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Communicating with Daughters About Familial Risk of Breast Cancer: Individual, Family, and Provider Influences on Women's Knowledge of Cancer Risk

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Abstract

Introduction—Women facing complex and uncertain situations such as cancer in their families may seek information from a variety of sources to gain knowledge about cancer risk and reduce uncertainty. We describe and assess the relative importance of information sources about familial breast cancer at the individual, family, and healthcare provider levels influencing women's reporting they had enough information to speak with daughters about breast cancer. This outcome we refer to as being informed about breast cancer.

Materials and Methods—Sister Study participants, a cohort of women with a family history of breast cancer, were surveyed on family cancer history, family communication, social support, and interactions with healthcare providers (n = 11,766). Adjusted percentages and 95% confidence intervals for being informed about breast cancer versus not being informed were computed for individual-, family-, and provider-level characteristics in three steps using multivariate logistic regression models.

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Results—We found 65% of women reported being informed about breast cancer while 35% did not. Having a trusted person with whom to discuss cancer concerns, having a lower versus higher perceived risk of breast cancer, having undergone genetic counseling, and being satisfied with physician discussions about breast cancer in their families were predictors of being informed about breast cancer.

Conclusions—Although acquiring objective risk information, such as through genetic counseling, may contribute to a basic level of understanding, communication with providers and within other trusted relationships appears to be an essential component in women's reporting they had all the information they need to talk with their daughters about breast cancer.

Keywords

breast cancer; oncology; risk communication; genetic counseling; family communication; information management

Introduction

Communication within families about genetic risk for breast cancer is uniquely challenging because hereditary cancers affect not only the individual but are relational—both genetically and psychosocially.[1] For the individual considering disclosure of genetic risk of cancer to family members, there can be tensions between the perceived responsibility to inform relatives, the desire to protect relatives from unnecessary worry, and the personal desire to maintain privacy about one's health and genetic makeup.[2–4] Communication of genetic risk is also influenced by factors such as cultural background, emotional closeness or distance between relatives, and open or closed family communication patterns.[5–9]

Complicating communication about familial cancer is the complexity of genetic information itself. The difficulty in understanding and conveying genetic risk information has been shown in studies that included both the public and medical professionals where a lack of awareness about the genetic heritability for breast and ovarian cancer risk from the paternal side of the family has been especially well documented.[10,11] Recent calls for educational materials or the direct assistance of healthcare providers in helping people communicate with relatives about genetic risk highlights an important unmet need.[12–17] In particular, whether a woman with a family history of breast cancer discusses familial cancer risk with her children or other relatives may well hinge on whether she believes she has enough information to do so.

Communication about familial breast cancer can be thought of as a way of both acquiring information and managing uncertainty—a theme of particular relevance to topics involving cancer risk and genetics. Research suggests, however, uncertainty in probabilistic, complex, or ambiguous situations cannot always be eliminated, but rather, would require management to reduce anxiety and worry.[18,19] Uncertainty management theory posits that persons confronted with unpredictable or complex situations or events such as cancer in their family, will seek information from a variety of sources to manage uncertainty, or conversely, may avoid especially distressing information as a coping mechanism.[18,20] Moreover, an individual seeking information may find that information from different sources may have

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different and perhaps conflicting effects on their confidence about what they know and about the accuracy of their knowledge.

Cancer in a family member is a serious event and intrafamilial communication can convey both emotional support and important risk information.[21] Outside the family, physicians remain the most trusted source of health information despite patients' first seeking information on the Internet.[22,23] At the individual level, information from different sources is integrated or filtered by factors such as education, age, and personal beliefs. Thus, a person's understanding of her vulnerability to cancer may differ greatly from scientific understanding, and may remain limited even after being provided with genetic risk information.[24–26] Furthermore, the accuracy of genetic information has been shown to decline as it moves from the clinic or healthcare provider to the family, and from one family member to another.[27,28]

We used a socio-ecologic conceptual model to frame demographic and psychosocial characteristics at the individual, family, and healthcare provider levels influencing a woman's reporting she has enough information to speak with her daughter about breast cancer (Fig. 1, conceptual model).[29] The aims of this analysis were to describe the characteristics that influence a woman's reporting she is informed about breast cancer and identify the relative importance of those characteristics.

