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Patient-Clinician Interactions and Disparities in Breast Cancer Care: The Equality in Breast Cancer Care Study

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Abstract

Purpose: To examine whether interpersonal aspects of patient-clinician interactions, such as patient-perceived medical discrimination, clinician mistrust, and treatment decision-making contribute to racial/ethnic/educational disparities in breast cancer care.

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Informed consent: Informed consent was obtained from all individual participants included in the study.

Data availability: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Methods: A telephone interview was administered to 542 Asian/Pacific Islander (API), Black, Hispanic and White women identified through the Greater Bay Area Cancer Registry, ages 20 and older diagnosed with a first primary invasive breast cancer. Adjusted odds ratios (aOR) and 95% confidence intervals (CI) were calculated from logistic regression models that assessed associations between race/ethnicity/education, medical discrimination, clinician mistrust, and treatment decision-making with concordance to breast cancer treatment guidelines (guideline-concordant treatment) and perceived quality of care (pQoC).

Results: Approximately three-quarters of women received treatment that was guideline-concordant (76.6%) and reported that their breast cancer care was excellent (72.1%). Non-college-educated Black women had lower odds of guideline-concordant care (*aOR (CI)*=0.29 (0.12–0.67)) vs. college-educated White women. Odds of excellent pQoC were lower among: college-educated Hispanic women (*aOR (CI)*=0.09 (0.02–0.47)) and API women regardless of education (*aORs* 0.50) vs. college-educated White women; women reporting low and moderate levels of discrimination (*aORs* 0.44) vs. none; and women reporting any clinician mistrust (*aOR (CI)*=0.50 (0.29–0.88)) vs. none. Disparities in guideline-concordant care and pQoC persisted after controlling for medical discrimination, clinician mistrust, and decision-making.

Conclusions: Interpersonal aspects of the patient-clinician interaction had an impact on pQoC but not receipt of guideline-concordant treatment and did not explain disparities in either outcome.

Implications for Cancer Survivors: Although breast cancer survivors' interpersonal interactions with clinicians did not influence receipt of appropriate treatment, intervention strategies to improve patient-clinician relations may help attenuate disparities in survivors' pQoC.

Keywords

disparities; breast cancer; discrimination; decision-making; mistrust

Introduction

Breast cancer is the most commonly diagnosed malignancy (excluding skin cancer) and second leading cause of cancer-related death among women in the US. [1] Although breast cancer mortality in the general population has been steadily decreasing over the past decade, [2] disparities in both incidence and mortality across racial/ethnic and socioeconomic groups persist. [3–5] Evidence of racial/ethnic and socioeconomic disparities in breast cancer treatment [6–12] and perceived quality of care (pQoC) [13, 14] is also accumulating, with implications for disparities in length and quality of life. [6, 8]

The context in which care is delivered, particularly the relationship between clinicians and patients, is an important determinant of improved cancer care and reduced disparities. [6, 15] Interpersonal aspects of patient-clinician interactions, including discrimination within the health care setting (medical discrimination), level of clinician mistrust, and extent and nature of patient participation in treatment decision-making, may contribute to disparities in breast cancer treatment and perceptions of care quality. [10, 14, 16–19] Patients' experiences of discrimination, defined as “the process by which a member of a socially defined group is treated differently because of their membership in that group” [20],^{p.169} have been associated with unequal medical treatment [19] and multiple negative health

outcomes, including poorer health status, greater pain, lower screening and adherence, [21, 22] and increased breast cancer incidence. [23] Mistrust of the healthcare system (including hospitals and clinicians) has been associated with lower receipt of adjuvant therapy [16] and indirectly associated with lower receipt of breast-conserving surgery, through lower patient confidence in interactions with physicians. [10] Discrimination and medical mistrust have also been associated with lower perceived quality of and satisfaction with medical care, which may partially account for racial differences in satisfaction with general medical care [24, 25] and breast cancer care, specifically. [14]

Unlike medical discrimination and clinician mistrust, shared decision-making is a favorable interpersonal experience within the medical context that may also impact receipt of appropriate treatment and pQoC. Decision-making style has been indirectly related to receipt of breast conserving surgery, [10] but this association may vary across race/ethnicity. In one study, greater patient involvement in treatment decisions was associated with a lower likelihood of breast-conserving surgery among White women but a greater likelihood of breast-conserving surgery among African American women. [17] Shared treatment decision-making has also been associated with increased patient satisfaction with treatment decisions after surgery, among both women with invasive breast cancer and women with ductal carcinoma in situ. [26, 27]

