

Patterns and Correlates of Knowledge, Communication, and Receipt of Breast Reconstruction in a Modern Population-Based Cohort of Patients with Breast Cancer

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Background: Disparities persist in the receipt of breast reconstruction after mastectomy, and little is known about the nature of communication received by patients and potential variations that may exist.

Methods: Women with early-stage breast cancer (stages 0 to II) diagnosed between July of 2013 and September of 2014 were identified through the Georgia and Los Angeles Surveillance, Epidemiology, and End Results registries and surveyed to collect additional data on demographics, treatment, and decision-making experiences. Treating general/oncologic surgeons were also surveyed. Primary outcomes measures included self-reported communication-related measures on receipt of information on breast reconstruction and on the receipt of breast reconstruction.

Results: The authors analyzed 936 women who underwent mastectomy for unilateral breast cancer. Four hundred eighty-four (51.7 percent) underwent mastectomy with reconstruction. Women who were older and for whom English was not their primary spoken language had lower odds of being informed by a doctor about breast reconstruction. Ultimately, women who were older, were Asian, had invasive disease, had bronchitis/emphysema, and had lower income were less likely to undergo breast reconstruction. Breast reconstruction was performed more often in patients undergoing bilateral mastectomies (OR, 3.27; 95 percent CI, 2.26 to 4.75). Women cared for by surgeons with higher volumes of breast cancer patients (≥ 51 patients per year) were more likely to undergo breast reconstruction (OR, 2.43; 95 percent CI, 1.40 to 4.20).

Conclusion: To eliminate existing disparities, increased efforts should be made in consultations for surgical management of breast cancer to provide information to all patients regarding the option of breast reconstruction, the possibility of immediate reconstruction, and insurance coverage of all stages of reconstruction. (*Plast. Reconstr. Surg.* 144: 303, 2019.)

The use of postmastectomy breast reconstruction in the United States has increased in recent years. In the late 1990s, concerns

existed regarding low reconstruction rates, with a report of reconstruction in less than 20 percent of eligible patients.¹ A decade after the passing of the 1998 Women's Health and Cancer Rights

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Act, breast reconstruction rates increased by 17 percent,² suggesting some effectiveness of the legislation mandating insurance coverage for reconstruction.

An appreciation of the benefits of breast reconstruction in women undergoing mastectomy has been pivotal in garnering improved acceptance among physicians and patients. These benefits include improvements in satisfaction with breast, body image, psychosocial well-being, sexual well-being, and overall quality of life.³⁻⁵ Unfortunately, disparities in the receipt of breast reconstruction have been documented, with notable variations based on geography, income, insurance type, age, and race.⁶⁻¹⁰ A potential reason for variations in postmastectomy reconstruction centers on the initial physician-patient discussion.¹¹ There are limited data in the surgical literature investigating the nature of communication with patients regarding breast reconstruction and whether such communication may be less robust in patients who have been historically underrepresented among those undergoing reconstruction following mastectomy.

Thus, the purpose of this study was to evaluate the patterns and correlates of receipt of information about breast reconstruction, along with immediate reconstruction rates in a diverse modern cohort of women with breast cancer. Specifically, we focus on understanding patterns of communication about breast reconstruction in the hopes of guiding future efforts to improve the equitable provision of information so that all breast cancer patients may consider the meaningful intervention of reconstruction after mastectomy.

PATIENTS AND METHODS

Study Population

After institutional review board approval, women with early-stage breast cancer (stages 0 to II) reported to the Georgia and Los Angeles County Surveillance, Epidemiology, and End Results registries between July of 2013 and September of 2014 were identified as part of the Individualized Cancer Care Study.¹² Women were ineligible if they had stage III or IV disease, their tumors were larger than 5 cm, they had four or more positive lymph nodes, or they could not complete a questionnaire in Spanish or English. As described previously, women were identified by rapid case ascertainment of their initial surgical pathology reports, obtained from a list of definitive surgical procedures performed with the goal of excising the tumor in its entirety while achieving clear margins.¹³

Surveys were sent by mail to eligible patients on average 2 months after the tumor resection, and the median \pm SD time from diagnosis to survey completion was 6.4 ± 3.0 months. A \$20 cash incentive was provided to encourage response and a modified Dillman approach to recruitment was used, which included reminders to nonresponders.¹⁴ As detailed in the supplemental figure, 3880 women were identified and mailed surveys. [See Figure, Supplemental Digital Content 1, which shows a diagram of the flow of patients into the study. Individualized Cancer Care study participants ($n = 936$), <http://links.lww.com/PRS/D555>.] We selected 3880, of whom 249 women were later deemed ineligible because of having a prior cancer diagnosis or stage III or IV disease; residing outside the Surveillance, Epidemiology, and End Results registry area; or being dead, too ill, or unable to complete a survey in Spanish or English. Of 3631 eligible women remaining, 1053 did not return mailed surveys, refused to participate, or were lost to follow-up. Nine hundred thirty-six respondents (36 percent) underwent mastectomy and represent the main analytic sample used herein; 906 (97 percent) identified the surgeon responsible for their mastectomy operations. For 720 respondents (77 percent), the treating general/oncologic surgeon completed a surgeon-specific survey that serves as a source of data on surgeon characteristics.

