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Racial/ethnic disparities in the association between patient care experiences and receipt of initial surgical breast cancer care: findings from SEER-CAHPS

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Abstract

Purpose—We determined whether racial/ethnic differences in patient experiences with care influence timeliness and type of initial surgical breast cancer treatment for a sample of female Medicare cancer patients.

Methods—We conducted a retrospective cohort study using the linked Epidemiology and End Results–Consumer Assessment of Healthcare Providers and Systems (SEER-CAHPS) dataset. The outcomes were: (1) time-to-initial surgical treatment, and (2) type of treatment [breast conserving surgery (BCS) vs. mastectomy]. The indicators were reports of four types of patient experiences with care including doctor communication, getting care quickly, getting needed care, and getting needed Rx. Interaction terms in each multivariable logistic model examined if the associations varied by race/ethnicity.

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Author contributions MA, AJF, and SWV contributed to the conception and design of this study. TAP contributed to data management. MA, AJF, and SWV contributed to the analyses and interpretation of data. MA prepared the first draft of this manuscript with feedback from AJF. All authors reviewed and approved the final version of the manuscript.

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Conflict of interest Authors have no relevant financial or non-financial interests to disclose.

Ethical approval The study was reviewed and granted exempt status by the UTHealth Committee for Protection of Human Subjects (HSC-SPH-20–0812).

Patient consent to participate This study used a large population-based dataset with unidentifiable patient information.

Results—Of the 2069 patients, 84.6% were White, 7.6% Black and 7.8% Hispanic. After adjusting for potential confounders, non-Hispanic Black patients who provided excellent reports of their ability to get needed prescriptions had lower odds of receiving surgery within 2-months of diagnosis, compared to NH-Whites who provided less than excellent reports (aOR: 0.29, 95% CI 0.09–0.98). There were no differences based on 1-month or 3-month thresholds. We found no other statistically significant effect of race/ethnicity. As to type of surgery, among NH Blacks, excellent reports of getting care quickly were associated with higher odds of receiving BCS versus mastectomy (aOR: 2.82, 95% CI 1.16–6.85) compared to NH Whites with less than excellent reports. We found no other statistically significant differences by race/ethnicity.

Conclusion—Experiences with care are measurable and modifiable factors that can be used to assess and improve aspects of patient-centered care. Improvements in patient care experiences of older adults with cancer, particularly among minorities, may help to eliminate racial/ethnic disparities in timeliness and type of surgical treatment.

Keywords

Neoplasm; Cancer treatment; Surgery; Inequities; Quality care; Survivorship

Background

Breast cancer is the second leading cause of cancer death in the United States (US) [1]. Although breast cancer incidence is higher among non-Hispanic Whites compared to other race/ethnicities, mortality rates are higher for non-Hispanic Blacks [2]. The recommended initial treatment for most patients with early-stage breast cancer is surgical treatment [3]. Timeliness of initiation of treatment is considered a measure of high quality care [4], and minimizing time-to-surgery can positively impact cancer outcomes [5, 6]. Although optimal times from breast cancer diagnosis to initial treatment are not well established, many researchers examine one-month intervals to treatment [6–8], and have found that mortality increases with delays longer than two months [6, 9]. Initial surgical treatment options for early-stage breast cancer patients include breast conserving surgery (BCS) and mastectomy. Both options have comparable survival rates [10], and decisions to select initial surgical treatment often depend on providers' recommendations and patients' preferences [11–13]. Researchers have found that patient-based decisions about type of initial surgical treatment take into account concerns about cancer recurrence, risks and side effects related to radiation, and body image issues [11]. According to these findings, incorporating patients' values and preferences are important for initial surgical treatment, but to date, no study has examined whether patient experiences with care impact timeliness and type of surgical treatment.

Racial/ethnic disparities in timeliness and receipt of type of surgery exist. Compared to non-Hispanic Whites, Black patients are less likely to receive initial surgical treatment within three months of their diagnosis [14, 15]. Minority patients receive BCS at lower rates than their White counterparts [16, 17]. In fact, Blacks are 42% less likely than Whites to receive BCS versus mastectomy [16], and Hispanics receive BCS at a lower frequency than Whites (37.1% vs 42.7%) [17]. Researchers have also found that the association between patient preferences and surgical treatment decisions vary by race/ethnicity [11]. However,

the extent of the effect of race/ethnicity on the association between patient experiences and surgical treatment choices is yet to be explored. Patient experiences with care can indicate access, timeliness, communication with providers, and overall perceptions of encounters with physicians or specialists [18]. Racial/ethnic minorities tend to report poorer experiences compared to non-Hispanic White patients [19]. Positive reports of patient experiences with care are associated with high-quality cancer care and treatment [19–21]. Thus, it is also likely that the association between patient experiences and initial surgical care varies by race/ethnicity and might drive high-quality surgical care.

