,” and “not at all”). We examined the difference in these percentages across racial/ethnic groups using Mantel-Haenszel tests.

All the descriptive and regression analyses described above were weighted using survey procedures (eg, PROC SURVEYLOGISTIC [SAS Institute] for logistic regression) to account for differential probabilities of sample selection and nonresponse, which made our statistical inference more representative of the population. We created an analytic weight that accounted for the initial sampling design (oversampling of black and Latina patients and disproportionate selection across geographic sites) and differential nonresponse in the 2 survey waves.<sup>12</sup> All analyses used commercially available statistical software (SAS, version 9.2; SAS Institute).

## Results

An analysis of sampled patients comparing nonrespondents with respondents who completed the initial and the follow-up surveys showed no significant differences by age at diagnosis. However, compared with respondents, nonrespondents to the follow-up survey were more likely to be black (35.2% vs 26.7%;  $P < .001$ ) or Latina (17.2% vs 13.3%;  $P = .002$ ), more likely to have stage II or III cancer (54.9% vs 37.8%;  $P < .001$ ), and more likely to have undergone mastectomy (37.5% vs 30.8%;  $P < .001$ ).

The characteristics of the patient population are summarized in **Table 1** and **Table 2**. The mean age was 55.8 years; 42.2% had no more than a high school education, and 64.3% had stage I or II breast cancer. Postmastectomy radiotherapy was reported by 33.0%, and 11.6% underwent a contralateral prophylactic mastectomy. Overall, 41.6% of the 485 patients treated with mastectomy who remained disease free had breast reconstruction; 146 of the procedures (24.8%) were performed at the time of mastectomy, and 76 (16.8%) were delayed. The most common type of reconstruction used implants or tissue expanders (61.9% of those undergoing reconstruction). A multivariable regression analysis of factors associated with not undergoing any breast reconstruction is shown in **Table 3**. Black patients, those with no more than a high school education, those without private insurance, those with any major comorbidity, older women, and those residing in Los Angeles County were significantly less likely to undergo reconstruction than their counterparts. Patients who received chemotherapy were also significantly less likely to undergo reconstruction.

Most women reported being satisfied with the decision-making process regarding reconstruction. The mean satisfaction score was 3.9 (SE, 0.05) on a 5-point Likert scale. About

**Table 1. Demographic Characteristics of 485 Participants With Breast Cancer Who Underwent Mastectomy<sup>a</sup>**

Variable	No. of Participants	Weighted % of Participants <sup>b</sup>
Reconstruction timing		
None	263	58.4
Immediate	146	24.8
Delayed	76	16.8
Type of reconstruction		
Autologous tissue	68	38.1
Implant	141	61.9
Breast size		
A or B	168	35.7
C	165	37.9
D or larger	131	26.5
Race		
Nonblack, non-Latina	233	40.9
Black	104	15.3
Latina	148	43.7
Educational level		
≤High school	174	42.2
≥Some college	306	57.8
Insurance type		
None	39	10.0
Private	283	57.7
Medicaid	47	12.1
Medicare	99	20.2
Income, \$		
<20 000	84	17.6
20 000-69 999	167	34.5
≥70 000	146	26.8
Unknown	88	21.1
Married or partnered		
Yes	288	59.8
No	195	40.2
≥1 Chronic condition <sup>c</sup>		
Yes	98	19.6
No	387	80.4
Smoking		
Yes	73	13.6
No	409	86.4

Abbreviation: AJCC, American Joint Committee on Cancer.

<sup>a</sup> Mean (SE) age of the sample was 55.8 (0.7) years. Among the 459 participants for whom the data were available, mean (SE) body mass index (calculated as weight in kilograms divided by height in meters squared) was 28.7 (0.4).

<sup>b</sup> Percentages are weighted to account for the sample design and nonresponse.

<sup>c</sup> Includes chronic obstructive pulmonary disease, heart disease, diabetes mellitus, or stroke.

13.3% of women reported being dissatisfied with the decision-making process (score, <3). **Table 4** shows correlates of dissatisfaction with the reconstruction decision-making process; dissatisfaction was associated with being black or Latina ( $P = .03$ ) but not with lower income or educational levels.

