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EPIDEMIOLOGY

Narrowing racial gaps in breast cancer chemotherapy initiation: the role of the patient–provider relationship

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Abstract Chemotherapy improves breast cancer survival but is underused more often in black than in white women. We examined associations between patient–physician relationships and chemotherapy initiation and timeliness of initiation among black and white patients. Women with primary invasive, non-metastatic breast cancer were recruited via hospitals (in Washington, DC and Detroit) and community outreach between July 2006 and April 2011. Data were collected via telephone interviews and medical records. Logistic regression models evaluated associations between chemotherapy initiation and independent variables. Since there were race interactions, analyses were race-stratified. Factors associated with time from surgery to chemotherapy initiation and delay of ≥90 days were evaluated with linear and logistic regressions, respectively. Among eligible women, 82.8 % were interviewed and 359 (90.9 %) of those had complete data. The odds of initiating chemotherapy were 3.26 times (95 % CI: 1.51, 7.06) higher among black women reporting greater communication with physicians (vs. lesser), after considering covariates. In contrast, the odds of starting chemotherapy were lower for white women reporting greater communication (vs. lesser) (adjusted OR 0.22, 95 % CI: 0.07, 0.73). The opposing direction of associations was also seen among the sub-set of black and white women with definitive clinical indications for chemotherapy. Among those initiating treatment, black women had longer mean time to the start of chemotherapy than whites (71.8 vs. 55.0 days, $p = 0.005$), but race was not significant after considering trust in oncologists, where initiation time decreased as trust increased, controlling for covariates. Black women were also more likely to delay ≥90 days than whites (27 vs. 8.3 %; $p = 0.024$), but this was not significant after considering religiosity. The patient–physician dyad and sociocultural factors may

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represent leverage points to improve chemotherapy patterns in black women.

Keywords Chemotherapy initiation · Disparities · Patient–provider communication

Introduction

Black women have higher rates of breast cancer mortality than white women despite lower age-adjusted incidence and comparable mammography use [1–3]. Moreover, stage for stage, black women have lower breast cancer survival [4–6], and this disparity has widened over the last two decades [4]. More aggressive breast cancers and/or limitations in access to timely diagnosis and quality care may explain some of the differences in survival outcomes [7]. However, race disparities persist even after considering these factors [8–10].

Since systemic therapy can reduce mortality by up to 50 % [11, 12], suboptimal use of adjuvant chemotherapy by black women may contribute to survival disparities [13]. Current research on patterns of care suggests that black women are more likely to experience delays in chemotherapy initiation than whites and may even have lower rates of initiating adjuvant therapy [14–16]. Unfortunately, significant delays such as those 90 days or more have been associated with increased mortality [13, 17–19]. When black women receive appropriate systemic therapies, their survival outcomes are similar to their white counterparts [20, 21].

Prescription of chemotherapy takes place within the patient–provider relationship, so components of this dyadic relationship may influence use. However, most studies have relied on secondary data or retrospective approaches and have had limited information about black women's interactions with their providers [14–16, 18, 22]. Moreover, we do not know if factors related to black women's therapy initiation differ from their white counterparts [23, 24]. To fill this gap, we conducted a study of black and white breast cancer patients to examine whether factors associated with chemotherapy initiation, days to initiation, and treatment delay differ by race. We hypothesized that black women would have lower chemotherapy initiation and greater delay, but that race differences could be diminished by good communication with and trust in oncologists. Results from this study are intended to inform interventions to improve the quality of breast cancer care and reduce treatment disparities.

Methods

The Adherence Model of Health Behavior [25] guided our study since it is unique in highlighting constructs relevant to initiation of cancer therapy among different race/ethnic groups. The model specifically posits that the "art of care" within the patient–provider interaction and sociocultural constructs predict cancer adherence behaviors [25, 26].

Setting and population

A convenience sample of women was recruited via hospital in-reach and outreach between July 2006 and April 2011. In-reach occurred at three hospitals in Washington, DC (including one NCI-designated Cancer Center) and one NCI-designated Cancer Center in Detroit, MI. Hospital in-reach was supplemented by outreach efforts, including fliers, posters, web-postings, mailings, and e-mail. Study procedures were approved by Institutional Review Boards at all institutions.

We included women over age 21 that were diagnosed with invasive non-metastatic disease for whom systemic adjuvant therapy would be considered with curative intent. We oversampled black women to facilitate race comparisons and to investigate within race group differences. Because we were interested in factors that would affect chemotherapy, we restricted the sample to women who were <20 weeks past their definitive surgery.