This study examined racial/ethnic disparities between four patient care experiences and (1) time to initial surgery and (2) type of initial surgery among women diagnosed with early-stage breast cancer. We hypothesized that the relation between patient care experiences on time to and type of initial breast cancer surgery varied by race/ethnicity.

Methods

Data source

We conducted a retrospective cohort study using data from SEER-CAHPS (surveillance, epidemiology, and end results—consumer assessment of healthcare providers and systems [22]). This linked dataset is a collaborative effort between the National Cancer Institute’s (NCI) Surveillance, Epidemiology, and End Results (SEER) cancer registry data and the Centers for Medicare and Medicaid Services’ (CMS) Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS). The SEER component of this dataset provides information on cancer statistics (1973–2013), the CMS component provides information on medical enrollment data and administrative and billing claims from Medicare beneficiaries enrolled in Fee for Service (FFS) plans (2002–2016), and the CAHPS survey component provides information from patients’ responses to surveys assessing experiences with care across different domains (1997–2015). The study was reviewed and granted exempt status by the UHealth Committee for Protection of Human Subjects (HSC-SPH-20-0812).

Study population

The study population consisted of females with a primary and only diagnosis of early stage breast cancer, 65 or older (age at survey completion), who completed a CAHPS survey within 24 months prior to their cancer diagnosis, and who were continuously enrolled in Medicare for at least 11 of the 12 months prior to survey completion. We considered continuous enrollment as enrollment on the fifteenth day of the month for 12 consecutive months, with no more than one-month interruption. If beneficiaries completed multiple surveys, we used the survey collected closest to the cancer diagnosis date.

Exclusion criteria

We excluded patients diagnosed with multiple malignant cancer types, breast carcinoma in situ, or metastatic cancer, and those without a record of receiving breast cancer surgery as initial treatment because we were interested in examining type and time to initial cancer-directed surgery. We also excluded records with missing information on race/ethnicity and variable categories with insufficient variation of responses (Fig. 1).

Outcomes

Time to initial surgical treatment was defined as months between diagnosis date and initial surgical treatment date. We used the SEER clinical diagnosis date (comprised of month and year) and assigned a midpoint for the day of diagnosis (15th of each month) to create each diagnosis date. Initial surgical treatment was created using the SEER initial course of treatment variable (consisting of month and year) and we assigned a midpoint for the day, as described above. Then, we created three outcome variables reflecting the time from diagnosis to initial surgical treatment, categorized as: less than or equal to 1 month, vs. otherwise; less than or equal to 2 months, vs. otherwise, less than or equal to 3 months, vs. otherwise. These categorizations were selected for comparability with other researchers who have used 1-month increments to assess timeliness of initial breast cancer treatment [6, 8].

Type of surgery was defined as receipt of BCS or mastectomy. We identified treatment information using a SEER variable which describes the surgical procedure performed as first course of cancer-directed therapy. Then we used SEER breast cancer surgical codes to dichotomize surgery type into: BCS (codes 20 and 39) or mastectomy (codes 40 and 80) [23].

Predictor variables

Patient experiences with care were assessed as multi-item composite scores of doctor communication, getting needed care, getting care quickly, and getting needed prescriptions. Survey respondents were asked about these domains thinking about their health care encounters in the last 6 months. A sample item is (getting care quickly): *How often did you get care as soon as you thought you needed it?* Each item was rated as 1 = never, 2 = sometimes, 3 = usually, and 4 = always. Composite items were scored using linear scoring [24], where higher scores indicated more positive assessments of reports of care. For ease of interpretation composite measures were transformed to a 0–100 scale. Because the CAHPS score distributions were negatively skewed, we dichotomized reports of patient experiences into less than excellent (0 to < 90 scores) and excellent reports of care (90–100 scores) [21, 25].

Covariates

The following covariates were included because they have been associated with time to surgical treatment and type of treatment received [26, 27]: disease stage, number of self-reported comorbidities, race/ethnicity, age at the time of survey completion, educational attainment, marital status, SEER geographic region, Medicare plan, survey administration mode, and year of survey completion. Analyses were adjusted for time since survey completion to account for changes over time.