Materials and Methods

Participants

Data were obtained from a CDC-sponsored survey conducted among participants in the Sister Study cohort, a nationwide prospective cohort study of genetic and environmental risk factors for breast cancer among women with at least one sister diagnosed with breast cancer but who were themselves breast cancer-free at the time of the survey (https://sisterstudy.niehs.nih.gov). Study design and methodology for the Sister Study is described at https://sisterstudy.niehs.nih.gov and in previous publications.[30,31] At enrollment, all Sister Study respondents completed a baseline survey that included demographics, personal medical history and family history of cancer. The CDC Survey collected information on cancer screening, genetic counseling, genetic testing, and cancer prevention behaviors among the 21,189 women scheduled for their periodic follow-up in 2011–2012 who had not reported a breast cancer diagnosis. The study was approved by the Institutional Review Boards of the NIEHS/NIH and the Co-pernicus Group.

A total of 19,540 women completed the survey (response rate = 92.2%). Of these women, 11,831 reported they had a daughter to whom they had given birth and were therefore eligible for this analysis. After excluding 19 women who reported a history of lobular carcinoma *in situ* or ductal carcinoma *in situ* and 84 women who did not answer the question on having enough information to speak with their daughter(s) about cancer in the family, the final sample size was 11,766 for analysis.

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Measures

Dependent variable—The outcome of interest was whether women agreed with the statement that they had "all the information they needed to speak with their daughter(s) about breast cancer." The 4 item response categories were dichotomized into strongly disagree/disagree versus agree/strongly agree with having enough information. For consistency throughout the following text we refer to this outcome as "being informed about breast cancer."

Individual level variables—Individual level characteristics included age, marital status, education level, a personal history of cancer other than breast cancer, and choice of survey administration (phone, paper, or online) that was used as a proxy for skill in navigating online resources (see Table 1 for categorization of variables). In addition, to assess a woman's perceived risk of breast cancer, respondents were asked whether their lifetime chance of developing breast cancer was much lower, lower, about the same, higher, or much higher compared with other women their age. Responses were categorized into three levels: much lower/lower, the same, and higher/much higher. In previous studies this measure has demonstrated good sensitivity in identifying high-risk women[32] and also was shown to influence genetic risk disclosure to family members.[33]

Family level variables—Family level factors included race/ethnicity, the number of first-degree relatives with breast cancer, time since the respondent's sister's cancer diagnosis, and household income. Women also were asked whether they have a trusted person with whom to speak about their concerns about developing breast cancer. The 4-level response categories (strongly disagree to strongly agree) were dichotomized as agree/strongly agree versus disagree/strongly disagree.

Research suggests social support attenuates or buffers the effects of stressful events.[34,35] Thus, the response to an event such as a diagnosis of cancer in one's family can be ameliorated through support offered by family members. Social support was measured with six items selected and adapted from the Medical Outcomes Study Social Support Survey Instrument[36] and the Abbreviated Childhood Trauma Questionnaire that address the availability of informational, instrumental, or tangible assistance when needed as well as emotional support received during adulthood and childhood.[37] Respondents were asked how often they could count on someone to provide emotional support (someone to confide in about problems, someone who will listen), how often they could count on someone for help (with daily chores or doctor's appointments), how often there is someone in the immediate family who believed in her and wanted her success, how often there was a family member who is making her feel important, and how often there was a family member who during childhood believed in her, and how often there was a family member who during her childhood made her feel special. Responses categories included 1 (none of the time), 2 (a little of the time), 3 (some of the time), 4 (most of the time), and 5 (all of the time). Responses were summed and categorized roughly into quartiles ranging from lowest to highest social support. The Cronbach's alpha for this scale was 0.86 demonstrating high internal consistency.