Despite this evidence, there has been limited research on whether medical discrimination, clinician mistrust, and treatment decision-making explain disparities in cancer care. Also lacking are studies that examine cancer disparities across multiple interdependent social statuses such as race/ethnicity and socioeconomic status (SES). [28, 29] The President's Cancer Panel has called for research that furthers understanding of socioeconomic heterogeneity within racial/ethnic groups and associated implications for cancer outcomes. [30] This nuanced approach may be particularly important for discrimination research as previous studies have documented differing reports of discrimination by SES within racial/ethnic groups. [28, 31] Examining the joint effects of race/ethnicity and SES may provide insights into how these factors combine to influence interpersonal experiences within the health care setting and inform the development of targeted interventions. [3, 29]

The current analysis leverages a diverse sample of breast cancer survivors and has three main objectives: 1) determine if there are disparities across racial/ethnic groups according to educational attainment (an indicator of SES) in breast cancer treatment and pQoC; 2) examine whether three different interpersonal experiences between patients and clinicians (medical discrimination, clinician mistrust, and treatment decision-making) are related to treatment and pQoC; and 3) examine whether disparities persist after accounting for these interpersonal experiences.

Methods

Study population

Data are from the Equality in Breast Cancer Care (EBCC) study, a cross-sectional study designed to examine disparities in breast cancer treatment and patient-reported outcomes. Women ages 20 years and older diagnosed with a first invasive primary breast cancer

between 2006 and 2009, and who resided in the San Francisco Bay Area (San Francisco, Contra Costa, Alameda, San Mateo, and Santa Clara counties) were identified through the Greater Bay Area Cancer Registry (GBACR) and were invited to participate first by mail (per cancer registry requirements, with written materials in English and, if applicable, the assumed language (Spanish, Mandarin, Cantonese, or Tagalog) of the patient based on her race/ethnicity in the registry) then with follow-up phone calls. Between 2011 and 2013, 542 women completed a telephone interview in English, Spanish, Mandarin, Cantonese, or Tagalog with trained, professional, bi-lingual interviewers. An overall survey response rate of 34% (range: 24% among Hispanic women to 47% among White women) was comparable to average response rates for web and paper surveys [32] and respondents were similar to the underlying target patient population on selected sociodemographic (age, race/ethnicity/education, partner status, insurance) and clinical characteristics (AJCC stage, tumor size, histology subtype). The study protocol was approved by the institutional review boards of the Cancer Prevention Institute of California (where the study was conducted) and the California Health and Human Services Agency.

Outcomes

Receipt of guideline-concordant care was based on whether women self-reported receiving treatment that aligned with the National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology [33] and the American Society of Clinical Oncology Quality Oncology Practice Initiative. [34, 35] Women reported whether they had received and completed surgery (e.g., lumpectomy, mastectomy), radiation, chemotherapy, and/or hormonal therapy during the course of their breast cancer care. GBACR data were used to fill in missing self-reported treatment data wherever possible. Each woman was considered to be in one or more patient subsets based on her age and tumor characteristics (subtype and stage). Similar to prior research [11], these subsets were used to define appropriate treatment options, as described in Table 1. Women with any non-concordant care were categorized as not receiving guideline-concordant care.

PQoC was based on a single question adapted from Malin and colleagues [36]: “Overall, on a scale of 1 to 10 where 1 is the worst health care possible and 10 is the best health care possible, what number would you use to rate the breast cancer care you have received?” Because responses were highly skewed (Mean=8.93, SD=1.36, Median=9), we created a dichotomous variable to indicate excellent (9–10) and less than excellent care (1–8). Similar dichotomizations have been used by other researchers examining self-reported quality of and satisfaction with care among cancer survivors. [37]

Interpersonal Factors

Medical discrimination was assessed using a newly created measure that included adapted items from the Everyday Discrimination Scale [38] and new items from our formative research. [39] Psychometric analyses indicated this 6-item scale measures a single underlying construct and performs equivalently across various racial/ethnic groups. [40] Women reported how often they perceived 6 types of discriminatory experiences while receiving breast cancer care (e.g., treated with less respect than other people) using a 4-point scale ranging from “never” to “often”. Responses to each item were dichotomized to reflect

whether the women had never (0) vs. ever (1; rarely, sometimes, or often) experienced a particular form of discriminatory treatment. Scores were summed to create a medical discrimination score that ranged from 0 to 6 (internal consistency reliability; $\alpha=0.82$). We then categorized levels of medical discrimination as: none (0), low (1–2), and moderate/high (3–6).