Statistical analyses

Descriptive statistics were calculated to characterize the sample population. We used chi-square tests to examine sample characteristics across time-to-surgery categories of less than 1 month, between 1 and 2 months, and more than 2 months of diagnosis. We also used one-way ANOVA analyses to assess the mean scores of our selected patient care experiences across time-to-surgery categories. Next, we conducted multivariable logistic

regression models adjusting for clinical and demographic characteristics to examine the relation between receiving timely initial surgical treatment and patient care experiences. To examine the effect of racial/ethnic background on the relation between care experiences on time-to-surgery, we included an interaction term (race/ethnicity by reports of patient care experiences) to each model. For type of surgery received, our second outcome, we conducted multivariable logistic regression analyses to examine the association between patient care experiences and type of surgical treatment received, while adjusting for clinical and demographic characteristics. Interaction terms were added to assess the effects of race/ethnicity on the relation between reports of care and surgery type.

We assessed the association between racial/ethnic background on timely receipt of surgical treatment and type of initial surgery received. First, we adjusted for demographics, then for demographic and clinical characteristics. Significance tests and confidence intervals for the estimates were 2-sided. All analyses were conducted in Stata statistical software version 16 [28].

Results

The analytic sample consisted of 2069 individuals (Fig. 1). The proportion of patients receiving surgery treatment within 1 month of diagnosis was 55%, between 1 and 2 months was 29%, and more than 2 months was 16%. The proportion of patients who received BCS was 58.6% vs. 41.4% who received mastectomy. Mean scores for getting needed care and getting prescription drugs were significantly different across racial/ethnic categories, but we found no mean differences by time-to-surgery categories or type of surgery (Table 1).

Association between racial/ethnic background and time to initial surgical treatment

We found that compared to non-Hispanic Whites, Hispanics had lower odds of receiving initial surgery within 2 months of diagnosis (aOR: 0.67, 95% CI 0.45–0.99), adjusting for demographic and clinical characteristics. There were no differences based on 1 month or 3 months thresholds. We did not find any significant differences in treatment initiation within 1, 2, or 3 months of diagnosis between non-Hispanic Black and non-Hispanic White patients (Table 2).

Effect of race/ethnicity on the association between patient care experiences and time to initial surgical treatment

Among Blacks, excellent reports of getting needed prescriptions were associated with lower odds of getting surgery within 2 months of diagnosis (aOR 0.29, 95% CI 0.09–0.98; Table 3), compared to Whites with less than excellent reports. We found no other statistically significant effect of race/ethnicity on the association between experiences with care and time to surgery.

Association between racial/ethnic background and type of surgical treatment

We did not find any statistically significant differences of type of surgery across racial and ethnic groups. Before adjusting for demographic and clinical characteristics, minority patients had lower odds of receiving BCS versus mastectomy compared to non-Hispanic

Whites; though, this relation was not statistically significant. After also adjusting for clinical characteristics, the odds ratio showed no association between type of initial surgery and race/ethnic background (Table 2).

Effect of race/ethnicity on the association between patient care experiences and type of surgical treatment

Among Blacks, excellent reports of their ability to get care quickly were associated with increased odds of getting BCS versus mastectomy (aOR 2.82, 95% CI 1.16–6.85; Table 4), compared to Whites with less than excellent reports. We found no other statistically significant differences by race/ethnicity on the association between care experiences and type of initial surgery received.

Discussion

We found that the association of patient care experiences with time to and type of initial breast cancer surgery varies for patients of diverse racial/ethnic backgrounds. Previous studies have found racial/ethnic differences in reports of patient care experiences [19], but to our knowledge this is the first study to determine differential effects of race/ethnicity on time to and type of initial breast cancer surgical treatment. Our study is in line with national imperatives for impacting health disparities as outlined by the Agency for Healthcare Research and Quality urging the assessment of relevant patient-centered care factors for at-risk populations [29].

Our findings also showed that Hispanics had lower odds of receiving initial breast cancer surgery within 2 months of diagnosis, compared to non-Hispanic Whites. This is consistent with other studies which have found that Hispanics experience longer-than-6-weeks delays in receipt of initial breast cancer surgical treatment more frequently than non-Hispanic Whites (15.3% vs 8.1%, respectively) [30]. Other studies have found that socio-demographic and clinical factors are associated with delays in surgical treatment [7]. Our study went further by adjusting for potential confounders and still found that race/ethnic background contributes to delays in receipt of timely initial breast cancer treatment.

Other researchers have found that Black patients are less likely to report excellent experiences with care [19] and more likely to experience delays in receiving initial breast cancer treatment [4, 31, 32]. We found that Black patients who provided excellent reports of care had lower odds of receiving surgical treatment within 2 months of their diagnosis. This was contrary to our expectations, yet these findings could reflect that care experiences among Black patients, although reported as excellent, can still be associated with deficits in health care delivery impacting cancer care. Findings from qualitative research conducted with Black patients highlight the discordance between high reports of care experiences and accounts of their actual experiences of sub-optimal care, including experiencing racial discrimination [33]. Perceived discrimination interferes with receipt of quality care for Blacks [34]. Thus, examining the gradient of reports in patient care experiences among racial/ethnic minorities can help understand the substantive meanings of their reports and aid in efforts to achieve culturally-sensitive delivery of care.