Measures

Questionnaires were developed using an iterative design process.¹⁵ We used standard techniques to assess content validity. This included review by survey design experts and cognitive interviewing with patients and clinicians outside our target sample.¹⁶ The four primary outcomes measures were three self-reported communication-related measures and one self-reported measure of receipt of breast reconstruction.

The first communication-related measure was reporting having been told by a doctor that “breast reconstruction is an option for women who have a mastectomy.” The second was reporting having been told by a doctor that “your insurance should cover most of the cost of breast reconstruction.” The third was whether the respondent knew that breast reconstruction could be performed immediately after mastectomy as part of the same operation.

In addition to receipt of reconstruction, type of reconstruction was also evaluated by self-report. Women were asked to describe the type of reconstruction received by choosing between (1) an

implant (silicone or saline) or (2) a deep inferior epigastric perforator flap, transverse rectus abdominis musculocutaneous flap, or latissimus dorsi flap (uses the patient's own tissue from the abdomen or back).

Covariates

Patient-level covariates included sociodemographic characteristics measured through the surveys: age at diagnosis, race, primary spoken language, marital status, education, income, and insurance coverage. Clinical and treatment variables included Surveillance, Epidemiology, and End Results–derived tumor stage, along with a number of patient-reported measures: breast cup size, comorbidities, body mass index, and surgical treatment. Surgeon-level characteristics considered included annual breast cancer patient volume, whether or not the practice teaches residents or fellows, and the surgeon's number of years in practice since completing residency.

Statistical Analysis

Survey weights were calculated to adjust for the differential probability of selecting patients by race/ethnicity, cancer stage, and Surveillance, Epidemiology, and End Results site because of our sampling design. In addition, to the extent that respondents differed from nonrespondents in these characteristics, weights were adjusted to compensate for survey nonresponse and normalized to the observed sample size to reduce the risk of bias. To correct for the potential bias that may be introduced by complete-case methods, values for missing items were imputed using sequential multiple imputation.^{17,18} We first described the characteristics of the sample, second determined associations of the patient- and surgeon-level covariates with the three communication measures, and third determined associations of the patient- and surgeon-level covariates with receipt of reconstruction. Weighted logistic regression models were constructed using all the prespecified characteristics listed above. Models were adjusted for patient sociodemographic and clinical/treatment factors and, when significant, clustering of patients within surgeons and key surgeon-level covariates. The *p* values are two sided, and values at or below 5 percent are considered significant. All analyses were performed using SAS Version 9.4 (SAS Institute, Inc., Cary, N.C.).

RESULTS

Patient demographics and treatment variables are listed in Table 1. The average age of

respondents was 57.7 years (range, 24.3 to 80.2 years). Overall, 484 women (51.7 percent) underwent mastectomy with reconstruction and 452 (48.3 percent) underwent mastectomy alone. Implant-based breast reconstruction was performed in nearly three-quarters of the patients who underwent reconstruction (72.0 percent), with autologous reconstructions performed in 19.1 percent of the patients. The vast majority of the patients in the cohort (92.3 percent) reported being told by a doctor that breast reconstruction was an option following mastectomy. Fewer reported knowing about the possibility of immediate reconstruction (73.4 percent) or having been informed by a doctor that insurance should cover most of the cost of breast reconstruction (71.1 percent). We compared the distributions between nonrespondents and respondents for age, race, grade, estrogen receptor status, site, and stage. Whites were significantly more likely to respond than minorities. Women with stage 1 disease were significantly more likely to respond than those with stage 0 or 2 disease. Other factors did not differ significantly.

Figure 1 presents findings from a multivariable model evaluating associations between patient variables and having been told by a doctor that breast reconstruction was an option. Women who were older (+1 year; OR, 0.92; 95 percent CI, 0.89 to 0.95) had significantly lower odds of being informed by a doctor about breast reconstruction as an option. Women who did not speak English as their primary language (English primary spoken language, no versus yes; OR, 0.33; 95 percent CI, 0.11 to 0.94) had significantly lower odds of being informed about reconstruction as an option. (See Table, Supplemental Digital Content 2, which shows a multiple variable model explaining whether a patient reports that a doctor told her that breast reconstruction was an option for her, <http://links.lww.com/PRS/D556>.) Without the inclusion of language in the multivariable model, women who are Asian or Latina (Asian versus white, OR, 0.31; 95 percent CI, 0.09 to 1.01; and Latina versus white, OR, 0.32; 95 percent CI, 0.10 to 1.00), underweight (underweight versus normal, OR 0.18; 95 percent CI, 0.04 to 0.90), and without private insurance (Medicaid versus private, OR, 0.31; 95 percent CI, 0.10 to 0.92; and other or no insurance versus private, OR, 0.16; 95 percent CI, 0.03 to 0.83) had significantly lower odds of being informed by a doctor about breast reconstruction as an option (see Table, Supplemental Digital Content 2, <http://links.lww.com/PRS/D556>).