Women with ductal and lobular carcinoma in situ, distant metastasis, recurrent disease, second primaries, who were not English speakers, who were of other races, or who could not give informed consent were excluded.

Among 678 potentially eligible patients screened for the study, 477 were eligible and 395 (82.8 %) consented (Fig. 1); 36 women were excluded from subsequent analyses due to missing clinical data. The final analytic dataset includes 359 women (254 recruited via in-reach and 105 recruited via outreach).

Data collection

Potentially eligible hospital patients were identified from surgery logs, pathology reports, and electronic appointment systems; patients responding to outreach recruitment self-referred to the study. Clinical research assistants confirmed eligibility and obtained consent for interviews and chart reviews. Interviews were conducted centrally by trained staff using a standardized computer-assisted telephone survey. On average, women were interviewed 3 months past their definitive surgery and interviews lasted about 50 min. Treatment and clinical variables were abstracted from medical records 12–18 months after interviews. Participants received a $25 incentive.

Measures

Study outcomes were chemotherapy initiation, time to initiation (in days), and chemotherapy delay (≥90 days).

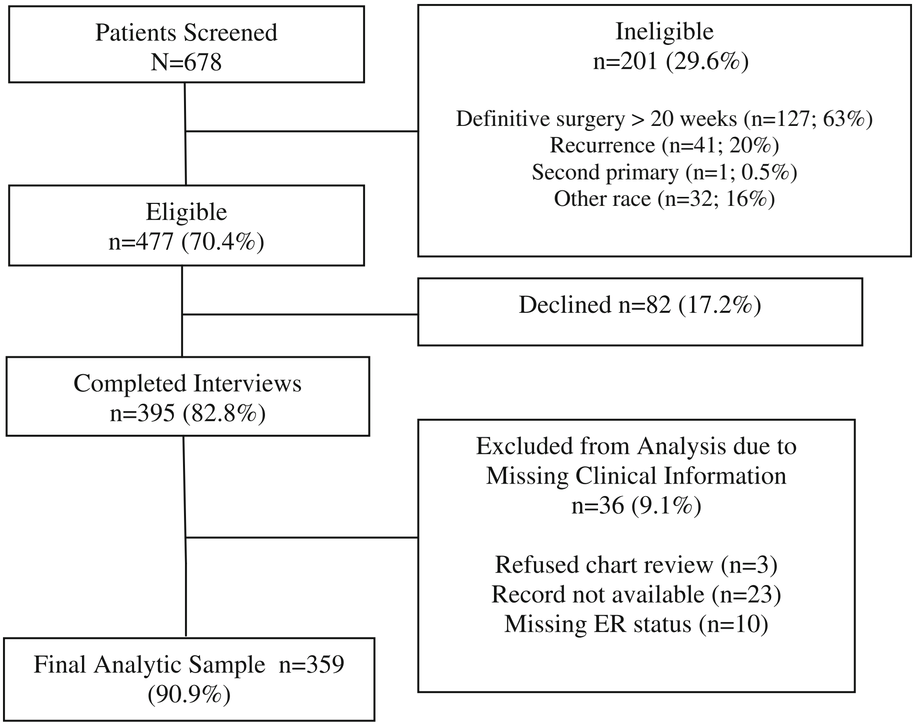

Fig. 1 Study schema

Initiation (yes vs. no) was defined as having initiated any chemotherapy regimen [22]. In addition, we examined initiation among women for whom chemotherapy would be regarded as clinically indicated in accordance with NCCN practice guidelines during the study period [e.g., positive nodes and/or estrogen receptor (ER) negative] [27, 28]. Days to chemotherapy initiation was measured among patients who initiated therapy as the number of days between a patient's last definitive surgery and her first cycle of adjuvant chemotherapy. The third outcome, initiation delay, was defined as $\geq$90 days from surgery to start of chemotherapy in accordance with reports [17, 18] that have linked this length of delay with decrements in survival [17].

Race was based on self-identification. Factors related to patient-centered interactions with physicians were collected via self-report and included communication, trust, medical mistrust, and perceived discrimination. The Makoul communication scale (7-items) was adapted to assess self-reported communication with oncologists (Cronbach's alpha: overall = 0.83; blacks = 0.82; whites = 0.85) [29]. The scale includes key dimensions of communication such as information-giving (e.g., "the doctor fully explained the risks of chemotherapy") and physicians' solicitation behaviors (e.g., "the doctor did not ask your opinion about taking chemotherapy"). Scores ranged from 8 to 41 and were dichotomized at the median; scores above the median reflect self-reported perceptions of greater communication.