Reasons for not undergoing reconstruction are summarized in **Table 5** for the 263 women treated with mastectomy

**Table 2. Clinical Characteristics of 485 Participants With Breast Cancer Who Underwent Mastectomy**

Variable	No. of Participants	Weighted % of Participants <sup>a</sup>
AJCC stage		
0	99	14.2
I	133	24.7
II	164	39.6
III	87	21.5
Postmastectomy radiotherapy		
Yes	144	33.0
No	322	67.0
Chemotherapy		
Yes	278	65.0
No	198	35.0
Contralateral prophylactic mastectomy		
Yes	56	11.6
No	429	88.4

Abbreviation: AJCC, American Joint Committee on Cancer.

<sup>a</sup> Percentages are weighted to account for the sample design and nonresponse.

alone. Common reasons among women of all racial/ethnic groups were the desire to avoid additional surgery (48.5%) or the feeling that reconstruction was not important (33.8%). However, ethnic minority groups were less likely to report the desire to avoid additional surgery (70.0% for nonblack, non-Latina patients vs 39.7% and 34.1% for black and Latina patients, respectively;  $P < .001$ ) or that reconstruction was not important (42.4% for nonblack, non-Latina patients vs 21.6% and 31.3% for black and Latina patients, respectively;  $P = .04$ ). Fear of implants (36.3%) was another commonly reported reason for not undergoing reconstruction. Concerns about interference with the detection of cancer and lack of awareness of the availability of reconstruction were cited by 23.9% and 18.1% of the sample, respectively. We found significant racial/ethnic gradients for some of the other reasons given for not undergoing reconstruction. More Latina patients reported concerns about interference with cancer detection or complications of the procedure and not being able to take time off from work or family. More black and Latina patients reported the systems barrier of having no insurance coverage.

Most of the 76 patients who underwent delayed breast reconstruction reported treatment-related reasons for the delay, including the need to focus on cancer treatment (68.7%) or the need to accommodate chemotherapy (50.7%) or radiotherapy (26.3%) (**Table 6**). Fewer than 15% indicated that they were unaware of the option of breast reconstruction at the time of their breast cancer surgery or that they had problems with insurance. We found little residual demand for breast reconstruction among women who had not undergone the procedure by 4 years after diagnosis; only 30 of the 263 respondents (11.4%) who had not undergone reconstruction indicated they were still considering the procedure.

Table 3. Adjusted ORs for Not Undergoing Reconstruction<sup>a</sup>

Variable	OR (95% CI)	P Value
Chemotherapy		
No	1 [Reference]	.050
Yes	1.82 (0.99-3.31)	
Major comorbidities		
No	1 [Reference]	.048
Yes	2.27 (1.01-5.11)	
Age in 10-y increments	2.53 (1.77-3.61)	<.001
Educational level		
≥Some college	1 [Reference]	<.001
≤High school	4.49 (2.31-8.72)	
Insurance		
Private	1 [Reference]	.04
Medicaid	2.72 (1.11-6.64)	
Medicare	2.43 (0.87-6.79)	
None	2.81 (1.06-7.50)	
Race		
Nonblack/non-Latina	1 [Reference]	.004
Black	2.16 (1.11-4.20)	
Latina	0.62 (0.28-1.37)	
Site		
Detroit	1 [Reference]	.04
Los Angeles	1.90 (1.03-3.50)	

Abbreviation: OR, odds ratio.

<sup>a</sup> Includes 471 patients; 14 patients were not included because of missing values for dependent or independent variables.

## Discussion

Our study suggests that the rate of breast reconstruction after mastectomy has been relatively stable over time in 2 large, diverse SEER catchment areas. In an earlier study<sup>7,13</sup> of women identified in the Detroit and Los Angeles SEER registries and treated from December 2001 through January 2003, 36% of those undergoing mastectomy had immediate reconstruction and an additional 12% underwent delayed reconstruction. In our present sample of patients diagnosed from July 1, 2005, through February 28, 2007, from the same SEER registries, the overall rate of reconstruction was 41.6% (24.8% immediate and 16.8% delayed). These findings are consistent with the 25% to 29% increase in reconstruction seen in statewide data from California from 2003 through 2007.<sup>2</sup> Albornoz et al<sup>14</sup> used the Nationwide Inpatient Sample database to examine rates of immediate reconstruction in 2008 and found that 37.8% of patients undergoing mastectomy underwent immediate reconstruction.