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We used a subset of communication-related questions from the Connection to the Experience of Cancer Scale (CONNECS) to describe family communication.[38] Each respondent was asked about "how much time was spent talking with her sister before she was diagnosed with cancer," "how much time was spent talking with her sister during her breast cancer diagnosis and treatment," "how much time was spent talking with her sister about her breast cancer," and "how much time was spent talking with family members about her sister's cancer." The 4-level response options included 1 (never), 2 (rarely), 3 (sometimes), and 4 (often). Answers were summed across items and divided into thirds, creating high, medium, and low levels of family communication. The internal consistency for these 4 items was adequate (Cronbach's alpha =0.74).

Provider level variables—We asked participants whether they had spoken with a healthcare provider about what their family history of breast cancer means for their own health and cancer risk ("no," "yes a little," "yes a lot") and whether they had received genetic counseling because of their family history of cancer. Genetic counseling was defined as a discussion with a trained genetic counselor about family health history. We chose genetic counseling as a key provider variable because genetic counselors assess and discuss family history and risk of cancer before genetic testing and interpret results after genetic testing, making genetic counseling an important source of information on breast cancer. We also asked how satisfied respondents were with the level of communication they had with their doctor about their family cancer history and their own cancer risk. Responses were coded as a 5-point scale ("very satisfied," "satisfied," "neither satisfied nor dissatisfied," "dissatisfied," or "very dissatisfied").

Statistical analysis

We used percentages and chi-square tests to describe the distribution of characteristics associated with the dichotomous outcome of being informed about breast cancer. We imputed missing values for household income using the hot deck method as implemented in SUDAAN with marital status and age as explanatory variables.[39] To examine the predictive power of the independent variables on our outcome, we conducted multivariate logistic regression analysis with hierarchical entry in three steps: the block of individual level characteristics entered first, then family level characteristics along with individual level characteristics, and finally provider characteristics added to the first two levels resulting in a full model. Entering the three sets of independent variables sequentially allowed us to examine the unique contribution above-and-beyond each group of variables. To enable straightforward interpretation of the model's results, we computed adjusted percentages (predicted margins) and 95% confidence intervals derived from the logistic regression models. Overall associations were assessed with the Wald F statistic. A p-value of ≤ 0.05 was considered statistically significant. We considered particularly noteworthy those results that were both statistically significant and had meaningfully different percentages. All analyses were conducted using SAS 9.3, with SUDAAN release 10 (Research Triangle Institute, Research Triangle Park, NC).

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Results

The 11,766 respondents in our sample ranged in age from 38 to 80 with an average age of 60 years. The majority were non-Hispanic white (84%), were married or partnered (79%), had a relatively high household income (almost 35% with income of $100,000 or higher), and almost half had a college or postcollege education (48%).

Table 1 shows the unadjusted predicted percentages of women responding “yes” and “no” to the being informed about breast cancer for the individual, family, and provider-related characteristics. Overall, 65% of the women reported being informed about breast cancer and 35% did not. All variables except education level and personal history of cancer were significantly associated with being informed about breast cancer.

Table 2 presents the adjusted percentages from sequential regression models. Model fit improved with the addition of family variables and provider variables to the individual variables (Hosmer-Lemeshow Wald p-value = 0.18 for individual level variables, 0.95 for individual and family level variables, and 0.75 for the model including all levels). Consistent with the bivariate results, the model with only individual characteristics showed women who perceived their risk of breast cancer as being much lower than most woman their age were more likely to report being informed about breast cancer compared with those who perceived their risk as being much higher (76% vs. 65%), and women whose mode of survey administration was paper were less likely to state they were informed about breast cancer (61%) compared with those who took the survey by phone or Internet (74% and 69%). Women who had never married were less likely to state they were informed about breast cancer as were older versus younger women. A personal history of cancer other than breast cancer was not associated with being informed about breast cancer.

