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Predictors and Outcomes of Contralateral Prophylactic Mastectomy Among Breast Cancer Survivors

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Abstract

Background—Women affected with breast cancer who carry a BRCA1 or BRCA2 (BRCA1/2) mutation are at risk of developing contralateral breast cancer. To reduce the risk of contralateral breast cancer, some patients opt for prophylactic surgery of the unaffected breast (contralateral prophylactic mastectomy; CPM) in addition to mastectomy of the affected breast.

Methods—We conducted the present study to determine the predictors and outcomes of CPM in the year following BRCA1/2 genetic counseling and testing. 435 women affected with unilateral breast cancer who received positive or uninformative BRCA1/2 genetic test results completed assessments prior to genetic counseling and testing and 1, 6, and 12 months after receipt of results.

Results—Prior to testing, 16% had undergone CPM (in conjunction with mastectomy of the affected breast). In the year following testing, 18% with positive test results and 3% with uninformative test results opted for CPM. CPM following testing was associated with a positive genetic test result, younger age at cancer diagnosis (OR = .94), and higher cancer-specific distress at baseline (OR = 3.28). CPM was not associated with distress outcomes at 12-months.

Conclusions—Following a positive test result, 18% of women previously affected with unilateral breast cancer had a CPM. Women affected with breast cancer at a younger age, particularly those with positive genetic test results and higher cancer-specific distress, are more likely to choose CPM than women who receive uninformative test results and who are less distressed and older at diagnosis. CPM does not appear to impact distress outcomes.

Keywords

BRCA1/2; breast cancer survivors; contralateral prophylactic mastectomy; genetic testing; psychosocial predictors; distress outcomes

Introduction

Contralateral breast cancer occurs in women previously diagnosed with breast cancer at a rate of about 1% per year [1]. For women who carry a BRCA1 or BRCA2 (BRCA1/2) mutation, the risk of developing a contralateral breast cancer is about 3% a year, and the 10-year risk is approximately 40% [2,3]. In order to reduce the risk of contralateral breast

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cancer, some breast cancer patients opt for prophylactic surgery of the unaffected breast (contralateral prophylactic mastectomy; CPM) in addition to mastectomy of the affected breast. Recent evidence suggests that CPM reduces the incidence of contralateral breast cancer by over 90% [4-8] and may also decrease breast cancer specific mortality [5,8].

Given the clear evidence of risk reduction, it is not surprising that newly diagnosed breast cancer patients who learn that they carry a BRCA1/2 mutation prior to their definitive breast cancer surgery opt for CPM at high rates [9,10]. Further, the use of CPM appears to be substantially higher among patients who are aware of their mutation status *prior* to their diagnosis compared to patients who learn of their mutation status *after* diagnosis and treatment [11]. At present, however, few breast cancer patients are aware of their mutation status at the time of breast cancer diagnosis. In the present study, we examined the use and predictors of CPM among breast cancer survivors who self-referred for genetic counseling and testing after they had completed surgical treatment for unilateral breast cancer. Within this sample, we prospectively evaluated the impact of genetic test result, sociodemographic, medical, and psychological factors on use of CPM. In our previous work, and consistent with the work of others, genetic test result [12,13] and cancer-specific worry or distress [14-16] predicted surgical decision making and risk prevention behaviors. Thus, in the present study, we hypothesized that women who received positive test results and had higher levels of baseline cancer-specific distress would be most likely to opt for CPM.

In addition to identifying predictors of CPM, we also evaluated the impact of CPM on psychological outcomes. Descriptive and cross-sectional studies suggest that the majority of women who choose CPM are satisfied with their decision and report few regrets over the long-term [17,18]. In a prospective study of newly diagnosed breast cancer patients, we found no adverse impact of CPM on quality of life at 1- and 12-months post-diagnosis [19]. In the present study, we evaluated the impact of CPM on distress outcomes one year following the receipt of genetic test results. This is the first study to prospectively evaluate psychosocial outcomes of CPM among previously diagnosed breast cancer patients following the receipt of genetic test results.