Although the optimal rate of breast reconstruction is uncertain, our results suggest that patient demand and clinical and treatment factors largely determined who underwent the procedure. A lack of interest in additional surgery at the time of cancer diagnosis was the primary reason for not undergoing reconstruction in our present patient sample and in a previously described sample.<sup>7,13</sup> Other investigators have also found that patients' feelings that reconstruction was not important and patients' desires to avoid additional surgery are

Table 4. Adjusted ORs for Dissatisfaction With the Reconstruction Decision-Making Process<sup>a</sup>

Variable	OR (95% CI)	P Value
Income, \$		
≥70 000	1 [Reference]	.15
20 000-69 999	1.29 (0.53-3.11)	
<20 000	2.00 (0.75-5.34)	
Unknown	0.58 (0.16-2.16)	
Educational level		
≥Some college	1 [Reference]	.20
≤High school	1.69 (0.76-3.73)	
Race		
Nonblack/non-Latina	1 [Reference]	.03
Black	2.87 (1.27-6.51)	
Latina	2.03 (0.89-4.67)	

Abbreviation: OR, odds ratio.

<sup>a</sup> Includes 470 patients; 15 patients were not included because of missing values for dependent or independent variables.

the major factors responsible for low rates of reconstruction.<sup>15</sup> Although feeling that reconstruction is not important may seem counterintuitive, breast-conserving surgery with radiotherapy is an alternative way to maintain a breast that is an option for most women with early-stage breast cancer,<sup>16</sup> involves a smaller surgical procedure with more rapid recovery than mastectomy with reconstruction, and results in a sensate breast mound. In contrast, mastectomy with reconstruction often requires additional surgical procedures, and the reconstructed breast lacks normal sensation, making breast-conserving surgery the preferred choice for some women desiring to maintain a breast. Greenberg et al<sup>3</sup> have demonstrated a strong inverse correlation between institutional rates of breast-conserving surgery and mastectomy with reconstruction ( $r = -0.80$ ;  $P = .02$ ) but no correlation between institutional rates of mastectomy alone and breast-conserving surgery or between mastectomy alone and mastectomy plus reconstruction.

We found that 16.8% of mastectomy-treated patients delayed reconstruction. This finding from a population study is somewhat higher than what was seen in a series from the M. D. Anderson Cancer Center, in which 8% of women underwent delayed reconstruction 15 to 27 months after mastectomy,<sup>17</sup> but suggests that most women desiring breast reconstruction have access to immediate breast reconstruction. Patient report of reasons for delaying reconstruction clearly showed that coordinating treatment delivery was the major factor in the decision to forgo reconstruction in our study population. Another reassuring finding from this study is that 4 years after diagnosis, only 30 of the 263 patients (11.4%) who had not undergone reconstruction were still considering it.

Our results suggest that some barriers to breast reconstruction linger. Black patients were less likely than nonblack, non-Latina patients to undergo reconstruction. In addition, patients without private insurance plans were less likely to undergo reconstruction. Patient-reported reasons for not undergoing reconstruction suggested patient knowledge- and attitude-related barriers and systems issues. Almost one-fifth of

Table 5. Reasons Given by Patients for Not Undergoing Reconstruction<sup>a</sup>

Reason	% of Patients <sup>b</sup>				P Value <sup>c</sup>
	Total	Nonblack, Non-Latina	Black	Latina	
<b>Patient Factors</b>					
Did not want additional surgery	48.5	70.0	39.7	34.1	<.001
Was not important	33.8	42.4	21.6	31.3	.04
Fear of implants	36.3	34.4	38.8	40.7	.73
Concerned about interference with detection of recurrence	23.9	16.1	18.6	32.5	
Concerned about possible complications	33.6	27.9	20.4	43.8	.02
Could not take much time off work or from family	16.1	8.9	9.5	24.7	.02
<b>Systems Factors</b>					
Did not know was an option	18.1	12.7	27.7	18.6	.51
Trouble finding surgeon	5.6	4.2	10.6	4.7	.51
No insurance coverage	11.8	2.2	23.7	18.6	.001
Surgeon did not take insurance	7.8	2.8	16.8	8.5	.09