Our findings also showed that among Blacks, excellent reports of their ability to get care quickly were associated with higher odds of BCS versus mastectomy. These findings may be related to access barriers. It has been previously reported that racial/ethnic minorities have limited access to radiation oncology specialists that may be needed for adjuvant radiation following BCS [35]. In this study, patients' excellent reports of their ability to get care quickly could be an indication that they had access to radiation oncologist services, and elected BCS because they would have been able to receive adjuvant radiation following their surgery. The pathway concerning the relation between patient experiences with care and receipt of BCS requires further study. Future research should explore other factors that may play a role in that pathway, such as confidence in obtaining needed care. The relation between patient experiences with care and breast cancer surgical care has been understudied. In fact, most investigators have focused on examining patients' beliefs, values and preferences related to surgery type [36], but have not assessed patient experiences with care. Due to space limitations, our findings on the relation between patient experiences with care and surgical outcomes can be found as supplementary material (Appendices A and B).

The clinical and research implications of our study are centered around the differential effects of race/ethnicity on patient care experiences and surgical treatment. First, perceptions of minority patients about their care are not static experiences and should be assessed through the care continuum. Second, reports of experiences with care are measurable and modifiable factors that could be addressed by future interventions to improve the delivery of high-quality care. Lastly, routine assessment of experiences with care among racial/ethnic minorities is needed to achieve an equitable and patient-centered healthcare system in the U.S.

Strengths and limitations

Our findings should be considered in the context of several strengths and limitations. Previous published studies indicated that patient care experiences are associated with improved outcomes; however, only recently, have investigators examined the association between patient care experiences and cancer-related outcomes [37]. Thus, our findings advance the body of knowledge about the role of patient care experiences on cancer-related care and highlight the need to include the assessment of these experiences in frameworks of cancer care. We capitalized on the opportunity to use the SEER-CAHPS linked data resource to investigate racial/ethnic disparities in the association between patient care experiences and the type and timeliness of surgical breast cancer treatment. Our findings support the importance of improving the delivery of care among minorities experiencing inequities in cancer care. One of our study limitations concerns the focus on BCS versus mastectomy to the exclusion of receipt of radiation therapy following BCS. Second, this study did not separate mastectomy into unilateral, bilateral or surgery with reconstruction types. Although we believe that these treatment types are important to examine, we wanted to assess receipt of initial treatment. We hope to explore other outcomes in subsequent studies. Third, while we adjusted our multivariable models for demographic and clinical characteristics, we did not adjust for clinical factors such as tumor size, nodal status, genetic mutations that are associated with receipt of mastectomy, facility type where cancer care was obtained, or the type of physician on whom patients based their reports. Fourth, our findings are

presented with the caveat that racial/ethnic minorities are less likely to respond to patient care experience surveys [38] and have greater rates of missing responses than Whites [39], which might result in under-representation of responses from minority groups. Lastly, our study findings may not be relevant to younger women or generalizable to all Medicare populations.

Conclusions

Our study contributes findings related to racial/ethnic disparities in receipt of initial breast cancer surgery among older Medicare beneficiaries. Examining patient care experiences with care can help assess aspects of patient-centered care that could be enhanced or improved (e.g., communication with providers, promptness of care, accessibility of needed care, and overall evaluations of care). Our findings can help inform policies to improve access and availability of care and can identify patient-centered practices that may ultimately lead to improved delivery of care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

Codes are available from the corresponding author upon reasonable request. SEER-CAHPS linked dataset used for this manuscript is publicly available through the National Cancer Institute, Division of Cancer Control and Population Sciences.

Abbreviations

US	United States
BCS	Breast conserving surgery
SEER-CAHPS	Surveillance, epidemiology, and end results—consumer assessment of healthcare providers and systems

NCI	National Cancer Institute
SEER	Surveillance, epidemiology, and end results
CMS	Centers for medicare and medicaid services
CAHPS	Medicare consumer assessment of healthcare providers and systems
FFS	Fee for service
ANOVA	Analysis of variance