Methods

Study Population

This study was approved by the institutional review board at Georgetown University. Participants (N = 435) were women affected with unilateral breast cancer who received BRCA1/2 test results through the Lombardi Comprehensive Cancer Center's Cancer Assessment and Risk Evaluation (CARE) program from 1995 to 2000. Patients were self- or physician-referred to the CARE program and all provided informed consent for the present study. Eligibility for genetic testing was determined by standard clinical criteria: individuals with a personal and family history of cancer that was roughly consistent with a minimum 10% prior probability of carrying a BRCA1/2 mutation based on published reports [20-23]. All genetic counseling and testing was provided to participants free of charge.

Because we were interested in predictors and outcomes of CPM among breast cancer survivors, we excluded individuals if they were unaffected with breast cancer (n = 618), male (n = 10), or diagnosed with bilateral breast cancer (n = 87) or ovarian cancer (n = 92). In addition, we excluded individuals who had participated in the intervention arm of a clinical trial to evaluate psychosocial telephone counseling following genetic testing for BRCA1 and BRCA2 mutations (n = 23) [24]. Finally, we excluded the small number of affected women who received a true negative genetic test result (n = 3). Of 488 eligible women, 53 (11%) were dropped due to missing baseline data on one or more of our psychosocial outcome measures. Thus, for analyses focused on predictors of CPM, the final

sample size was 435. There were no differences between participants with and without missing baseline data on any of our psychosocial or sociodemographic variables. For analyses focused on the impact of CPM on psychosocial outcomes at the 12-month follow-up assessment, we dropped 99 participants (23%) who did not complete the 12-month follow-up interview. Thus, the final sample size for the 12-month outcome analyses (n = 336) represents 69% of the all eligible participants. Participants who were lost to attrition did not differ from completers on any baseline study variables with the exception of race. Specifically, 40% (n = 14) of non-Caucasian participants dropped out compared to 21% (n = 83) of Caucasian participants. Among those who remained in the study, race was not associated with any of our outcome variables.

Procedures

Details of the procedures for this study and the content of the genetic counseling are described in previous reports [25]. Briefly, women eligible for the CARE program completed a baseline telephone interview. The baseline interview assessed sociodemographics, family and personal cancer history, surgical history, cancer-specific distress, and general distress. Participants were then invited to a pretest education and counseling session with a genetic counselor. This 1- to 2-hour session included discussion of risks (e.g., qualitative, pedigree-based assessments; autosomal dominant inheritance; cancer risks associated with mutations in BRCA1/2; risks of second cancers, etc.), the process of BRCA1/2 testing, interpretation of results, and options for cancer prevention and surveillance, including data on prophylactic surgeries. At the conclusion of the counseling session, participants were eligible to provide a blood sample for testing. Genetic test results were disclosed at a subsequent genetic counseling/disclosure session; this session lasted up to 1 hour and included discussion of results, screening/prevention guidelines in relation to the test result, implications of test result for family members, and discussion of the psychological impact of the test result.

Participants eligible for this study received either positive or uninformative (a deleterious mutation was not detected) test results. All participants received an individualized written summary of test results, management guidelines, and supplementary education materials. All participants (regardless of test result) were called 2 weeks after test result disclosure to review issues of concern. Structured follow-up phone interviews were conducted at 1-, 6-, and 12-months after disclosure to assess changes in health status (including development of a new cancer or recurrence of breast cancer), surgery history, distress, as well as behavioral and psychosocial outcomes reported elsewhere [25,26].

Measures

Sociodemographics and medical history—At baseline, we assessed age, race, marital status, education level, employment status, religion, income, personal/family history of cancer, and history of risk-reducing surgery. Several of these variables were dichotomized as follows: age (≤ 50 versus > 50), race (Caucasian versus other), marital status (married versus other), education (≤ high school graduate versus > high school graduate), employment (employed full time versus other), religion (Jewish versus other), income (≤ $75,000 per year versus > $75,000 per year). We also assessed history of breast cancer at each follow-up to record development of new contralateral breast cancers.