With the addition of family level variables into the model, marital status was no longer statistically significant and each of the family level variables, except for household income, were associated with being informed about breast cancer. Non-Hispanic black women, compared with other women, were significantly less likely to report being informed about breast cancer. Having a trusted person with whom to speak about breast cancer concerns was a predictor of being informed about breast cancer as was having two or more breast cancer-affected relatives compared with only one affected sister. Social support and family communication were significant, although weaker, predictors of being informed about breast cancer.

After the final step of adding provider level variables, family communication and social support were no longer statistically significant predictors. Race/ethnicity, mode of survey administration, and having a trusted person to speak about breast cancer remained statistically significant predictors with meaningful percentage differences between categories. Among the provider characteristics, being more satisfied versus less satisfied with a physician discussion about family cancer history was a strong predictor of being informed about breast cancer. Only small percentage differences were seen between the categories (no, a little, in depth) of the variable “spoke with a physician about family cancer history.” Also statistically significant but less meaningful in terms of percent differences was

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receipt of genetic counseling (“yes” vs. “no”) and having two or more relatives with breast cancer versus one affected sister.

Discussion

We found factors at the individual, family, and provider levels that influenced women being informed about breast cancer. In terms of both statistical significance and meaningful percentage differences, having a trusted person with whom to speak about breast cancer, a lower versus a higher perceived risk of breast cancer, non-Hispanic black race, and higher versus lower satisfaction with physician discussion were associated with being informed about breast cancer.

Having a trusted person with whom to speak about breast cancer concerns, whether that person was a family member, friend, or a physician, remained strongly associated with being informed about breast cancer in the final model including all levels. Physicians are the most trusted source of health-related information, playing an important role in promoting adherence to health behavior and treatment recommendations as well as providing appropriate referrals for specialized care.[22,23,40] This is reflected in our finding that greater satisfaction with physician discussion about cancer in the family significantly contributed to being informed about breast cancer. Although over 80% of respondents were satisfied or very satisfied with their discussion with their physician, we found as satisfaction increased, the percentage of women reporting having enough information about cancer increased. Furthermore, speaking in depth versus speaking a little or not speaking with a physician was significantly informative for women. Neither social support nor level of familial communication remained as significant predictors of being informed about breast cancer in the final model that included provider characteristics.

Women who reported having undergone genetic counseling, a process involving a detailed discussion about family cancer history, were more likely to report being informed about breast cancer although the percentage differences were not large. Previous studies, including an analysis of over 3,000 women from a national sample of insured persons for whom genetic testing has been reported, demonstrate an association between genetic counseling and improved knowledge about BRCA mutations and a greater understanding of genetics.[22,23,40,41]

Women with a higher perceived risk of breast cancer were less likely to report being informed about breast cancer than women with a lower perceived risk. Communication theory suggests attempts to reduce uncertainty may create more uncertainty, especially in situations where uncertainty cannot be reduced or avoided.[42] This may well describe the case for women at high risk for breast cancer or women who believe themselves to be at high risk. For these women, uncertainty, already an inherent part of being at high risk, becomes an ongoing, chronic process[43,44] brought on by having to make healthcare decisions about preventive measures such as enhanced screening or prophylactic surgery, or by the added worry about breast cancer risk for close family members. These are uncertainties not experienced by women believing themselves to be at the same or lower-

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than-average risk of cancer. Thus, uncertainty and the need for more information to answer ongoing questions may increase with being or believing oneself to be at high risk.

Our analysis showed that non-Hispanic black women were significantly less likely than non-Hispanic white, Hispanic, or other women to report being informed about breast cancer. Our findings are consistent with studies describing limited knowledge and awareness of cancer genetics and BRCA1/2 mutations among African American women as barriers to the uptake of genetic counseling and testing.[45–47] Underlying this knowledge barrier may be concerns about genetic discrimination and a lack of trust in the medical system—a recurrent theme in the literature on African Americans.[48,49] A lack of provider referrals to genetic services as well as high costs and administrative barriers for these services have been shown to limit young African American breast cancer survivors' participation in genetic counseling and testing.[50,51]

All women in this cohort had a sister with breast cancer and almost 25% had more than one relative with breast cancer. It is likely that the lived experience with breast cancer among one or more relatives provided practical knowledge about breast cancer. This is suggested by our finding that having more affected relatives than a single sister predicted being informed about breast cancer.