Table 1. Characteristics of the Sample Population, Total and by Reconstruction Status*

Characteristic	All Women	Women with Reconstruction	Women without Reconstruction
Site			
State of Georgia	536 (58.75)	335 (64.08)	201 (51.3)
LA County, Calif.	400 (41.25)	192 (35.92)	208 (48.70)
Stage			
Not reported	46 (3.73)	23 (3.34)	23 (4.27)
0 (DCIS)	159 (24.07)	108 (28.30)	51 (18.17)
1	427 (40.34)	250 (41.28)	177 (39.02)
2	304 (31.86)	146 (27.08)	158 (38.54)
Age (continuous)	57.72 ± 0.37	54.45 ± 0.46	62.3 ± 0.53
Diabetes			
Not reported	7 (0.69)	3 (0.64)	4 (0.75)
No	764 (82.41)	466 (89.50)	298 (72.52)
Yes	165 (16.90)	58 (9.86)	107 (26.73)
Bronchitis/emphysema			
Not reported	7 (0.63)	3 (0.52)	4 (0.79)
No	868 (92.68)	503 (95.32)	365 (88.99)
Yes	61 (6.69)	21 (4.16)	40 (10.22)
BMI, kg/m ² (continuous)	28.03 ± 0.25	27.2 ± 0.29	29.22 ± 0.42
BMI			
Not reported	34 (3.58)	15 (2.72)	19 (4.77)
Underweight (<18.5 kg/m ²)	12 (1.22)	4 (0.79)	8 (1.83)
Normal weight (18.5–25 kg/m ²)	340 (37.89)	213 (41.45)	127 (32.91)
Overweight (>25–30 kg/m ²)	247 (26.05)	148 (27.72)	99 (23.71)
Obese (>30 kg/m ²)	303 (31.26)	147 (27.32)	156 (36.78)
Race			
White	503 (56.26)	316 (61.95)	187 (48.31)
Black	156 (17.00)	84 (16.85)	72 (17.22)
Latina	146 (12.52)	71 (10.89)	75 (14.80)
Asian	104 (11.43)	45 (8.22)	59 (15.93)
Other/unknown/missing	27 (2.79)	11 (2.10)	16 (3.74)
English as primary spoken language			
Yes	840 (91.21)	492 (94.38)	348 (86.77)
No	96 (8.79)	35 (5.62)	61 (13.23)
Breast cup size			
Not reported	30 (3.14)	13 (2.53)	17 (3.98)
A/B	323 (34.02)	162 (30.01)	161 (39.61)
C	278 (30.12)	159 (30.39)	119 (29.74)
D	172 (17.96)	107 (19.9)	65 (15.25)
DD+	133 (14.77)	86 (17.16)	47 (11.41)
Education			
Not reported	7 (0.69)	3 (0.46)	4 (1.02)
High school or less	242 (24.40)	88 (16.21)	154 (35.83)
At least some college	687 (74.91)	436 (83.33)	251 (63.14)
Income (USD)			
<\$40,000	262 (26.71)	110 (20.04)	152 (36.01)
\$40,000–\$89,999	274 (30.81)	165 (32.69)	109 (28.18)
≥\$90,000	243 (26.99)	192 (36.60)	51 (13.56)
Not reported	157 (15.50)	60 (10.67)	97 (22.25)
Insurance			
Not reported	35 (3.15)	15 (2.09)	20 (4.62)
None	4 (0.39)	1 (0.17)	3 (0.69)
Medicaid	118 (11.64)	40 (7.42)	78 (17.55)
Medicare	220 (23.42)	83 (15.76)	137 (34.12)
Other public	15 (1.64)	9 (1.81)	6 (1.39)
Private	544 (59.76)	379 (72.74)	165 (41.63)
Marital status			
Not reported	8 (0.74)	4 (0.61)	4 (0.91)
Not married	317 (33.58)	157 (30.26)	160 (38.2)
Married	611 (65.69)	366 (69.12)	245 (60.88)
Surgical treatment			
Unilateral mastectomy	508 (54.96)	198 (39.90)	310 (76.00)
Bilateral mastectomy	428 (45.04)	329 (60.10)	99 (24.01)
Was told by a doctor that breast reconstruction is an option for women who have mastectomy			
Not reported	12 (1.23)	3 (0.53)	9 (2.21)
No	67 (6.50)	12 (2.51)	55 (12.07)
Yes	857 (92.27)	512 (96.95)	345 (85.72)

(Continued)

Table 1. Continued

Characteristic	All Women	Women with Reconstruction	Women without Reconstruction
Was told by a doctor that insurance should cover most of the cost of breast reconstruction			
Not reported	63 (7.06)	19 (4.03)	44 ((11.29)
No	204 (21.88)	79 (15.50)	125 (30.80)
Yes	669 (71.06)	429 (80.47)	240 (57.91)
Knew that breast reconstruction can be performed immediately after mastectomy as part of the same operation			
Not reported	13 (1.38)	5 (0.84)	8 (2.13)
No	81 (9.11)	41 (8.06)	40 (10.58)
Yes	683 (73.42)	455 (85.83)	228 (56.07)
Don't know	159 (16.09)	26 (5.26)	133 (31.22)
Type of breast reconstruction for the subset reporting reconstruction			
Not reported		37 (8.9)	
A DIEP flap, TRAM flap, or latissimus dorsi flap		95 (19.10)	
An implant (silicone or saline)		389 (72.00)	

LA, Los Angeles; DCIS, ductal carcinoma in situ; BMI, body mass index; DIEP, deep inferior epigastric perforator; TRAM, transverse rectus abdominis musculocutaneous.