Cancer-Specific Distress—We measured cancer-specific distress with the 15-item Impact of Event Scale (IES) [27]. The IES has two subscales that measure intrusive and avoidant ideation using Likert-style response options. We used the total IES score and internal consistency in the present study was 0.87.

General Distress—We measured general distress with the short-form of the valid and reliable Hopkins Symptom Checklist (HSCL-25) [28]. This 25-item Likert-style scale assesses the presence and severity of anxiety and depression symptoms during the previous month. We used the total score on the HSCL-25 and internal consistency in the present study was 0.91.

Test Result—Because the present analysis was limited to affected women, the vast majority of participants were probands (i.e., the first person in the family to be tested). Thus, results were classified as "positive" if a deleterious mutation was identified in BRCA1 or BRCA2 (n = 73, 16.8%) and "uninformative" if a deleterious mutation was not detected (n = 362, 83.2%).

Contralateral Prophylactic Mastectomy—We defined CPM as removal of the unaffected breast for purposes of breast cancer risk reduction. CPM could have been performed at the time of mastectomy of the affected breast or at a later point. CPM history was assessed through participant self-report at baseline and at the 1-, 6- and 12-month follow-up interviews.

Statistical Analyses

Descriptive statistics were generated to characterize the sociodemographics, medical variables, and family history of the sample. To evaluate bivariate predictors of contralateral prophylactic mastectomy (CPM) and distress outcomes, we used χ^2 tests, *t* tests and Pearson correlation coefficients. To identify independent predictors of CPM, we used multiple logistic regression with backward elimination of nonsignificant variables. To identify independent predictors of distress outcomes at 12 months, we used multiple linear regression with hierarchical variable entry.

Results

Sample Characteristics

Table 1 displays sample characteristics of participants categorized by CPM status. All participants were previously diagnosed with breast cancer. The majority of participants were white (92%) and college educated (93%) and about half were employed full-time (51%). Participants had a mean age of 50.1 years (Range: 26.7 to 80.4 years, SD = 10.4) and were a mean of 5.7 years (Range: 0.03 to 35.2 years; SD = 6.2) since their initial breast cancer diagnosis.

Rates of Contralateral Prophylactic Mastectomy

At baseline, 16% (n = 70) of the sample had already undergone CPM (in conjunction with mastectomy of the affected breast) prior to referral for genetic counseling and testing. Of the remaining 365 women, 9 (17.6%) of those who received positive test results (n=51) opted for CPM in the year following testing and 8 (2.5%) of those who received uninformative test results (n=314) opted for CPM. Thus, by 1 year post-genetic testing, 20% of the total sample (87 out of 435 women) had opted for CPM (in addition to removal of their affected breast). Among those who received positive test results, 7% received a CPM either before or after testing.

Predictors of Contralateral Prophylactic Mastectomy Prior to Genetic Counseling

Given the high rate of CPM at baseline, we evaluated bivariate associations between baseline sociodemographic, psychosocial, family-history, and medical variables with baseline CPM history (see Tables 2 and 3). The following variables were significantly

associated with having received CPM *prior* to genetic counseling: age at breast cancer diagnosis (t (433) = 3.51, $p < .001$), years since breast cancer diagnosis (t (433) = 3.67, $p < .001$), , not being employed full-time (χ^2_1 (N = 435) = 4.59, $p = .03$), and having at least one first degree relative affected with breast or ovarian cancer (χ^2_1 (N = 435) = 11.13, $p < .001$).

We included these variables in a backward logistic regression model (Table 4). Results indicated that having CPM prior to genetic counseling was independently associated with younger age at breast cancer diagnosis (odds ratio [OR] = 0.95; 95% CI = 0.92 to 0.98), more time since breast cancer diagnosis (OR = 1.07; 95% CI = 1.02 to 1.11), having at least one affected first degree relative (odds ratio [OR] = 3.63; 95% CI = 1.78 to 7.44), and not being employed full time (OR = 0.57; 95% CI = 0.33 to 0.99).