To measure patients' level of trust in their oncologist, we adapted items from the primary care assessment survey, which has shown good reliability (0.86) in cancer settings and was reliable in our sample (Cronbach's alpha overall = 0.81, black = 0.81, white = 0.80); higher scores indicate higher trust [31–33]. Perceived healthcare discrimination was assessed using the race-based experiences scale that includes 7 questions about healthcare discrimination and was categorized as any versus none [34]. The suspicion subscale of the group-based medical mistrust scale measured the perceived level of group distrust in healthcare systems and practices [35] with higher scores indicating more mistrust (Cronbach's alpha overall = 0.84; blacks = 0.77; whites = 0.87).

Sociocultural factors included religiosity and chemotherapy attitudes. Religiosity was measured using nine items from Lukwago et al. [36] (e.g., "I talk openly about my faith") (Cronbach's alpha overall = 0.95, blacks = 0.94, whites = 0.94) and was dichotomized at the median with higher scores indicating high religiosity. To measure attitudes about chemotherapy, we expanded a two-item measure [23] to seven items that captured women's perceptions about the efficacy of therapy ("chemotherapy does not help you live longer") and about side effects ("the side effects of chemotherapy are worse than the disease") (Cronbach's alpha overall = 0.60, blacks = 0.59, whites = 0.50). Scores above the median reflected positive attitudes and those below were negative.

In addition, women were asked whether they received information about breast cancer treatment by radio/TV and internet (yes vs. no).

Clinical factors that were used to control for chemotherapy outcomes included ER status (positive vs. negative), surgery type (lumpectomy or mastectomy), nodal status (positive or negative), pathological tumor size, and human epidermal growth factor receptor (Her2/neu), which was categorized similar to other reports as positive, negative, or unknown [37]. Comorbidity was measured using the Charlson comorbidity index score [38]. Body mass index was calculated from data in the medical charts and categorized as either obese (kg/m$^2 \geq 30$) or non-obese (kg/m$^2 < 30$) [39]. Demographic variables were age, education, marital status, and employment status.

Statistical analysis

We used *t* tests and χ^2 tests to assess bivariate relationships between chemotherapy initiation and delay and study variables. Multivariable logistic regression was employed to model initiation and delay. Selection of variables for inclusion in regression models was based on bivariate significance ($p < 0.05$). We tested for the presence of interactions between variables of interest and race. Because we found significant interactions by race with regards to chemotherapy initiation, we conducted race-stratified analyses. No interactions were found for ≥90 day delay, so those analyses include all women and control for race. We evaluated the goodness-of-fit and the predictive capability of the logistic models using the Hosmer–Lemeshow test and the C-statistic measure.

To examine relationships between independent variables and time to initiation, we used Pearson's correlation tests and ANOVA. Significant variables ($p < 0.05$) were included in a series of linear regression models: race and time to interview were entered first, followed by demographic factors, and then by patient–provider factors. We evaluated whether each block of independent variables changed the race effect and explained more outcome variability using changes in R^2 and corresponding *F* tests log transformation of the time outcome was performed to satisfy the normality assumption. Since the results using the log transformed and original data were similar, for ease of interpretation, we only present the original data. Since there were no race interactions, stratified analyses were not considered.

To account for potential clustering by treating hospital, we also run corresponding logistic and linear regression models with generalized estimating equations (GEE). Since the results were virtually unchanged, we only present the results of the models without GEE. All analyses were conducted using IBM SPSS Software Version 19.

Results

Participants' characteristics

The study sample was 58 % black and 42 % white. Women's ages ranged from 25 to 89 years ($m = 54.8$; $SD = 11.7$) and virtually all patients were insured (99.4 %). As shown in Table 1, compared to whites, black women were more likely to be unmarried (65 vs. 28 %; $p < 0.001$) and obese (50 vs. 22 %; $p < 0.001$). More than half of black women (54 %) had tumor sizes ≥2 cm compared to about one-third of white women (35 %, $p = 0.001$). There was a non-significant trend toward more ER-negative tumors in black patients (27 vs. 20 % for whites; $p = 0.114$). Racial differences in additional sources of information (i.e., internet) were noted ($p = 0.014$). In terms of the interactions with providers, black women reported higher medical mistrust (12.8 ± 3.3 vs. 9.6 ± 3.1; $p < 0.001$), more discrimination (44 vs. 16 %; $p < 0.001$), and less trust in oncologists than whites (8.9 ± 1.8 vs. 9.2 ± 1.1; respectively; $p < 0.05$). No differences were noted in patients' ratings of patient–physician communication about chemotherapy ($p \geq 0.05$).