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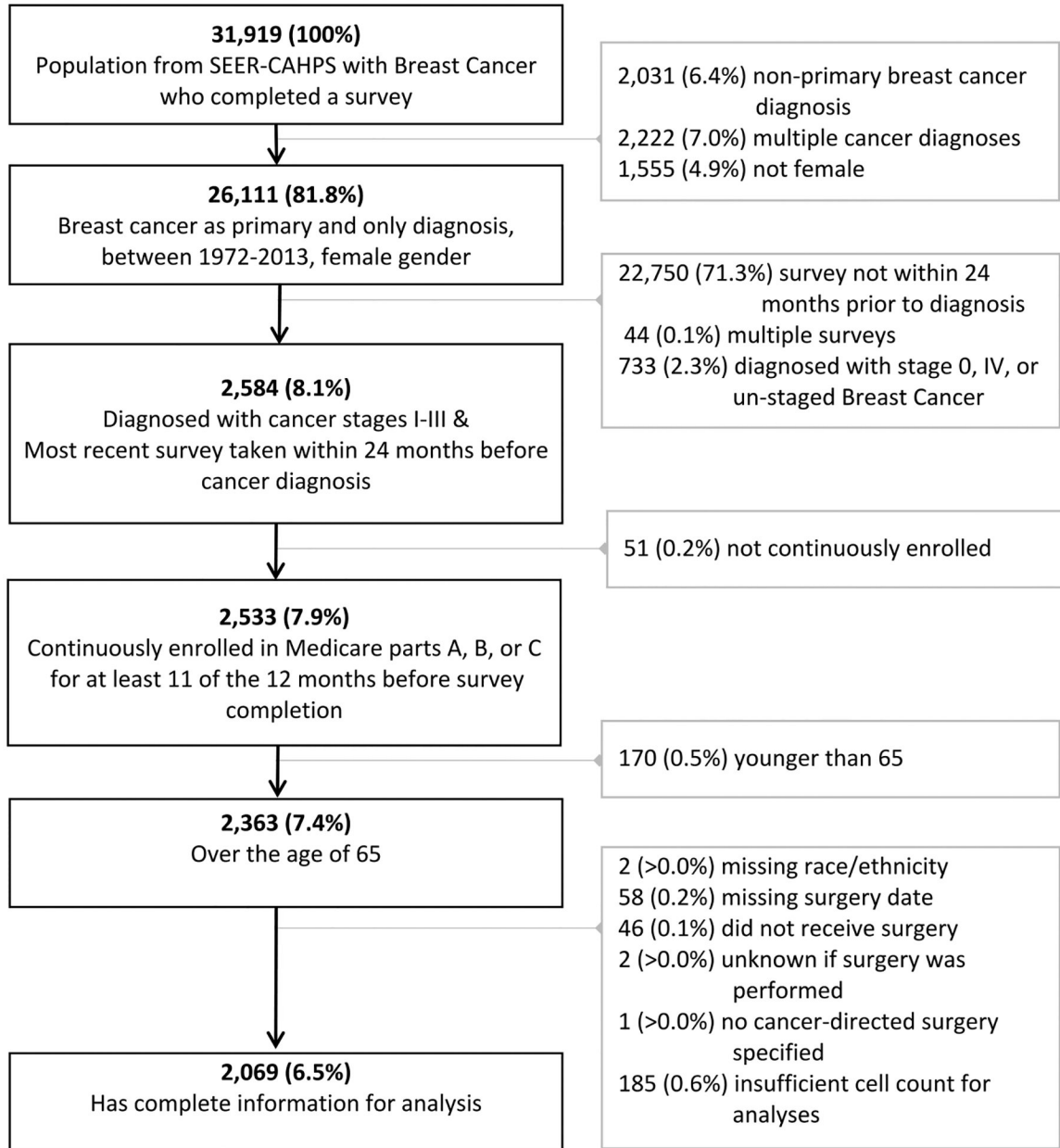


Fig. 1.
CONSORT diagram for study population

Demographic and clinical characteristics by time-to-surgery category, racial/ethnic background, and surgery type (N = 2069)