Among the strengths of this study are the high response rate from a targeted subset of women in the larger Sister Study, and the large sample size that allowed us to investigate a number of characteristics in some detail. One limitation of this study is that our data are self-reported and therefore subject to recall bias and social desirability bias (a tendency by respondents to answer questions in a way they believe will be viewed favorably). However, for many of the factors we studied, self-report was the only practical method of soliciting information. Additionally, the cross-sectional nature of our study does not allow for determining the direction or the causal nature of relationships between variables of interest. Because we were primarily interested in the potential sources of information for women with a family history of cancer, our outcome of interest was worded in terms of "having all the information I need" for a discussion about cancer. We recognize there are important factors beyond information alone that would influence the subjective assessment of "having enough knowledge to speak about breast cancer." These might include self-efficacy to engage in discussions, comfort in having conversations about cancer family history, or family dynamics, which we did not measure in the survey. Despite these limitations, our results highlight important factors that can influence a woman's confidence in her knowledge about cancer risk and identify opportunities for increasing that knowledge.

Conclusions

Our key findings point to having a trusted person with whom to discuss cancer concerns, and satisfying physician encounters as significant contributors to being informed about breast cancer. The measure of successful communication about cancer risk in families has often focused on uptake of genetic counseling and testing by at-risk relatives, or on the depth of knowledge being conveyed by medical professionals, our findings also suggest that simply conveying objective risk information may not reduce uncertainty or increase confidence in

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cancer knowledge.[52,53] Rather, successful communication may depend on the depth and tenor of discussions with healthcare providers and within other trusted relationships—a situation more likely to be achieved through long-term relationships that foster trust and through conversations that go beyond evidence and risk.[54]

Advances in genetics and molecular medicine along with mass media attention have increased public awareness of the importance of cancer family history. Uptake of genetic testing through traditional genetic counseling channels or through direct to consumer testing, combined with the decreasing cost of testing, makes discussions about genetics within the family setting more likely to occur, thus making ease of obtaining information more urgent. However, an increase in information may not necessarily translate to less uncertainty or a more complete understanding of what is currently known about cancer family history or genetic heritability. Effectively incorporating genetic knowledge into medicine and into discussions within families requires a better understand how the public makes sense of this information. This insight would guide the development of tools or strategies that make family history and genetics relevant and practically useful for individuals needing to make decisions that could impact their own or a family member's health.

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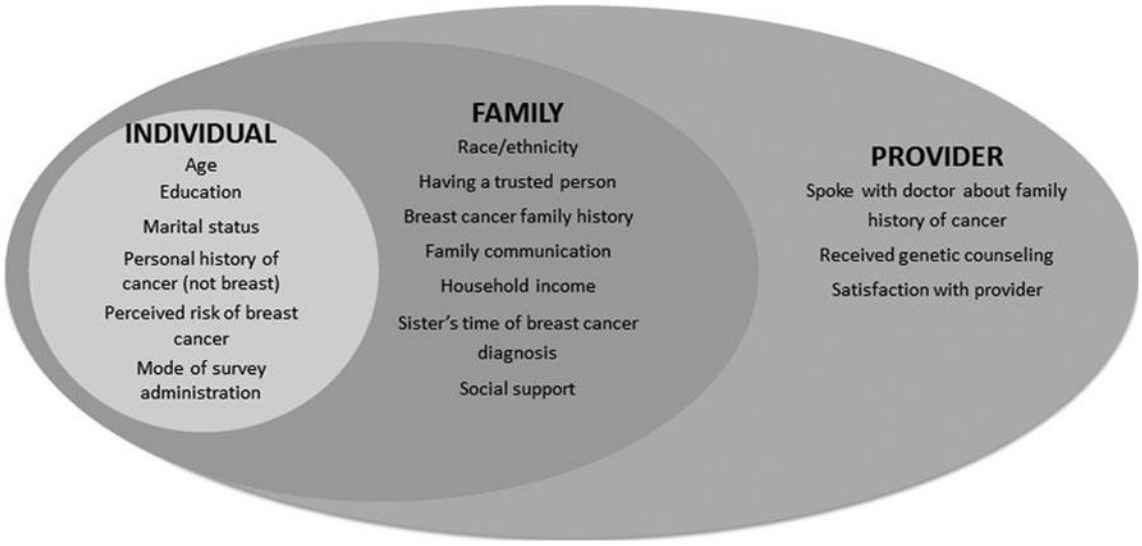