Predictors of Contralateral Prophylactic Mastectomy Following Genetic Counseling

Among participants who had not previously had both breasts removed, we evaluated bivariate predictors of the receipt of CPM in the year *following* genetic testing. The following variables were significantly associated with the receipt of CPM in the year following testing: younger age (t (363) = 3.46, $p < .001$), younger age at time of breast cancer diagnosis (t (363) = 2.96, $p < .001$), less time since breast cancer diagnosis (t (363) = 2.31, $p = .03$), greater cancer-specific distress at baseline (t (363) = 3.73, $p < .001$), greater general distress at baseline (t (363) = 2.23, $p = .04$), and a positive genetic test result (χ^2 (365, 1) = 22.5, $p < .001$). Variables not significantly associated with CPM in the year following testing included: use of Tamoxifen, having a lumpectomy or mastectomy of the affected breast at baseline, or current adjuvant treatment.

As above, variables with significant bivariate associations with CPM in the year following testing, with the exception of age, were evaluated in a backward logistic regression model (Table 5). We did not include age in multivariate modeling because age was completely accounted for by the combination of two other variables—age at time of breast cancer diagnosis and time since breast cancer diagnosis. After elimination of non-significant variables, three variables remained independently associated with the receipt of CPM in the year following testing: genetic test result (OR = 0.23; 95% CI = 0.08 to 0.66), age at time of breast cancer diagnosis (OR = 0.94; 95% CI = 0.88 to 1.0), and baseline cancer-specific distress (OR = 3.28; 95% CI = 1.29 to 8.34). Participants who received a CPM in the year following genetic testing were younger at time of breast cancer diagnosis, more distressed prior to genetic counseling, and more likely to have received positive BRCA1/2 test results.

Impact of CPM on Psychological Distress

We evaluated the impact of CPM on cancer-specific (IES) and general distress (HSCL-25) at the 12-month follow-up using multiple linear regression with hierarchical variable entry. Baseline variables significantly associated with cancer-specific distress outcomes included: baseline cancer specific distress (r (336) = .49, $p < .001$), age (r (336) = -0.18, $p = .001$), and time since breast cancer diagnosis (r (336) = -.22, $p < .001$). We controlled these variables by entering them on the first two steps of the regression. Genetic test result (positive vs. uninformative), when entered on step 3, was not significantly associated with cancer-specific distress [$\Delta R^2 = .00$, F = 0.09, $p = .76$]. On the final step, we entered CPM status (no CPM vs. CPM prior to testing vs. CPM following testing) as a dummy coded variable with no CPM as the reference category. CPM was not associated with cancer-specific distress at 12 months [$\Delta R^2 = .01$, F= 1.85, $p = .16$].

We conducted an identical analysis to evaluate the impact of CPM on general distress at 12 months. Baseline variables significantly associated with general distress outcomes included: baseline general distress (r (335) = .47, $p < .001$), age (r (335) = -0.18, $p = .001$), and time

since breast cancer diagnosis (r (335) = -.22, $p < .001$). Once again, neither genetic test result [$\Delta R^2 = .001$, F = 0.53, $p = .47$] nor CPM status [$\Delta R^2 = .00$, F = 0.07, $p = .94$] independently predicted general distress at 12 months. Only general distress at baseline ($\beta = .41$, $p < .001$) and less time since diagnosis ($\beta = .18$, $p = .039$) independently predicted general distress at 12 months.

Discussion

In the present study we prospectively evaluated rates and predictors of CPM in women affected with breast cancer in the year following BRCA1/2 genetic counseling and testing. Women with a BRCA1/2 mutation had a significantly higher rate of CPM (18%) compared to women receiving uninformative test results (3%). Previous research among unaffected women in the United States and Australia has reported rates of bilateral prophylactic mastectomy ranging from 3%-15% [29-31]. In studies conducted in Europe, rates of prophylactic mastectomy among BRCA1/2 carriers unaffected with breast cancer are much higher, around 50% [32,33]. Differences in rates of prophylactic surgery may be due to physician attitudes, insurance coverage, and other cultural factors [30,34]. Thus, for rates of prophylactic surgery in the United States, the 18% rate of CPM in the present study suggests that compared to unaffected mutation carriers, women previously affected with breast cancer may be more likely to opt for prophylactic surgery following a positive BRCA1/2 test result.