Clinician mistrust was assessed with two items adapted from Bickell et al. [16] that asked about trust in doctors and nurses using a 4-point Likert scale ranging from “strongly agree” to “strongly disagree”. Responses were dichotomized (agree/disagree). The variable was dichotomized into no mistrust vs. any mistrust (agreement with either or both items).

Treatment decision-making was measured using a single item adapted from Katz and colleagues [17]: “Which of the following best describes the role your doctors played when making a decision about your treatment?” Women who indicated that their final treatment decision was “made together with your doctor(s)” were coded as having shared treatment decision-making and served as the referent group. Women who reported that their treatment decision was entirely or mostly by them or their physician were coded as having patient-driven and physician-driven treatment decision-making, respectively.

Race/Ethnicity/Education

We categorized women according to their self-reported race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Asian/Pacific Islander (API)). To evaluate the joint effects of race/ethnicity and education, we created a combined 8-category variable that further delineated each racial/ethnic group by educational status (with and without a college degree). Although the statistical interaction between race/ethnicity and education was not significant for either outcome of interest in preliminary analyses, this approach allowed for examination of the interdependent effects of multiple social statuses [41] and has been used in other cancer disparities research. [3] We chose to categorize women based on college, rather than high school, education given the high level of educational attainment in our sample.

Covariates

We evaluated sociodemographic, clinical, and institutional characteristics as potential covariates. Relationship status at time of diagnosis was defined as partnered (married, domestic partner, living with a partner) or not partnered (single, separated, divorced, widowed). Health insurance was coded hierarchically as: other (military (n=5), other (n=6), or uninsured (n=2)); public insurance (Medicare, Medi-Cal, other government/public program); or private health insurance. Information on American Joint Commission on Cancer (AJCC) stage, histology, and tumor size were obtained from the GBACR. Based on the first reporting hospital as coded in the GBACR, we described two hospital characteristics: whether it was an NCI-designated cancer center and privately or publicly owned.

Statistical Analysis

Chi-square tests at the $p < 0.10$ level were used to identify potential confounders for inclusion in multivariable models. We used logistic regression to assess the relationships between the two outcomes of interest (guideline-concordant treatment and pQoC) and race/ethnicity/education as well as each of the three types of interpersonal experiences (medical discrimination, clinician mistrust, treatment decision-making) (research objective 1). Next, a series of multivariable logistic regression models tested the effects of race/ethnicity/education, medical discrimination, clinician mistrust, and treatment decision-making on both outcomes when controlling for significant covariates (research objectives 2 and 3). We performed sensitivity analyses to examine the robustness of findings when modeling race/ethnicity and education separately, and results were similar to using the combined race/ethnicity/education variable (data not shown). Missing data were handled using listwise deletion, yielding analytic sample sizes of 505 and 509 for the fully-adjusted models of guideline-concordant treatment and pQoC, respectively. Statistical significance for the unadjusted and multivariable regression models was evaluated at the $p < 0.05$ level and 95% confidence intervals. SAS version 9.3 (Cary, NC) was used to conduct all analyses.

Results

API, Black, and Hispanic women accounted for approximately two-thirds of the sample (Table 2). Larger proportions of API and White women were college-educated, whereas larger proportions of Black and Hispanic women did not have a college degree. Participants ranged in age from 28 to 88 years ($Mean = 60.4$ years; $SD = 11.0$). Approximately 70% of women reported being partnered and having private health insurance. The vast majority of women were diagnosed with stage I or II breast cancer (88.9%) and ductal histology (72.1%). Tumor sizes varied, though 60.0% were smaller than 2 cm. Less than 10% of women received breast cancer care at an NCI-designated cancer center, although a majority (53.3%) received care at hospitals that were privately owned. A majority (64.2%) of women reported never having a discriminatory experience while receiving breast cancer care and only 18.1% reported any clinician mistrust. More than half reported non-shared treatment decision-making (39.1% driven by patient, 14.2% driven by physician). Approximately three-quarters of women received treatment that was guideline-concordant (76.6%) and reported that their breast cancer care was excellent (72.1%) (Table 2).