*Weighted for sample design and survey nonresponse.

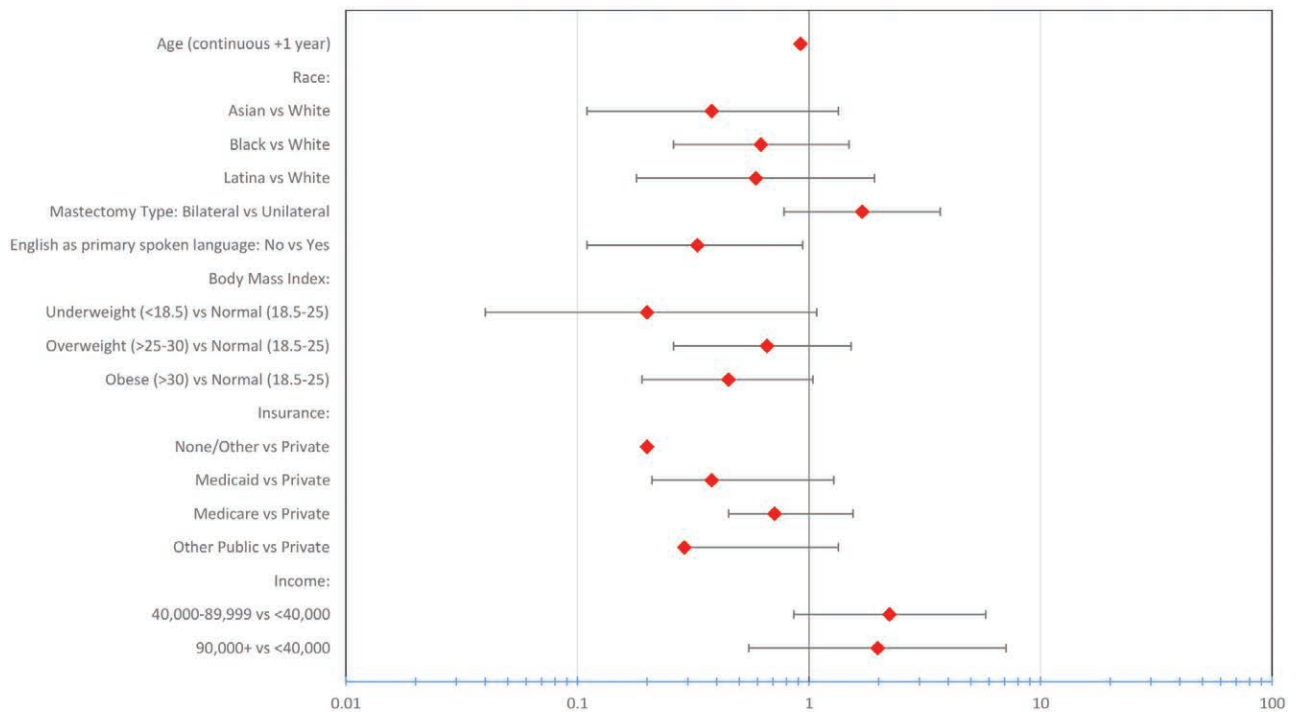


Fig. 1. Forest plot for the multiple variable model explaining whether the patient reports that a doctor told her that breast reconstruction was an option for her. Full details of the model are provided in **Table, Supplemental Digital Content 2**, <http://links.lww.com/PRS/D556>.

Figure 2 presents findings from a multivariable model evaluating the association between patient and surgeon variables and having been told by a doctor that insurance should cover the cost of breast reconstruction. Women who were older were less likely to report being told by a doctor that insurance should cover most of the cost

of breast reconstruction (OR, 0.96; 95 percent CI, 0.94 to 0.98). Language was not significantly associated with communication about insurance coverage of reconstruction. The surgeon performing mastectomy also had a significant association with having been told about insurance coverage. Evaluation by a surgeon with a practice pattern 1 SD