FIG. 1.
Three level ecologic model for being informed about breast cancer.

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Table 1

Demographic and Psychosocial Characteristics of Being Informed About Breast Cancer

Characteristics	Being informed, *N* = 7,644 *n* (row %)	Not being informed, *N* = 4,084 *n* (row%)	*p*[a]
Individual level			
Respondent's age at special survey			0.005
38–49	983 (62.2)	597 (37.8)	
50–59	2,610 (64.7)	1,433 (35.3)	
60–69	2,753 (65.7)	1,435 (34.3)	
70–80	1,298 (67.7)	619 (32.3)	
Education			0.12
≤ high school/GED	1,219 (63.1)	712 (36.9)	
Some college	2,703 (65.5)	1,424 (34.5)	
College graduate	2,007 (64.9)	1,084 (35.1)	
Postgraduate	1,714 (66.5)	864 (33.5)	
Marital status			<0.01
Never married	75 (58.1)	54 (41.8)	
Partnered	6,099 (65.9)	3,153 (34.1)	
Widowed/divorced/separated	1,468 (62.6)	877 (37.4)	
Personal history of cancer			0.07
Yes	839 (67.5)	404 (32.5)	
No	6,805 (64.9)	3,680 (35.1)	
Perceived chance of developing breast cancer			<0.001
Much lower than most women your age	223 (76.1)	70 (23.9)	
Lower	519 (65.3)	276 (34.7)	
About the same	2,561 (66.2)	1,305 (33.8)	
Higher	3,535 (64.0)	1,985 (36.0)	
Much higher	783 (64.4)	432 (35.6)	
Mode of survey administration			
Telephone	947 (73.1)	349 (26.9)	<0.0001
Internet	3,135 (68.3)	1,457 (31.7)	
Paper	3,562 (61.0)	2,278 (39.0)	
Family level			
Household income			
<$20,000	290 (62.8)	172 (37.3)	<0.0001
$20,000–$49,999	1,449 (62.1)	884 (37.9)	
$50,000–$99,999	3,144 (65.2)	1,681 (34.8)	
$100,000–$200,000	2,149 (66.4)	1,089 (33.6)	
More than $200,000	611 (70.3)	258 (29.7)	
Family communication			<0.0001
Low level	2,528 (62.4)	1,526 (37.6)	
Medium level	2,404 (65.4)	1,270 (34.6)	
High level	2,703 (67.7)	1,287 (32.3)	