Distributions of age, AJCC stage, and tumor size differed across treatment groups (guideline-concordant and non-guideline-concordant), and age and AJCC stage differed across pQoC groups (excellent and less than excellent care) (Table 2). These variables were included as covariates in their respective multivariable models.

No overall differences in guideline-concordant care were observed by race/ethnicity/education ($\chi^2 = 8.38$, $p = 0.30$), medical discrimination ($\chi^2 = 1.95$, $p = 0.38$), clinician mistrust ($\chi^2 = 0.001$, $p = 0.97$), or treatment decision-making ($\chi^2 = 1.61$, $p = 0.45$) in unadjusted analyses (Model 0, Table 3). Nevertheless, compared to White women with greater than a college education, Black women with less than a college education had significantly lower odds of guideline-concordant care ($OR = 0.40$, 95% CI : 0.18, 0.85; Model 0, Table 3). These patterns held when controlling for age, stage, and tumor size (Models 1–3, Table 3). The disparity

observed among Black women with less than a college education persisted when controlling for covariates and all three interpersonal factors ($OR=0.29$, 95% *CI*: 0.12, 0.67, Model 3, Table 3).

Significant differences in pQoC were observed by race/ethnicity/education ($\chi^2=25.83$, $p<0.001$), medical discrimination ($\chi^2=64.92$, $p<0.0001$), and clinician mistrust ($\chi^2=11.86$, $p<0.001$) in unadjusted models (Model 0, Table 4). Odds of excellent perceived quality of breast cancer care were significantly lower among college-educated Hispanic women ($OR=0.14$, 95% *CI*: 0.04, 0.52) relative to college-educated White women. API women, regardless of education, reported lower odds of excellent pQoC (non-college-educated: $OR=0.30$, 95% *CI*: 0.16, 0.56; college-educated: $OR=0.39$, 95% *CI*: 0.22, 0.70) relative to college-educated White women. In the unadjusted models, lower odds of excellent care were reported among women reporting low ($OR=0.39$, 95% *CI*: 0.23, 0.63) and moderate ($OR=0.13$, 95% *CI*: 0.08, 0.21) levels of medical discrimination vs. none, and women reporting any mistrust of physicians or nurses ($OR=0.45$, 95% *CI*: 0.28, 0.71) vs. none (Table 4). Treatment decision-making was marginally associated with pQoC in the unadjusted model ($\chi^2=5.32$, $p=0.07$); women who reported that their treatment decision was driven by their doctor had significantly lower odds of reporting excellent breast cancer care than women reporting shared decision-making ($OR=0.64$, 95% *CI*: 0.43, 0.97). Patterns observed for medical discrimination and clinician mistrust, but not treatment decision-making, persisted when controlling for age and stage (Models 2a-2c, Table 4). The final model (Model 3, Table 4) controlled for all three interpersonal aspects of patient-clinician interactions (medical discrimination, clinician mistrust, and treatment decision-making) in addition to age and stage. After full adjustment, medical discrimination and clinician mistrust remained associated with lower pQoC and racial/ethnic/educational disparities persisted.

Discussion

We found racial/ethnic/educational disparities in breast cancer treatment (based on self-report and cancer registry data) and pQoC, with non-college-educated Black women less likely to receive guideline-concordant treatment, and college-educated Hispanic women and API women with and without a college degree less likely to report excellent pQoC. Some have speculated that medical discrimination [18, 19], clinician mistrust [16, 19], and treatment decision-making [10, 17] might explain disparities in breast cancer outcomes. We found that none of these interpersonal experiences were associated with receipt of guideline-concordant breast cancer treatment, but both medical discrimination and clinician mistrust were negatively associated with perceptions of excellent quality of care. However, none of these interpersonal factors reduced racial/ethnic/educational disparities in treatment and pQoC.