Table 1

Characteristic	Total sample, n (%)	Time from cancer diagnosis to initial surgical therapy			Racial/ethnic background			Surgical treatment type				
		Less than 1 month, n = 1130 (55%)	Between 1 and 2 months, n = 604 (29%)	More than 2 months, n = 335 (16%)	P-value	Non-hispanic White (n = 1750)	Non-hispanic Black (n = 158)	Hispanic (n = 161)	P-value	Mastectomy (n = 856) 41.4%	BCS (n = 1213) 58.6%	P-value
Age at survey												
Median	75.0	74.7	75.6	74.6	0.592	75.2	73.0	73.8	<0.001	75.9	74.3	0.004
Mean (SD)	75.6 (6.4)	75.5 (6.5)	75.8 (6.0)	75.7 (6.6)		75.8 (6.4)	73.9 (6.0)	74.9 (5.9)		76.1 (6.4)	75.3 (6.3)	
66-69	471 (22.8)	276 (24.4)	118 (19.5)	77 (23.0)	0.172	379 (21.7)	49 (31.0)	43 (26.7)	0.027	180 (21.0)	291 (24.0)	0.019
70-74	577 (27.9)	311 (27.5)	169 (28.0)	97 (29.0)		483 (27.6)	49 (31.0)	45 (27.9)		218 (25.5)	359 (29.6)	
75-79	501 (24.2)	256 (22.7)	171 (28.3)	74 (22.1)		424 (24.2)	36 (22.8)	41 (25.5)		231 (27.0)	270 (22.3)	
80-84	338 (16.3)	187 (16.6)	98 (16.2)	53 (15.8)		303 (17.3)	<11%	<12%		142 (16.6)	196 (16.2)	
85 +	182 (8.8)	100 (8.8)	48 (8.0)	34 (10.1)	0.037	161 (9.2)	<7%	<7%	-	85 (9.9)	97 (8.0)	0.797
Race/ethnicity												
Non-hispanic White	1,750 (84.6)	973 (86.1)	505 (83.6)	272 (81.2)		-	-	-		719 (84.0)	1,031 (85.0)	
Non-hispanic Black	158 (7.6)	83 (7.4)	51 (8.4)	24 (7.2)		-	-	-		69 (8.1)	89 (7.3)	
Hispanic	161 (7.8)	74 (6.5)	48 (8.0)	39 (11.6)	0.971	-	-	-	0.006	68 (7.9)	93 (7.7)	0.714
Marital status												
Not married	1,120 (54.1)	610 (54.0)	325 (53.8)	185 (55.2)		927 (53.0)	108 (68.3)	85 (52.8)		462 (54.0)	658 (54.3)	
Married	871 (42.1)	475 (42.0)	<43%	<42%		755 (43.1)	<29%	<42%		365 (42.6)	506 (41.7)	
Unknown	78 (3.8)	45 (4.0)	<4%	<4%	0.165	68 (3.9)	<7%	<7%	<0.001	29 (3.4)	49 (4.0)	0.024
Education level												
High school or less	1,165 (56.3)	654 (57.9)	321 (53.2)	190 (56.7)		945 (54.0)	107 (67.7)	113 (70.2)		507 (59.2)	658 (54.3)	
Some college +	904 (43.7)	476 (42.1)	283 (46.8)	145 (43.3)	0.194	805 (46.0)	51 (32.3)	48 (29.8)	0.014	349 (40.8)	555 (45.7)	0.149
Self-reported comorbidities												
0	1,624 (78.5)	899 (79.6)	476 (78.8)	249 (74.3)		1397 (79.8)	114 (72.2)	113 (70.2)		662 (77.3)	962 (79.3)	
1	318 (15.4)	166 (14.7)	95 (15.7)	57 (17.0)		254 (14.5)	31 (19.6)	33 (20.5)		131 (15.3)	187 (15.4)	