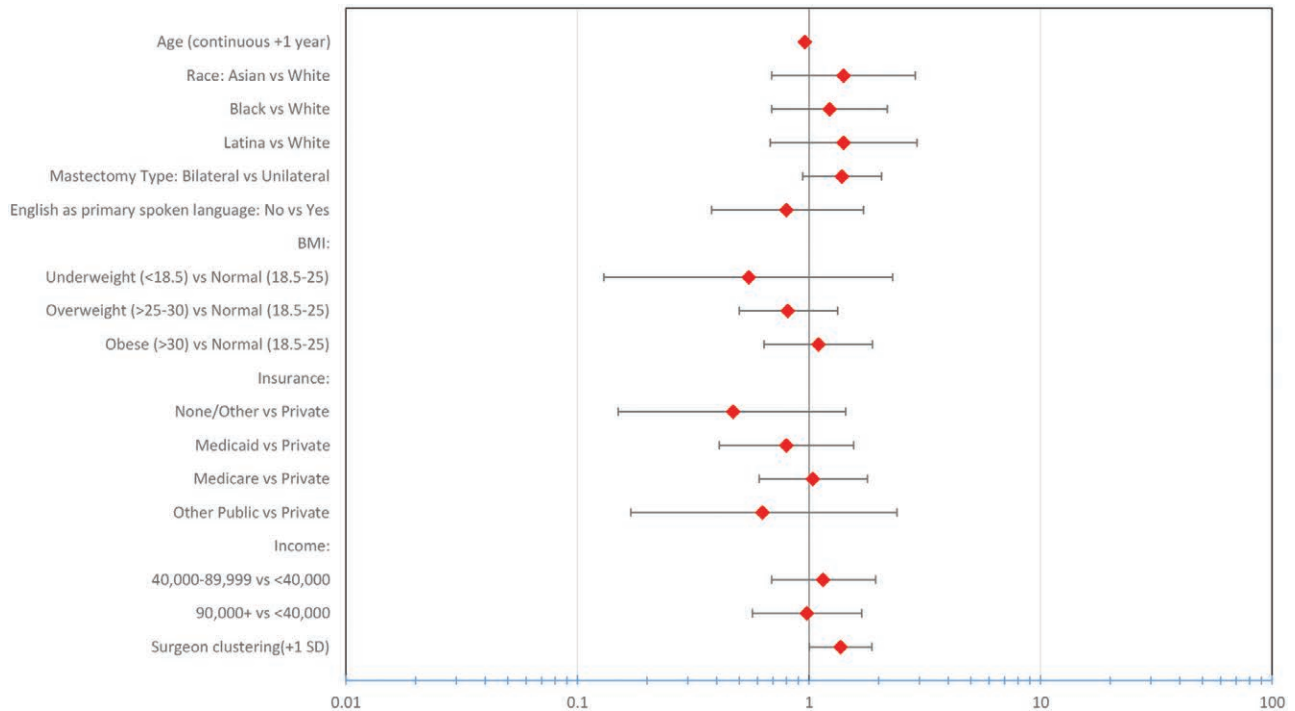


Fig. 2. Forest plot for the multiple variable model explaining whether a patient reports that a doctor told her that insurance should cover most of the costs of breast reconstruction. Full details of the model are provided in **Table, Supplemental Digital Content 3**, <http://links.lww.com/PRS/D557>.

deviation above the average surgeon for communication about insurance coverage increased the likelihood that women reported having been told about insurance coverage, with an odds ratio of 1.37 (95 percent CI, 1.00 to 1.87). (See **Table, Supplemental Digital Content 3**, which shows a multiple variable model explaining whether a patient reports that a doctor told her that insurance should cover most of the costs of breast reconstruction, <http://links.lww.com/PRS/D557>.)

Figure 3 presents findings from a multivariable model evaluating the association between patient variables and knowledge that reconstruction can be performed immediately after mastectomy. Women who were older (OR, 0.97; 95 percent CI, 0.95 to 0.99) and those who were nonwhite (Asian versus white, OR, 0.34; 95 percent CI, 0.17 to 0.69; black versus white, OR, 0.40; 95 percent CI, 0.24 to 0.66; and Latina versus white, OR, 0.48; 95 percent CI, 0.24 to 0.96) had decreased odds of knowing that immediate reconstruction was an option. Women with bronchitis/emphysema were also less likely to know about immediate reconstruction (OR, 0.45; 95 percent CI, 0.22 to 0.91). Those undergoing bilateral mastectomy had 1.59 times greater odds of knowing about immediate reconstruction (95 percent CI, 1.05 to 2.41). Women who were uninsured (OR,

0.25; 95 percent CI, 0.06 to 0.98) had significantly decreased odds of knowing that reconstruction can be performed immediately after mastectomy. In contrast, women with at least some college education (OR, 1.81; 95 percent CI, 1.16 to 2.80) and with incomes over \$40,000 (\$40,000 to <\$90,000 versus <\$40,000, OR, 2.11; 95 percent CI, 1.25 to 3.54; and ≥\$90,000 versus <\$40,000, OR, 2.43; 95 percent CI, 1.36 to 4.34) had increased odds of knowing that reconstruction can be performed in the immediate setting. Language was not significantly associated with knowing about the possibility of immediate breast reconstruction. Women evaluated by surgeons with teaching responsibilities were significantly more likely to know that immediate breast reconstruction after mastectomy was an option (OR, 2.12; 95 percent CI, 1.23 to 3.65). (See **Table, Supplemental Digital Content 4**, which shows a multiple variable model explaining whether a patient knew that reconstruction could be performed immediately after mastectomy, <http://links.lww.com/PRS/D558>.)