In this racially/ethnically diverse sample of breast cancer survivors, only Black women with less than a college education had significantly lower odds of receiving guideline-concordant breast cancer care than college-educated White women. Although our sample was drawn from a specific region in the US, Chen and Li [7] similarly found that Black women were less likely than White women to receive guideline-concordant care

using data from 18 SEER cancer registries. A prior study among an insured population within an equal-access healthcare system also showed similar results among less educated Black women [34]. In a population-based setting, Black breast cancer survivors without a college education experienced inefficient referrals and care transfers, along with delays in appointment scheduling. [42] More uncertainty about treatment and treatment goals [43] has been documented among low-income Black breast cancer survivors and may also contribute to non-guideline-concordant care. Financial burden has previously been linked to treatment nonadherence and could be a key consideration for Black women without a college education. [44] Further research that explores which barriers are of most concern for Black breast cancer survivors with less than a college education is warranted.

Efforts to provide high-quality, patient-centered care [19, 45] have generated interest in patient-reported outcomes such as pQoC. In the current study, Hispanics with a college education and APIs with and without a college degree had reduced odds of reporting excellent pQoC, even after controlling for covariates, medical discrimination, clinician mistrust, and treatment decision-making. It is possible that the college-educated Hispanic women in our sample had higher expectations for their care than Hispanics with less education [46] however, why the observed association was limited to Hispanics warrants further evaluation of cultural nuances. API breast cancer survivors may be more influenced by language and cultural barriers and therefore uncomfortable and uncertain about communicating with their clinicians [47]. Lack of communication or poor communication may have elevated low ratings of pQoC among API survivors in our study, especially among recent immigrants. It may be important for future studies of pQoC to assess aspects and quality of patient-clinical communication [48].

For the breast cancer survivors in our sample, receipt of guideline-concordant treatment was distinct from perceptions of quality of care. Disparities in treatment and pQoC were not consistent: non-college-educated Black women had lower odds of guideline-concordant care when compared to college-educated White women, but not lower odds of excellent quality of care. College-educated Hispanic women and API women of all educational levels had lower odds of excellent pQoC, but were not less likely to receive guideline-concordant care. Additional research, perhaps of the qualitative nature, is needed to identify the specific concerns identified in our research.

We observed robust associations between medical discrimination, clinician mistrust, and pQoC. Interventions to improve pQoC can aim to target clinicians' beliefs and behaviors to improve interpersonal aspects of patient-clinical interactions. [19] Social psychologists have offered strategies to combat possible unconscious prejudice and stereotypes among health care clinicians. [49] Increasing clinicians' ability to assume the perspective of their patients, engage in emotional empathy, and recognize and address unconscious biases hold particular promise for improving interracial patient-clinician interactions. [49, 50] Some organizations and schools have utilized the Implicit Association Test (IAT) to assess unconscious bias in training current and future healthcare professionals. [51, 52] Research that evaluates the implementation of such strategies with breast cancer care clinicians could contribute to improved pQoC among women of all racial/ethnic/educational backgrounds.

While this study contributes to the sparse literature on interpersonal aspects of the patient-clinician interaction and has implications for breast cancer care, it does have limitations. Response rates were lower than anticipated, limiting the generalizability of our findings, though respondents were generally similar in characteristics to the underlying sample. The low response rate was primarily due to multiple ongoing breast cancer studies drawing from the GBACR and study fatigue among eligible women. Given small subgroup sample sizes, additional studies are needed to confirm the observed race/ethnicity/education disparity in guideline-concordant care. Clinician-patient relationship constructs were asked at the same time as the pQoC outcome, therefore we are not able to assess temporality nor causality. Self-reported breast cancer treatment may be subject to limitations in memory or understanding, particularly for women with lower levels of education or income. However, women with breast cancer have been shown to self-report treatment with a high degree of accuracy [53], regardless of socioeconomic status [54] and some studies have considered self-report to be as good of a gold standard as medical records [55]. We relied on a self-reported, albeit widely used, measure of quality of care, which reflects women's subjective evaluation of their breast cancer care. However, obtaining clinicians' corresponding evaluations of the quality of care provided would further advance our understanding of how care is delivered and received. Assessing specific clinical encounters, perhaps through observation, could provide valuable information on particular aspects of the medical encounter that contribute to medical discrimination, clinician mistrust, and shared treatment decision-making. Finally, the assessment of disparities in guideline-concordant care and pQoC by nativity in addition to race/ethnicity and education is important, as immigrants may experience less guideline-concordant care and pQoC due to greater vulnerability to poorer interpersonal interactions in the healthcare setting, largely stemming from stronger cultural and language barriers than non-immigrants. However, there was not enough variability in our dataset to assess findings by nativity and race/ethnicity. Future research, in larger study populations, should look at this important factor.