Characteristic	Total sample, n (%)	Time from cancer diagnosis to initial surgical therapy				Racial/ethnic background				Surgical treatment type		
		Less than 1 month, n = 1130 (55%)	Between 1 and 2 months, n = 604 (29%)	More than 2 months, n = 335 (16%)	P-value	Non-hispanic White (n = 1750)	Non-hispanic Black (n = 158)	Hispanic (n = 161)	P-value	Mastectomy (n = 856) 41.4%	BCS (n = 1213) 58.6%	P-value
2 +	127 (6.1)	33 (5.5)	29 (8.7)	0.906	99 (5.7)	13 (8.2)	15 (9.3)	63 (7.4)	64 (5.3)	<0.001		
Tumor stage												
I	1212 (58.6)	662 (58.6)	357 (59.1)	193 (57.6)	1,040 (59.4)	84 (53.2)	88 (54.6)	352 (41.1)	860 (70.9)	0.178		
II-III	857 (41.4)	468 (41.4)	247 (40.9)	142 (42.4)	710 (40.6)	74 (46.8)	73 (45.4)	504 (58.9)	353 (29.1)	0.797		
Type of surgery				0.438								
Breast conserving	1213 (58.6)	655 (57.9)	351 (58.2)	207 (61.8)	1,031 (58.9)	89 (56.3)	93 (57.8)	-	-	-		
Mastectomy	856 (41.4)	475 (42.1)	253 (41.8)	128 (38.2)	719 (41.1)	69 (43.7)	68 (42.2)	-	-	-		
Medicare plan				<0.001								
MA PDP	430 (20.8)	193 (17.1)	148 (24.5)	89 (26.6)	327 (18.7)	57 (36.1)	46 (28.6)	182 (21.3)	248 (20.5)	0.783		
MA only	865 (41.8)	504 (44.6)	235 (38.9)	126 (37.6)	737 (42.1)	53 (33.5)	75 (46.6)	354 (41.4)	511 (42.1)			
FFS PDP	314 (15.2)	162 (14.3)	96 (15.9)	56 (16.7)	275 (15.7)	22 (13.9)	17 (10.6)	136 (15.9)	178 (14.7)			
FFS only	460 (22.2)	271 (24.0)	125 (20.7)	64 (19.1)	411 (23.5)	26 (16.5)	23 (14.2)	184 (21.5)	276 (22.7)			
Geographic region				<0.001								
West	1159 (56.0)	588 (52.0)	356 (59.0)	215 (64.2)	992 (56.7)	40 (25.3)	127 (78.9)	482 (56.3)	677 (55.8)	<0.001		
Midwest	181 (8.7)	96 (8.5)	60 (9.9)	25 (7.5)	158 (9.0)	<11%	<7%	81 (9.5)	100 (8.2)			
North East	322 (15.6)	191 (16.9)	79 (13.1)	52 (15.5)	278 (15.9)	26 (16.5)	18 (11.2)	98 (11.4)	224 (18.5)			
South	407 (19.7)	255 (22.6)	109 (18.5)	43 (12.8)	322 (18.4)	<48%	<7%	195 (22.8)	212 (17.5)			
Survey administration mode				0.639						0.388		
Mail	357 (17.3)	197 (17.4)	108 (17.9)	52 (15.5)	277 (15.8)	37 (23.4)	43 (26.7)	155 (18.1)	202 (16.7)			
Phone	1712 (82.7)	933 (82.6)	496 (82.1)	283 (84.5)	1,473 (84.2)	121 (76.6)	118 (73.3)	701 (81.9)	1,011 (83.3)			
Survey year				<0.001						0.099		
1997-2000	360 (17.4)	234 (20.7)	90 (14.9)	36 (10.8)	308 (17.6)	23 (14.6)	29 (18.0)	167 (19.5)	193 (15.9)			
2001-2005	787 (38.0)	450 (39.8)	217 (35.9)	120 (35.8)	689 (39.4)	43 (27.2)	55 (34.2)	314 (36.7)	473 (39.0)			
2007-2011	922 (44.6)	446 (39.5)	297 (49.2)	179 (53.4)	753 (44.0)	92 (58.2)	77 (47.8)	375 (43.8)	547 (45.1)			
Time from survey to cancer diagnosis				0.619						0.619		
6 months	547 (26.4)	291 (25.8)	165 (27.3)	91 (27.2)	473 (27.0)	35 (22.2)	39 (24.2)	221 (25.8)	326 (26.9)			

Characteristic	Total sample, <i>n</i> (%)	Time from cancer diagnosis to initial surgical therapy			Racial/ethnic background			Surgical treatment type			
		Less than 1 month, <i>n</i> = 1130 (55%)	Between 1 and 2 months, <i>n</i> = 604 (29%)	More than 2 months, <i>n</i> = 335 (16%)	<i>P</i> -value	Non-hispanic White (<i>n</i> = 1750)	Non-hispanic Black (<i>n</i> = 158)	Hispanic (<i>n</i> = 161)	<i>P</i> -value	Mastectomy (<i>n</i> = 856) 41.4%	<i>B</i> CS (<i>n</i> = 1213) 58.6%
6 to < 12 mo	550 (26.6)	299 (26.5)	164 (27.2)	87 (25.9)	454 (26.0)	46 (29.1)	50 (31.1)	230 (26.9)	320 (26.4)		
12 to < 18 mo	476 (23.0)	254 (22.5)	135 (22.4)	87 (25.9)	408 (23.3)	34 (21.5)	34 (21.1)	188 (22.0)	288 (23.7)		
18 to 24 mo	496 (24.0)	286 (25.3)	140 (23.1)	70 (21.0)	415 (23.7)	43 (27.2)	38 (23.6)	217 (25.3)	279 (23.0)		
Doctor communication (<i>n</i> = 1578)	88.5 (16.8)	88.2 (16.6)	89.3 (16.4)	87.8 (18.3)	88.3 (17.0)	88.4 (15.6)	90.2 (16.4)	89.1 (15.9)	88.0 (17.4)	0.515	0.186
Getting care quickly (<i>n</i> = 1546)	83.9 (23.2)	84.3 (22.6)	84.2 (23.1)	82.1 (25.3)	84.1 (22.7)	80.0 (28.2)	85.1 (24.3)	84.9 (22.4)	83.3 (23.7)	0.182	0.194
Getting needed care (<i>n</i> = 1701)	88.3 (21.2)	88.5 (21.5)	88.7 (20.5)	86.7 (21.3)	89.0 (20.4)	83.5 (26.2)	84.4 (24.2)	89.4 (20.4)	87.5 (21.7)	0.002	0.072
Getting needed Rx (<i>n</i> = 1763)	91.0 (20.5)	90.8 (21.5)	91.2 (20.0)	91.6 (18.0)	91.9 (19.4)	83.9 (22.8)	89.0 (22.8)	90.2 (22.1)	91.6 (19.3)	<0.001	0.134