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Characteristics	Being informed, *N* = 7,644 *n* (row %)	Not being informed, *N* = 4,084 *n* (row%)	*p*[a]
Race/ethnicity			<0.0001
Non-Hispanic white	6,514 (66.2)	3,323 (38.8)	
Non-Hispanic black	608 (55.5)	487 (44.5)	
Hispanic	327 (66.1)	168 (34.0)	
Other	193 (64.6)	106 (35.5)	
Have trusted person with whom to discuss cancer			<0.0001
Agree/strongly agree	7,020 (68.6)	3,221 (31.5)	
Strongly disagree/disagree	565 (40.5)	830 (59.5)	
How recent was sister's diagnosis			0.03
3–5 years	1,896 (63.8)	1,074 (36.2)	
5–10 years	3,065 (64.7)	1,669 (35.3)	
10+ years	2,672 (66.8)	1,331 (33.3)	
Breast cancer family history			<0.0001
1 affected relatives	5,675 (63.9)	3,210 (36.1)	
2 affected relatives	1,724 (68.9)	780 (31.2)	
3–5 affected relatives	245 (72.3)	94 (27.7)	
Social support			
1st quartile (lowest social support score)	1,499 (59.0)	1,040 (41.0)	<0.0001
2nd	1,634 (65.5)	862 (34.5)	
3rd	2,270 (66.4)	1,147 (33.6)	
4th quartile (highest social support score)	1,950 (68.4)	900 (31.6)	
Provider level			
Spoke with doctor about cancer family history			<0.0001
Yes, a little/a lot	6,748 (66.4)	3,423 (33.6)	
No	877 (57.6)	646 (42.4)	
Received genetic counseling			<0.0001
Yes	810 (74.9)	272 (25.1)	
No	6,823 (64.2)	3.806 (35.8)	
Satisfaction with provider's discussion			<0.0001
Very satisfied	3,260 (76.0)	1,029 (24.0)	
Satisfied	3,353 (64.2)	1,868 (35.8)	
Neither satisfied nor dissatisfied	827 (49.0)	861 (51.0)	
Dissatisfied	139 (33.9)	271 (66.1)	
Very dissatisfied	37 (52.9)	33 (47.1)	

[a] *p*-Values from chi-square tests.

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Table 2

Adjusted Percentages and 95% Confidence Intervals for Predictors of Being Informed About Breast Cancer

	Step 1			Step 2			Step 3		
	Individual level variables			Family level variables			Provider level variables		
Variables	**PM[a]**	**95% CI**	***p***	**PM**	**95% CI**	***p***	**PM**	**95% CI**	***p***
Age			<0.0001			<0.001			<0.0001
38–49	61.2	58.7–63.6		61.6	59.1–64.1		60.9	54.4–63.4	
50–59	64.0	62.5–65.5		64.0	62.4–65.5		63.8	62.3–65.3	
60–70	66.0	64.7–67.5		65.9	64.5–67.3		66.2	64.8–67.7	
70–80	68.8	66.7–70.9		68.4	66.1–70.5		68.9	66.6–71.0	
Education			0.15			0.22			0.28
≤ high school/GED	63.0	60.9–65.2		63.1	60.8–65.3		63.3	61.0–65.5	
Some college	65.6	64.2–67.1		65.6	64.1–67.1		65.8	64.2–67.2	
College graduate	65.1	63.4–66.8		64.9	63.2–66.6		65.0	63.3–66.7	
Postgraduate	66.2	64.3–68.0		65.9	64.0–67.8		65.8	63.8–67.6	
Marital status			<0.0001			0.56			0.32
Never married	56.9	49.2–65.2		67.4	58.7–75.0		69.2	60.7–76.6	
Partnered	66.2	65.2–67.20		65.3	64.3–66.3		65.4	64.4–66.4	
Widowed/divorced/separated	61.6	59.6–63.6		64.2	62.0–66.3		64.0	61.9–66.1	
Personal history of cancer other than breast			0.14			0.25			0.42
Yes	67.1	64.4–69.7		66.6	63.9–69.2		66.2	63.5–68.8	
No	65.0	64.0–65.9		64.9	64.0–65.8		65.0	64.1–66.0	
Perceived risk of breast cancer			0.001			<0.0001			<0.0001
Much lower than women your age	75.6	70.3–80.1		76.6	71.4–81.2		75.2	69.7–80.0	
Lower	64.7	61.3–68.0		66.9	63.5–70.1		66.6	63.3–69.9	
About the same	66.2	64.7–67.6		66.9	65.4–68.4		66.9	65.4–68.4	
Higher	64.1	62.9–65.4		63.5	62.2–64.8		64.0	62.8–65.3	
Much higher	64.8	62.9–67.4		62.3	59.4–65.1		61.4	58.5–64.2	
Mode of survey administration			<0.0001			<0.0001			<0.0001
Telephone	73.6	71.1–75.9		72.8	70.1–75.3		71.3	68.6–73.9	