By examining the joint effects of race/ethnicity and education, we were able to detect nuanced disparities in guideline-concordant care and pQoC in a multiethnic, multilingual sample of breast cancer survivors, although results of this study should be considered preliminary given the small sample sizes when assessing the intersectional effects of race/ethnicity and education. Nonetheless, results of fully adjusted models allowed us to understand the relative contributions of medical discrimination, clinician mistrust, and treatment decision-making to clinical and patient-reported outcomes. Notably, this is the first application of a medical discrimination measure that was developed specifically for breast cancer survivors and is based on robust formative research. [39] Directly measuring perceptions of discrimination allowed us to test its associations explicitly with important treatment and survivorship outcomes, which represents an advance over indirect approaches that can only assume that unexplained variance in outcomes of interest are due to discrimination. [56] Although we did not detect an association between medical discrimination and breast cancer care, experiences of discrimination contribute to socioeconomic inequities, chronic stress, and restricted access to healthcare goods and services, which can increase the incidence of adverse health outcomes such as treatment side effects, comorbidities, cancer recurrence, and mortality.[39] Therefore, factors other

than discrimination within these complex psychosocial and socioeconomic pathways may influence racial/ethnic/educational disparities in guideline-concordant care, as we saw in our study. In summary, our results highlight negative associations between pQoC and perceived medical discrimination and clinician mistrust, identify vulnerable populations who may benefit from efforts to improve breast cancer care, and emphasize the need to examine interpersonal aspects of patient-clinician interactions on breast cancer outcomes.

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Table 1.

Criteria for Determination of Receipt of Non-Guideline-Concordant Care

Subset	Inclusion Criteria	Guideline Treatment ^a	Definition of Non-Guideline-Concordant Treatment
1	<ul style="list-style-type: none"> ■ Stage I-III ■ Tumor size ≤ 5 cm ■ Not having a diagnosis of Paget disease, inflammatory carcinoma, or being diagnosed by mammography only ■ Confirmed pathology ■ Known lymph node involvement ■ No diagnosis of bilateral tumors or a second primary breast tumor within 60 days 	<ul style="list-style-type: none"> ■ Lumpectomy with full-course of radiation ■ Mastectomy, with or without radiation 	<ul style="list-style-type: none"> ■ No surgery ■ Lumpectomy without radiation ■ Lumpectomy with early discontinuation of radiation
2	<ul style="list-style-type: none"> ■ Estrogen receptor (ER)+ and/or progesterone receptor (PR)+ 	<ul style="list-style-type: none"> ■ Endocrine therapy 	<ul style="list-style-type: none"> ■ No endocrine therapy
3	<ul style="list-style-type: none"> ■ Stage I-III ■ Age <70 ■ ER- and PR- ■ Tumor size ≥ 1cm 	<ul style="list-style-type: none"> ■ Chemotherapy 	<ul style="list-style-type: none"> ■ No chemotherapy

^aDefinitions based on the Comprehensive Cancer Network Clinical Practice Guidelines in Oncology [33] and the American Society of Clinical Oncology Quality Oncology Practice Initiative [35]

	Total			Patient and Registry-Reported Outcome: Treatment (N=542)			Patient-Reported Outcome: Perceived Quality of Care (N=541)		
	N	Col %	P-value	N	Row %	P-value	N	Row %	P-value
Public	136	25.1		27	19.9		37	27.2	
Other or missing	15	2.8		1	6.7		3	20.0	
Clinical characteristics									
AJCC Stage									
I	295	54.4		91	30.9		83	28.1	
II	187	34.5		36 ^d	19.2		68 ^d	36.4	
III or IV	46	8.5		---	---		---	---	
Missing	14	2.6		---	---		---	---	
Tumor Size									
<1 cm	111	20.5		42	37.8		33	29.7	
1–1.9 cm	214	39.5		50	23.4		58	27.1	
2–2.9	95	17.5		20	21.1		30	31.6	
3+ cm	105	19.4		15 ^e	14.3		30 ^e	28.6	
Missing	17	3.1		---	---		---	---	
Histology subtype									
Ductal	391	72.1		93	23.8		111	28.4	
Lobular	110	20.3		24	21.8		27	24.6	
Other	41	7.6		10	24.4		13	31.7	
Hospital characteristics									
NCI-designated cancer center									
No	503	92.8		118	23.5		142	28.2	
Yes	39	7.2		9	23.1		9	23.1	
Ownership									
Public	192	35.4		44	22.9		55	28.7	
Private	289	53.3		70	24.2		77	26.6	