Although the rate of prophylactic surgery in this study was higher compared to previous studies of unaffected mutation carriers, the rate was considerably lower than among newly diagnosed breast cancer patients with a BRCA1/2 mutation. In our own research, we have reported a 48% rate of CPM among newly diagnosed breast cancer patients who learn they carry a BRCA1/2 mutation at the time of their diagnosis [9]. Other researchers have reported even higher rates of prophylactic surgery among newly diagnosed patients [10]. A partial explanation may be that 16% of the women in the present study had already undergone CPM following their initial breast cancer diagnosis and prior to enrollment in this study. In a newly diagnosed sample, these women would not have undergone prophylactic surgery yet and would contribute to the higher rate of CPM. Beyond this, however, it may be that patients are more willing to consider prophylactic mastectomy in conjunction with treatment than they are to consider prophylactic mastectomy years following the completion of treatment. Although we do not have information on the stage of participants' breast cancer diagnoses, it is interesting to note that initial surgical treatment (lumpectomy or mastectomy with or without reconstruction) was not associated with the use of CPM in this sample.

We also examined predictors of CPM among affected women following BRCA1/2 testing. Consistent with our predictions, the receipt of a positive genetic test result and a higher baseline level of distress were associated with subsequent CPM. In addition to these variables, we also found that younger age at the time of breast cancer diagnosis predicted subsequent CPM. These results are consistent with previous work indicating that receipt of a positive BRCA1/2 test result and baseline levels of distress impacted surgery decisions [9,12,13]. Clinically, these results suggest that patients who are most distressed are most likely to opt for CPM, and for BRCA1/2 carriers, CPM could provide reassurance for the most worried patients. Indeed, research on prophylactic surgery decisions suggests that reassurance is a prime motivator for prophylactic surgery [17]. Among women who receive uninformative test results, rates of CPM are low. However, the association with distress raises the possibility that in some cases the decision to obtain a CPM following an uninformative test result may be based on the desire to reduce distress. Future research should examine the ongoing risks and motivations for CPM among women with uninformative BRCA1/2 test results. Future investigations can also explore our finding that

employment status was associated with uptake of CPM prior to BRCA1/2 genetic counseling and testing.

We did not find a relationship between CPM and distress outcomes. These findings confirm results from retrospective studies that documented high rates of satisfaction and few regrets following CPM or BLM [17,18,35]. These results are also consistent with our own prospective research among newly diagnosed patients in which CPM and non-CPM patients did not differ on distress or quality of life outcomes [19].

The data reported here are consistent with existing evidence that patients who choose CPM do not fare worse in terms of psychological outcomes than those who decide against CPM. Although these data are reassuring, these results do not support the routine recommendation of CPM to all mutation carriers. First, the sample in this study was a group of women who self-selected into a research program for BRCA1/2 genetic counseling and testing and also self-selected for CPM. In particular, prior research has suggested patients who opted for BLM or CPM after a specific physician recommendation fared worse than those who actively participated in the decision-making process or opted for these surgeries in the absence of a specific recommendation [17,36]. Taken together, these results highlight the individual nature of and long-term satisfaction with CPM decision making, a personal process that incorporates both psychological factors and the medical evidence for risk management options for previously affected women at risk for contralateral breast cancer. As noted above, the present sample was self-selected and genetic counseling and testing were provided free of charge, factors that limit the generalizability of the results. Although our results indicate that CPM following genetic testing was less likely to occur as more time passed since the date of breast cancer diagnosis, another limitation to this study is the likelihood that some patients opted for CPM after the study period of 12-months. This study was conducted in the late 1990s and into early 2000, and thus there are potential differences in rates of CPM between our sample and current practices and recommendations. Specifically, recent reports have clearly documented the efficacy of BLM/CPM as an effective risk reduction strategy [4,5,8], potentially leading to higher rates of prophylactic surgery than reported in the present study. Alternatively, recent evidence documenting breast cancer risk reduction associated with bilateral prophylactic oophorectomy (BPO) [37,38] may result in more patients choosing BPO as a primary breast cancer risk management strategy. An additional limitation was the small number of women who opted for CPM following genetic testing. This limited our ability to conduct more sophisticated multivariate modeling and increased the confidence intervals surrounding the odds ratios reported in this study. Future research should address these limitations by replicating the present results using a larger and newly-recruited clinical sample of women seeking BRCA1/2 testing.