P-value represents a two-sided t-test, chi-square test, or one-way ANOVA

mo months

* CAHPS means are unadjusted

Table 2

Results of multivariable models assessing the association between race/ethnicity and (a) time to surgical treatment (less than 1 month, less than 2 months, or less than 3 months from diagnosis), (b) type of surgery (BCS vs mastectomy)

Model ^c	Time to surgery ^a						Treatment type ^b						
	1 month		2 months		3 months		BCS vs mastectomy		BCS vs mastectomy		BCS vs mastectomy		
	N	OR	95% CI	OR	95% CI	OR	95% CI	N	OR	95% CI	N	OR	95% CI
Model 1: Unadjusted	2069							2069			2069		
Non-hispanic Black		0.88	0.64	1.22	1.03	0.65	1.62		0.90	0.65		0.90	0.65
Hispanic		0.68 *	0.49	0.94	0.58 **	0.39	0.84		0.95	0.69		0.95	0.69
Model 2: Adjusted for demographics	2069							2069			2069		
Non-hispanic Black		0.79	0.56	1.11	0.92	0.57	1.48		0.93	0.66		0.93	0.66
Hispanic		0.75	0.53	1.04	0.66 *	0.44	0.99		0.95	0.68		0.95	0.68
Model 3: Adjusted for demographics and clinical characteristics	2069							2069			2069		
Non-hispanic Black		0.78	0.56	1.10	0.93	0.58	1.50		1.02	0.71		1.02	0.71
Hispanic		0.74	0.53	1.04	0.67 *	0.45	0.99		1.01	0.72		1.01	0.72

^c Reference category is non-hispanic Whites

^a Models were adjusted for: age, marital status, SEER geographic region, self-reported comorbidities, tumor stage, type of surgery, medicare plan, survey administration mode, survey year, and time since surgery

^b Modeling odds of breast conserving surgery(BCS) vs mastectomy adjusted for: age, marital status, SEER geographic region, self-reported comorbidities, tumor stage, medicare plan, survey administration mode, survey year, and time since survey Bold represents significant at

* $p < 0.05$,

** $p < 0.01$, *** $p < 0.001$

[†] $n = 173$ because of low variability of distribution of reports of getting needed drugs by outcome (surgery < 3 months) among Hispanic; Bold represents significant at

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Table 4
Results of models assessing the effect of race/ethnicity on the relation between patient experiences and type of initial surgical treatment (BCS vs mastectomy)

Surgical type	BCS		BCS		BCS	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
N analyzed	1578		1546		1701	
CAHPS measure		Doctor communication		Getting care quickly		Getting needed care
Less than excellent reports	Ref		Ref		Ref	
Excellent reports	0.85	[0.66–1.10]	0.86	[0.68–1.10]	0.83	[0.65–1.06]
Race/ethnicity						
Non-hispanic White	Ref		Ref		Ref	
Non-hispanic Black	1.13	[0.56–2.30]	0.65	[0.33–1.27]	0.71	[0.37–1.37]
Hispanic	0.95	[0.44–2.02]	1.23	[0.59–2.55]	1.37	[0.70–2.68]
Race by reports of care interactions						
White * less than excellent reports	Ref		Ref		Ref	
Black * excellent reports	0.96	[0.40–2.27]	2.82 *	[1.16–6.85]	1.97	[0.85–4.57]
Hispanic * excellent report	1.26	[0.51–3.11]	0.99	[0.40–2.42]	0.61	[0.26–1.39]

Modeling odds of BCS (breast conserving surgery vs mastectomy)

Excellent reports consist of scores 90–100, and less than excellent reports consist of scores 89,99.

Separate logistic regression models were conducted for each patient experience measure

Models were adjusted for: age, race/ethnicity, marital status, SEER geographic region, self-reported comorbidities, tumor stage, medicare plan, survey administration mode, survey year, and time since survey.

Bold represents significant at

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$