<sup>a</sup> Includes 263 patients.<sup>b</sup> Indicates percentage of patients who responded that the factor contributed "quite a bit" or "a lot" to the decision to not have breast reconstruction. Percentages are weighted to account for the sample design and nonresponse.<sup>c</sup> Tests for differences in item response across race/ethnic groups.Table 6. Reasons Given by Patients for Delay in Breast Reconstruction<sup>a</sup>

Reason	% of Patients <sup>b</sup>
<b>Clinical Patient Factors</b>	
Needed radiotherapy	26.3
Needed chemotherapy	50.7
Focused on treating the cancer	68.7
<b>Patient Attitudes</b>	
Not sure wanted reconstruction	10.1
Too much time off work or from family	6.7
<b>Systems Factors</b>	
Did not know of the reconstruction option	14.3
Trouble finding surgeon to perform reconstruction	0.0
Problems with initial breast surgery	8.1
No insurance coverage	10.3

<sup>a</sup> Includes the 76 patients who delayed breast reconstruction.<sup>b</sup> Indicates percentage of patients who responded that the factor contributed "quite a bit" or "a lot" to the decision to delay breast reconstruction. Percentages are weighted to account for the sample design and nonresponse.

women who did not undergo reconstruction reported a lack of knowledge regarding the procedure. Many women continue to report fear of implants as 1 reason for forgoing reconstruction, despite their proven safety.<sup>18-20</sup> Nearly one-fourth of women who did not undergo reconstruction in our sample reported concern about potential interference with cancer detection as a decision factor despite the clinical evidence not supporting this contention.<sup>20,21</sup> Furthermore, Latina patients were more likely than other groups to endorse these beliefs. Results also suggest the presence of lingering systems-related barriers for some patient subgroups—particularly for black patients, 23.7% of whom reported insurance-related barriers (vs 2.2% of nonblack, non-Latina and 18.6% of Latina patients;  $P = .001$ ). These findings are consistent with those of a prior study in this patient sample examining racial and ethnic disparities in the use of reconstruction in which minority

women were found to have lower satisfaction with the information received and decision making than white women.<sup>1</sup> Other studies have also observed lower rates of reconstruction among black,<sup>2</sup> Asian,<sup>2,22</sup> and Latina women.<sup>15</sup>

Some aspects of the study methods merit comment. A strength of the study was its diverse population-based sample and rigorous attention to measurement.<sup>8,12</sup> The results are limited to women from 2 metropolitan areas and may not reflect access to reconstruction nationally, particularly in rural areas where plastic surgeons may be less available. The study was retrospective in design, and patient recall of their clinician encounters may have varied over time. Finally, we noted substantial decay in the longitudinal sample, which may have introduced selection bias.

## Conclusions

We found that women are largely satisfied with the process of making decisions about breast reconstruction and that stable rates of the procedure largely reflect patient demand. A minority of women delayed reconstruction within 4 years of cancer diagnosis, and delay was largely explained by relevant clinical and treatment-related factors. These findings suggest that legislative mandates to change the approach to patient education, such as a New York State law passed in 2010,<sup>6</sup> are likely to be less effective than more ground-level practice initiatives, such as patient decision tools or encouragement of input from plastic surgeons at the time decisions about treatment are made.<sup>5,7</sup> Our study suggests that room exists for improved education regarding the safety of breast implants and the effect of reconstruction on follow-up surveillance, information about which could be readily addressed through decision tools. Finally, development of specific approaches to address patient-level and systems factors with a negative effect on the use of reconstruction among minority women is needed.

### ARTICLE INFORMATION

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**Author Contributions:** Drs Morrow and Katz had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors have read and approved the manuscript.

**Study concept and design:** Morrow, Alderman, Katz.  
**Acquisition, analysis, or interpretation of data:** Morrow, Li, Alderman, Jagsi, Hamilton, Graff, Hawley.

**Drafting of the manuscript:** Morrow, Li, Alderman, Katz.

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