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Table 1

Characteristics of Sample with and without Contralateral Prophylactic Mastectomy (CPM)

Characteristic	Baseline CPM (n = 70)	CPM following result (n=17)	No CPM (n = 348)	All (n = 435)
Mean age (SD)	50.6 (10.6)	41.6 (10.3)	50.4 (10.2)	50.1 (10.4)
Age at diagnosis (SD)	41.5 (6.9)	38.2 (10.1)	45.2 (9.4)	44.3 (9.3)
Time since diagnosis (SD)	9.1 (8.9)	3.3 (3.1)	5.2 (5.4)	5.7 (6.2)
Marital status				
Married (%)	50 (71.4)	13 (76.5)	251 (72.1)	314 (72.2)
Unmarried (%)	20 (28.6)	4 (23.5)	97 (27.9)	121 (27.8)
Education				
No college (%)	6 (8.6)	1 (5.9)	25 (7.2)	32 (7.4)
Some college/degree (%)	64 (91.4)	16 (94.1)	323 (92.8)	403 (92.6)
Employed				
Full time (%)	28 (40.0)	9 (52.1)	188 (54.0)	225 (51.3)
< Full time (%)	42 (60.0)	8 (47.9)	160 (46.0)	210 (49.7)
Annual income				
< 75,000 (%)	39 (55.7)	8 (47.6)	182 (52.3)	229 (52.6)
> 75,000 (%)	31 (44.3)	9 (52.9)	166 (47.7)	206 (47.4)
Race				
White (%)	66 (94.3)	15 (88.2)	319 (91.7)	400 (91.9)
Other (%)	4 (5.7)	2 (11.8)	29 (8.3)	35 (8.1)
Ethnicity				
Jewish (%)	26 (37.1)	4 (23.5)	119 (34.2)	149 (34.3)
Non-Jewish (%)	44 (62.9)	13 (76.5)	229 (65.8)	286 (65.7)
First-degree relatives with breast cancer				
< 2 (%)	15 (21.4)	2 (11.8)	54 (15.5)	71 (16.3)
≥ 2 (%)	55 (78.6)	15 (88.2)	294 (84.5)	364 (83.7)
Oophorectomy at baseline				
Yes	15 (21.4)	2 (11.8)	64 (18.4)	81 (18.6)
No	55 (78.6)	15 (88.2)	284 (81.6)	354 (81.4)
BRCA1/2 test result				
Uninformative (%)	48 (68.6)	8 (47.1)	306 (87.9)	362 (83.2)
Positive (%)	22 (31.4)	9 (52.9)	42 (12.1)	73 (16.8)