Finally, Figure 4 presents findings from a multivariable model evaluating associations between patient and surgeon variables and the receipt of reconstruction. Older women were less likely to undergo reconstruction [OR, 0.95 (+1 year of age); 95 percent CI, 0.93 to 0.97]. Women with

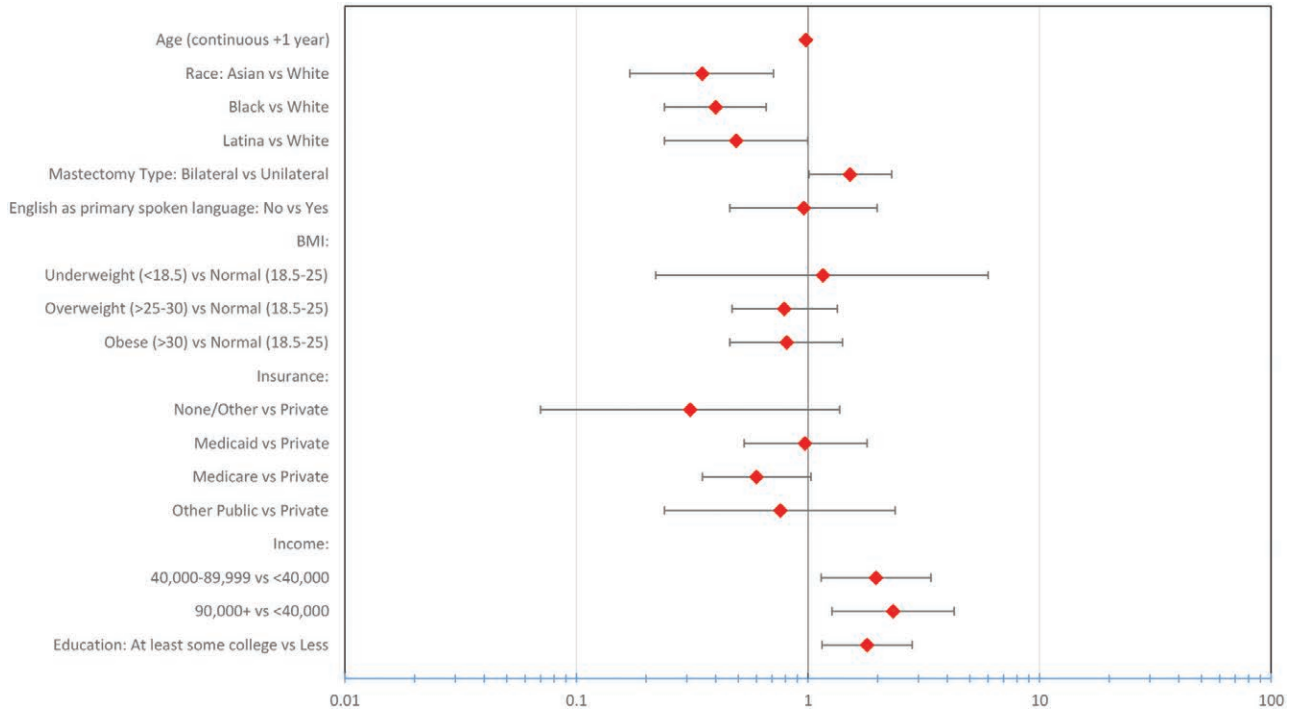


Fig. 3. Forest plot for the variable model explaining whether a patient knew that reconstruction could be performed immediately after mastectomy. Full details of the model are provided in **Table, Supplemental Digital Content 4**, <http://links.lww.com/PRS/D558>.