	Patient and Registry-Reported Outcome: Treatment (N=542)			Patient-Reported Outcome: Perceived Quality of Care (N=541)							
	Total	Not guideline-concordant		Less than excellent		Excellent					
	N	Col %	N	Row %	N	Row %	N	Row %	P-value		
Missing	61	11.3	13	21.3	48	78.7	19	31.2	41	67.2	
Interpersonal factors											
Discrimination											
Never (0)	348	64.2	83	23.9	265	76.2	59	17.0	289	83.1	<0.01
Low (1-2)	102	18.8	19	18.6	83	81.4	35	34.3	66	64.7	
Moderate (3-6)	89	16.4	24	27.0	65	73.0	55	61.8	34	38.2	
Missing	3	0.6	1	33.3	2	66.7	2	66.7	1	33.3	
Clinician mistrust											
None (0)	436	80.4	103	23.6	333	76.4	106	24.3	329	75.5	<0.01
Any (1)	98	18.1	23	23.5	75	76.5	41	41.8	57	58.2	
Missing	8	1.5	1	12.5	7	87.5	4	50.0	4	50.0	
Treatment decision-making											
Patient-driven	212	39.1	55	25.9	157	74.1	67	31.6	144	67.9	0.07
Shared	252	46.5	53	21.0	199	79.0	58	23.0	194	77.0	
Physician-driven	77	14.2	19	24.7	58	75.3	25	32.5	52	67.5	
Missing	1	0.2	0	0.0	1	100.0	1	100.0	0	0.0	
Total	542	100.0	127	23.4	415	76.6	151	27.9	390	72.1	

^aCD = 4-year college degree

^bPartnered = legally married or registered domestic partner, living with a partner to whom you are not married, in a relationship but not living with a partner; Not-partnered = single, separated, divorced, widowed

^cOther = Military, Indian Health Service, other, uninsured; Public = Medicare, Medi-Cal, another government or public program

^dAlso includes counts for stage III, IV and missing because these categories had counts <5 and cell sizes <5 cannot be shown per California Cancer Registry guidelines

^eAlso includes counts for missing because this category had a count of <5 and cell sizes <5 cannot be shown per California Cancer Registry guidelines

Table 3. Association between Race/Ethnicity/Education, Medical Discrimination, Clinician Mistrust, Treatment Decision-Making and Receipt of Guideline-Concordant Breast Cancer Treatment

	Model 0: Unadjusted ^b			Model 1 ^c : Disparities			Model 2a ^c : Discrimination			Model 2b ^c : Clinician mistrust			Model 2c ^c : Treatment Decision-Making			Model 3 ^d : Disparities and Interpersonal Factors		
	OR (95% CI)	p		OR (95% CI)	p		OR (95% CI)	p		OR (95% CI)	p		OR (95% CI)	p		OR (95% CI)	p	
Combined race/ethnicity/education ^a			0.30			0.18												
API <CD	0.83 (0.43, 1.58)	0.56		0.71 (0.35, 1.41)	0.33											0.76 (0.37, 1.54)	0.44	
API CD+	0.77 (0.43, 1.37)	0.37		0.74 (0.39, 1.38)	0.34											0.80 (0.42, 1.52)	0.50	
Black <CD	0.40 (0.18, 0.85)	0.02		0.32 (0.14, 0.72)	0.01											0.29 (0.12, 0.67)	<0.01	
Black CD+	1.43 (0.39, 5.27)	0.59		1.34 (0.35, 5.14)	0.67											1.43 (0.37, 5.54)	0.60	
Hispanic <CD	1.01 (0.37, 2.74)	0.98		1.12 (0.40, 3.18)	0.83											1.09 (0.38, 3.13)	0.87	
Hispanic CD+	1.01 (0.20, 5.06)	0.99		0.75 (0.14, 4.07)	0.73											0.54 (0.09, 3.10)	0.49	
White <CD	1.15 (0.55, 2.41)	0.72		1.03 (0.47, 2.26)	0.94											1.10 (0.49, 2.44)	0.82	
White CD+	1.00	---		1.00	---											1.00	---	
Discrimination		0.38						0.60										0.68
Never (0)	1.00	---					1.00	---								1.00	---	
Low (1–2)	1.37 (0.78, 2.39)	0.27					1.30 (0.73, 2.32)	0.38								1.25 (0.69, 2.29)	0.46	
Moderate (3–6)	0.85 (0.50, 1.44)	0.54					0.92 (0.52, 1.62)	0.76								0.91 (0.50, 1.68)	0.77	
Clinician Mistrust		0.97							0.88									0.97
None (0)	1.00	---							1.00	---						1.00	---	
Any (1)	1.01 (0.60, 1.69)	0.97							0.96 (0.55, 1.67)	0.88						0.99 (0.55, 1.79)	0.97	
Treatment Decision-Making		0.45															0.31	
Shared	1.00	---																1.00
Physician-driven	0.81 (0.45, 1.48)	0.50																0.72 (0.38, 1.37)
Patient-driven	0.76 (0.49, 1.17)	0.21																0.71 (0.45, 1.13)