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	Step 1			Step 2			Step 3		
	Individual level variables			Family level variables			Provider level variables		
Variables	**PM[a]**	**95% CI**	***p***	**PM**	**95% CI**	***p***	**PM**	**95% CI**	***p***
Internet	68.5	67.1–69.8		64.4	67.1–69.8		68.2	66.8–69.5	
Paper	60.7	59.5–62.0		60.9	59.6–62.1		61.6	60.3–62.8	
Household income						0.11			0.28
<$20,000				65.1	60.4–69.6		66.5	61.8–70.8	
$20,000–$49,999				63.1	61.9–65.3		63.6	61.5–65.8	
$50,000–$99,999				64.9	63.5–66.3		65.1	63.7–66.4	
$100,000–$200,000				65.8	64.0–67.5		65.5	63.8–67.2	
More than $200,000				68.7	65.4–71.8		67.8	64.6–70.9	
Family communication						0.002			0.26
Low level				63.2	61.7–64.7		64.3	62.8–65.8	
Medium level				65.0	63.4–66.5		65.2	63.7–66.7	
High level				67.1	65.6–68.6		66.0	64.5–67.6	
Race/ethnicity						<0.0001			<0.0001
Non-Hispanic white				66.1	65.1–67.0		66.0	65.0–67.0	
Non-Hispanic black				53.8	50.6–57.0		54.3	51.1–57.4	
Hispanic				69.1	64.7–73.1		70.4	66.1–74.3	
Other				65.1	59.5–70.3		66.6	61.0–71.7	
Having a trusted person with whom to discuss cancer						<0.0001			<0.0001
Agree/strongly agree				68.2	67.3–69.1		67.5	66.6–68.5	
Strongly disagree/disagree				42.2	39.6–45.0		48.0	45.2–50.8	
How recent was sister’s diagnosis						0.02			0.09
3–5 years				63.3	61.6–65.0		63.6	61.8–65.4	
5–10 years				65.0	63.6–66.3		65.3	63.9–66.7	
10+ years				66.5	65.0–68.0		66.1	64.6–67.6	
Family history of breast cancer						<0.0001			0.02
1 affected relatives				63.6	62.8–64.9		64.5	63.4–65.5	
2 affected relatives				68.6	66.7–70.4		67.2	65.3–69.1	
3–5 affected relatives				71.9	66.9–76.4		69.3	64.0–74.1	

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	Step 1			Step 2			Step 3		
	Individual level variables			Family level variables			Provider level variables		
Variables	**PM[a]**	**95% CI**	***p***	**PM**	**95% CI**	***p***	**PM**	**95% CI**	***p***
Social support						0.01			0.23
1st quartile (lowest score)				62.4	60.5–64.3		63.5	61.6–65.3	
2nd				65.7	63.8–67.5		66.0	64.2–67.8	
3rd				65.5	63.9–67.0		65.5	63.9–67.1	
4th quartile (highest score)				66.4	64.7–67.1		65.5	63.8–67.3	
Spoke with doctor about cancer family history									<0.001
No							66.9	64.3–69.4	
Yes, a little							63.5	62.2–64.7	
Yes, a lot							67.2	65.5–68.8	
Received genetic counseling									0.02
Yes							68.8	65.7–71.8	
No							64.8	63.9–65.7	
Satisfaction with physician discussion									<0.0001
Very satisfied							73.3	71.7–74.7	
Satisfied							64.6	63.2–65.9	
Neither satisfied nor dissatisfied							53.1	50.5–55.7	
Dissatisfied							42.1	36.9–47.4	
Very dissatisfied							59.0	47.0–70.0	

[a]PM, predicted marginal from logisitic regression using all variables in each step.