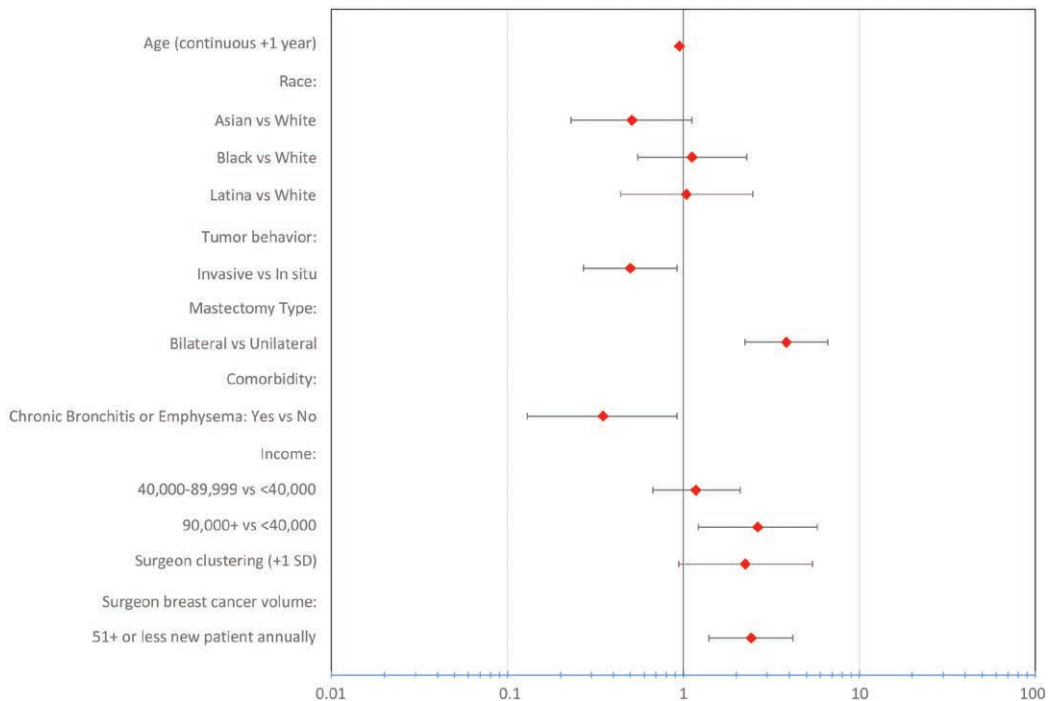


Fig. 4. Forest plot for the multiple variable model explaining receipt of breast reconstruction. Full details of model provided in **Table, Supplemental Digital Content 5**, <http://links.lww.com/PRS/D559>.

comorbid bronchitis/emphysema were less likely to undergo breast reconstruction (OR, 0.35; 95 percent CI, 0.13 to 0.92). Women with invasive disease were significantly less likely to undergo

reconstruction than those with noninvasive disease (OR, 0.50; 95 percent CI, 0.27 to 0.92). Those who underwent bilateral mastectomies had three times the odds of undergoing reconstruction

than those undergoing unilateral mastectomies (OR, 3.85; 95 percent CI, 2.24 to 6.63). The odds of women with higher annual income (>\$90,000) undergoing reconstruction was 2.65 times higher (95 percent CI, 1.22 to 5.77) than the odds of women with lower annual income (<\$40,000). Here also, language was not significantly associated with receipt of reconstruction. Women managed by surgeons with a high breast cancer patient volume (≥ 51 patients per year) were more likely to undergo breast reconstruction (OR, 2.43; 95 percent CI, 1.40 to 4.20) than women managed by surgeons with lower volumes. (See Table, Supplemental Digital Content 5, which shows a multiple variable model explaining receipt of breast reconstruction, <http://links.lww.com/PRS/D559>.)

DISCUSSION

In this study of a modern population-based cohort of women with breast cancer, approximately half received breast reconstruction, and the vast majority stated that they had been told by a doctor that reconstruction was an option for them. Unfortunately, we observed a number of disparities in both communication and receipt of breast reconstruction in this sample. Increasing age was associated with lower rates of reconstruction receipt and also consistently associated with poorer communication about reconstruction. Women for whom English was not the primary spoken language were less likely to have been told that reconstruction was an option. Racial differences also existed, with Asian, black, and Latina women being less likely to know about immediate reconstruction, and Asian women less likely to receive breast reconstruction after controlling for other factors. Socioeconomic vulnerability factors also showed important associations. Those who were uninsured were less likely to know about immediate reconstruction, whereas those with greater education and higher income were more likely to know about immediate reconstruction, and those with higher income were more likely to receive it. These findings suggest that disparities continue to exist, both in terms of reconstruction receipt and also notably with respect to access to the information necessary for all women to share in the important decision regarding whether to pursue breast reconstruction after mastectomy.

There appears to have been some improvement over time in the proportion of patients who receive some information on reconstruction. In 2008, it was reported that only 33 percent of patients surveyed through specific Surveillance,

Epidemiology, and End Results registries had a discussion about breast reconstruction with their general surgeon.¹⁹ A survey of surgeons in 2007 revealed that only 24 percent of surgeons had a high referral propensity, defined as referring more than 75 percent of their patients to plastic surgeons before breast surgery.²⁰ Surgeons with a high propensity for referrals to plastic surgeons were more likely to be female, had high clinical breast surgery volumes (>50 procedures per year), and worked in cancer centers. Almost 10 years later, we show that many more women who receive mastectomy are at least informed about the option of postmastectomy breast reconstruction (92.3 percent of the current sample), but fewer know about the possibility of immediate reconstruction or have been told about insurance coverage of costs, and disparities in access to information continue to warrant attention. The specific surgeon performing mastectomy had a significant impact—regarding both communication and receipt of reconstruction—suggesting that interventions to target the communication practices of general/oncologic surgeons might be fruitful approaches to ensure equitable access of all women to this option, with important consequences for quality of life during survivorship. The plastic surgery community should continue to increase outreach efforts to raise awareness of the benefits of breast reconstruction among general and oncologic surgeons and consider creating easily accessible educational tools and decision aids for breast reconstruction that could potentially bridge the existing information gap on breast reconstruction. These tools should, however, supplement and not replace consultations with reconstructive surgeons.