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^a CD=4-year college degree

^b Results are from four separate unadjusted models

^c Adjusted for age, AJCC stage, and tumor size

^d Adjusted for age, AJCC stage, tumor size, race/ethnicity/education and all three interpersonal factors

Table 4.

Association between Race/Ethnicity/Education, Medical Discrimination, Clinician Mistrust, Treatment Decision-Making and Perceived Excellent Quality of Breast Cancer Care

	Model 0: Unadjusted ^b		Model 1 ^c : Disparities		Model 2a ^c : Discrimination		Model 2b ^c : Clinician mistrust		Model 2c ^c : Treatment Decision-Making		Model 3 ^d : Disparities and Interpersonal Factors	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Combined race/ethnicity/education ^a												
API <CD	0.30 (0.16, 0.56)	<.001	0.32 (0.17, 0.61)	<.01							0.42 (0.21, 0.85)	0.03
API CD+	0.39 (0.22, 0.70)	<.01	0.43 (0.24, 0.79)	<.01							0.50 (0.26, 0.96)	0.04
Black <CD	0.99 (0.39, 2.53)	0.98	0.91 (0.35, 2.36)	0.84							1.29 (0.43, 3.86)	0.65
Black CD+	0.61 (0.20, 1.87)	0.39	0.63 (0.20, 1.95)	0.42							0.56 (0.17, 1.87)	0.34
Hispanic <CD	0.67 (0.26, 1.76)	0.42	0.63 (0.24, 1.70)	0.36							0.58 (0.20, 1.72)	0.33
Hispanic CD+	0.14 (0.04, 0.52)	<.01	0.10 (0.02, 0.43)	<.01							0.09 (0.02, 0.47)	<.01
White <CD	0.78 (0.37, 1.62)	0.50	0.76 (0.35, 1.62)	0.47							0.85 (0.37, 1.96)	0.71
White CD+	1.00	---	1.00	---							1.00	---
Discrimination		<.0001				<.0001						<.0001
Never (0)	1.00	---	1.00	---							1.00	---
Low (1–2)	0.39 (0.23, 0.63)	<.001	0.41 (0.24, 0.68)	<.001							0.44 (0.25, 0.75)	<.01
Moderate (3–6)	0.13 (0.08, 0.21)	<.0001	0.12 (0.07, 0.21)	<.0001							0.15 (0.08, 0.26)	<.0001
Clinician Mistrust		<.001										0.02
None (0)	1.00	---	1.00	---							1.00	---
Any (1)	0.45 (0.28, 0.71)	<.001	0.38 (0.23, 0.61)	<.0001							0.50 (0.29, 0.88)	0.02
Treatment Decision-Making		0.07										0.07
Shared	1.00	---	1.00	---							1.00	---
Physician-driven	0.62 (0.36, 1.09)	0.10									0.54 (0.3, 0.98)	0.04
Patient-driven	0.64 (0.43, 0.97)	0.04									0.69 (0.45, 1.06)	0.09

^d Adjusted for age, AJCC stage, race/ethnicity/education and all three interpersonal factors

^c Adjusted for age and AJCC stage

^q Results are from four separate unadjusted models

^g CD=4-year college degree

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