Table 2

Bivariate Associations with CPM History

		CPM Prior to Testing			CPM Following Testing	
		Yes (n = 70)	No (n = 365)		Yes (n = 17)	No (n = 348)
Variable	χ^2	No. (%)	No. (%)	χ^2	No. (%)	No. (%)
Marital Status	0.02			0.15		
Married		50 (71.4)	264 (72.3)		13 (76.5)	251 (72.1)
Unmarried		20 (28.6)	101 (27.7)		4 (23.5)	97 (27.9)
Education	0.18			0.04		
No college		6 (8.6)	339 (92.9)		1 (5.9)	323 (92.8)
Some college/degree		64 (91.4)	26 (7.1)		16 (94.1)	25 (7.2)
Employed	4.59*			0.01		
Full time		28 (40.0)	197 (54.0)		9 (52.1)	188 (54.0)
< Full time		42 (60.0)	168 (46.0)		8 (47.9)	160 (46.0)
Annual Income	0.32			0.18		
≤ 75,000		39 (55.7)	190 (52.0)		8 (47.6)	182 (52.3)
> 75,000		31 (44.3)	175 (48.0)		9 (52.9)	166 (47.7)
Race	0.61			0.25		
White		66 (94.3)	334 (91.5)		15 (88.2)	319 (91.7)
Other		4 (5.7)	31 (8.5)		2 (11.8)	29 (8.3)
Ethnicity	0.31			0.83		
Jewish		26 (37.1)	123 (33.7)		4 (23.5)	119 (34.2)
Non-Jewish		44 (62.9)	242 (66.3)		13 (76.5)	229 (65.8)
First-degree affected relatives	1.59			0.18		
< 2		55 (78.6)	309 (84.7)		15 (88.2)	294 (84.5)
≥ 2		15 (21.4)	56 (15.3)		2 (11.8)	54 (15.5)
Oophorectomy at baseline	0.48			0.46		
Yes		15 (21.4)	65 (17.8)		2 (11.8)	63 (18.1)
No		55 (78.6)	300 (82.2)		15 (88.2)	285 (81.9)
BRCA1/2 test result				22.5***		
Uninformative		------	------		8 (47.1)	305 (87.9)

Variable	χ^2	CPM Prior to Testing		χ^2	CPM Following Testing	
		Yes (n = 70) No. (%)	No (n = 365) No. (%)		Yes (n = 17) No. (%)	No (n = 348) No. (%)
Positive		-----	-----		9 (52.9)	42 (12.1)

* p < .05

** p < .01

*** p < .001.

Table 3

Continuous-Variable Associations with CPM History

		CPM Prior to Testing			CPM Following Testing	
		Yes	No		Yes	No
Variable	***t*-value**	**M (SD)**	**M (SD)**	***t*-value**	**M (SD)**	**M (SD)**
Age	-0.50	50.6 (10.6)	51.0 (10.4)	3.46***	41.6 (10.3)	50.4 (10.2)
Age at Diagnosis	3.51***	41.5 (6.9)	44.9 (9.6)	2.96**	38.2 (10.1)	45.2 (9.4)
Time since Diagnosis	-3.67***	9.1 (8.9)	5.1 (5.4)	2.31*	3.3 (3.1)	5.2 (5.4)
Baseline cancer specific distress	1.10	15.9 (14.4)	18.0 (14.1)	-3.73***	30.2 (18.1)	17.4 (13.7)
Baseline general distress	-0.12	39.5 (9.6)	39.4 (10.1)	-2.23*	46.6 (13.9)	39.0 (9.8)

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 4

Backward Logistic Regression Model of CPM Prior to Testing

Variable*	OR	95% CI
Age at breast cancer diagnosis	0.95	0.92 to 0.98
Time since breast cancer diagnosis	1.07	1.02 to 1.11
One or more affected first-degree relatives	3.63	1.78 to 7.44
Employment status	0.57	0.33 to 0.99

Abbreviations: CPM, contralateral prophylactic mastectomy; OR, odds ratio.

* Final model $\chi^2_4 = 43.32$; $p < .0001$.

Table 5

Backward Logistic Regression Model of CPM in the Year Following Testing

Variable*	OR	95% CI
Genetic Test Result		
Uninformative (vs. Positive)	0.23	0.08 to 0.66
Age at breast cancer diagnosis	0.94	0.88 to 1.00
Baseline cancer-specific distress	3.28	1.29 to 8.34

Abbreviations: CPM, contralateral prophylactic mastectomy; OR, odds ratio.

Variables removed from model: time since breast cancer diagnosis ($\chi^2_1 = 1.21$; $p = 0.27$), baseline general distress ($\chi^2_1 = 0.44$; $p = 0.51$).

*Final model $\chi^2_3 = 29.66$; $p < .0001$.