Breast reconstruction rates have risen over the years, with some variability in reported immediate reconstruction rates from large national databases.²¹ We found a 51.7 percent rate of immediate breast reconstruction based on responses to surveys sent to patients identified through the Surveillance, Epidemiology, and End Results database. Alongside the overall increase in breast reconstruction rates, it is important to note the concomitant rise in contralateral prophylactic mastectomy rates among women with early-stage unilateral breast cancer. Surveillance, Epidemiology, and End Results registry data show an increase in contralateral prophylactic mastectomy rates among women undergoing mastectomy with stage 0 to II breast cancer, from 13.5 percent to 33.6 percent between 2004 and 2014.²² Reconstruction rates in patients undergoing contralateral

prophylactic mastectomy increased from 46.2 percent to 62.5 percent over that period. Women in this study cohort who underwent contralateral prophylactic mastectomy were significantly more likely to know about immediate reconstruction and undergo reconstruction. This is likely a reflection of the fact that though the choice for contralateral prophylactic mastectomy is primarily based on women's oncologic concerns, a secondary desire for symmetry with reconstruction is prominent.²³ Symmetry can be effectively achieved in women undergoing contralateral prophylactic mastectomy with either implant or autologous forms of breast reconstruction, as similar materials are used on both sides. In contrast, in women undergoing unilateral mastectomy, symmetry is best achieved with autologous tissue reconstruction, given the concept of matching the natural breast with "like tissue," a soft primarily adipose tissue-based reconstruction.²⁴ In the long term, satisfaction with autologous reconstruction from the patient's perspective tends to be greater even with natural soft-tissue changes that occur with aging.²⁵ Implant-based reconstructions were the predominant form of reconstruction received by women in this study cohort (70 percent), consistent with the reported distribution on reconstruction types in other studies.^{26,27} The relationship between the decision for contralateral prophylactic mastectomy and breast reconstruction is a complex one but, here again, to avoid decisions made for additional oncologic surgery (contralateral prophylactic mastectomy) based primarily on a desire for symmetry, it is important to inform patients that symmetry can be achieved with unilateral mastectomies with appropriately selected reconstructive procedures.

Beyond the quality of information provided is the need for an equitable delivery of information to all women considering mastectomy. We found that women who fit a certain demographic (young, white, private insurance) were more likely to be informed about and receive reconstruction. Disparities in breast reconstruction based on age, race, insurance type, and socioeconomic status have been well documented.²⁸⁻³⁰ We, however, did not find a significant difference in the likelihood of reconstruction among black, Latina, and Asian women relative to white women in the present sample. Our finding of greater odds for breast reconstruction in patients with noninvasive disease has also been previously reported by others and might be attributed to the fact that the adjuvant postmastectomy treatment of ductal carcinoma in situ tends not to be a limiting factor

for immediate breast reconstruction.^{6,28} Less is known about the correlates of communication in this context in the modern era and whether improved communication will influence uptake of reconstruction. A study of the more recent 2011 New York Public Health Law (N.Y. Public Health Law 2803-O), which mandates that physicians communicate about breast reconstruction with patients undergoing mastectomy, showed some reduction in disparities in reconstruction receipt between Hispanic and white patients (9 percent decrease) and other minorities and white patients (13 percent decrease), 1 year after enactment; no improvements were found in the disparities between African American and white patients.³¹ Some reasons suggested for the limited effect of the law aside from a short follow-up period include potential differences in effective communication style for specific patient groups, a lack of patient trust based on past experiences, language barriers, and limited physician knowledge about the benefits of breast reconstruction. Interestingly, we found that language plays a role in the receipt of information, with women who did not have English as their primary language being less likely to know about breast reconstruction. Of note, differences by race and insurance status appeared to be mediated by communication challenges of failure to speak English as a native language. Addressing this will likely require delivery of information about reconstruction using the primary language of the patient to ensure proper provider-patient communication. This will require additional resources in the form of translated educational materials and interpreters. Also equally important would be encouraging consultations with family members present and asking pointed questions afterward to assess understanding.

This study has a number of strengths, including the large, diverse population of patients and high survey response rate, but limitations are also inherent in its design. As women were surveyed from two regions of the United States, our findings, though significant, might not be generalizable to patients in all locations. Exclusion of women who could not complete questionnaires in Spanish or English also limits generalizability to non-English-speaking populations beyond Latinas. In addition, given the several months that elapsed from the preoperative consultations to filling out the surveys, there is a potential for recall bias among women in the study. In particular, we were limited in our ability to evaluate associations between communication and reconstruction receipt because women who actually received reconstruction would be

expected to be more likely to recall conversations with providers about it being an option for them or insurance coverage, and to have knowledge regarding options for timing. We limited our analyses to avoid fallacies of causal inference that could result from analyzing associations between the communication variables and reconstruction receipt. It is possible that information on immediate reconstruction and on insurance coverage of reconstruction may not have been presented to women who expressed lack of interest in initial information on the option of breast reconstruction. Nevertheless, even a woman who expresses no interest in initial information on the option of breast reconstruction might be driven by misconceptions about the cost or burden of requiring a separate surgical procedure, so this seems to be important information to provide to all women.

CONCLUSIONS

Increased efforts should be made early in consultations for surgical management of breast cancer to provide information, in a language understood by the patient, on the option of reconstruction, about insurance coverage of reconstruction, and regarding the possibility of immediate breast reconstruction. Acknowledging that not all women want reconstruction, this information should be provided to all women, and not preferentially to those who might be presumed to have greatest interest, such as whites, those with private insurance, or younger patients, as this can perpetuate meaningful disparities in long-term quality-of-life outcomes for breast cancer survivors. The current study suggests the potential value in developing and evaluating communication interventions targeting surgeons who perform mastectomy, to ensure dissemination of critical information regarding reconstruction to all patients in a concerted attempt to eliminate existing disparities.

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