Chemotherapy initiation

The overall rate of chemotherapy initiation was 39 %: 30 % in whites and 46 % in blacks. Because of significant interactions between race and age ($p = 0.035$) and race by communication ($p = 0.002$), stratified analyses were performed. These models revealed differences by race in the direction and significance level of study variables (Table 2). The largest difference in effect was for communication, where greater patient–provider communication (vs. less) was associated with higher odds of initiation among blacks (OR: 3.26, 95 % CI: 1.51, 7.06), while greater communication was associated with lower initiation in whites (OR: 0.22, 95 % CI: 0.07, 0.73).

Age effects were somewhat different within each race group, with each 1 year of increasing age significantly associated with lower chemotherapy initiation in whites (OR: 0.90, 95 % CI: 0.84, 0.95) but not in blacks (OR: 0.99, 95 % CI: 0.95, 1.03). Attitudes about chemotherapy were also associated with initiation in both race groups, with positive (vs. negative) attitudes being associated with higher odds of initiation for blacks (OR: 2.58, 95 % CI: 1.16–5.71) and whites (OR: 2.99, 95 % CI: 1.05–8.48).

Analysis among the subgroup of patients with more definitive indications for chemotherapy ($n = 187$) revealed higher uptake of chemotherapy (58 %: 65.8 % in blacks vs. 44.3 % in whites; $p < 0.001$). In multivariable analyses, we found the same significant interactions by race as in the overall sample. Thus, we constructed race-stratified models

Table 1 Demographic, clinical, psychosocial, and healthcare characteristics of breast cancer patients by race and chemotherapy initiation status (*N* = 359)

	Total *N* = 359		Black *N* = 210		White *N* = 149		*p* value	Chemotherapy Initiated				*p* value
								Yes *N* = 141		No *N* = 218		
	n	%	*n*	%	*n*	%		*n*	%	*n*	%	
Demographic characteristics												
Age: mean (SD)	54.8 (11.7)		54.1 (12.0)		55.7 (11.2)		0.197	52.2 (11.3)		56.4 (11.6)		0.001
Race												
Black	210	58.5	–	–	–	–		97	46.2	113	53.8	0.001
White	149	41.5	–	–	–	–		44	29.5	105	70.5	
Education												
No college education	78	21.7	65	31.0	13	8.7	<0.001	45	57.7	33	42.3	<0.001
Some college	106	29.5	74	35.2	32	21.5		42	39.6	64	60.4	
Bachelors and above	175	48.7	71	33.8	104	69.8		54	30.9	121	69.1	
Marital status												
Married/living as married	182	50.7	74	35.2	108	72.5	<0.001	68	37.4	149	62.6	0.452
Currently Single	177	49.3	136	64.8	41	27.5		73	41.2	104	58.8	
Employment												
Full time employed	127	37.7	64	33.7	63	42.9	0.085	55	43.3	72	56.7	0.391
Other	210	62.3	126	66.3	84	57.1		81	38.6	129	61.4	
Clinical characteristics												
Estrogen receptor status												
ER-positive	274	76.3	154	73.3	120	80.5	0.114	92	33.6	182	66.4	
ER-negative	85	23.7	56	26.7	29	19.5		49	57.6	36	42.4	<0.001
Surgery												
Mastectomy	127	35.6	68	32.5	59	39.9	0.154	54	42.5	73	57.5	0.385
Lumpectomy	230	64.4	141	67.5	89	60.1		87	37.8	143	62.2	
Nodal status												
Positive	128	38.8	77	39.7	51	37.5	0.688	77	60.2	51	39.8	<0.001
Negative	202	61.2	177	60.3	85	62.5		64	31.7	138	68.3	
Tumor size												
<2 cm	178	53.9	89	46.1	89	65.0	0.001	54	30.3	124	69.7	<0.001
≥2 cm	152	46.1	104	53.9	48	35.0		86	56.6	66	43.4	
HER-2												
Positive	42	11.7	24	11.4	18	12.1	0.900	26	61.9	16	38.1	<0.001
Negative	248	69.1	144	68.6	104	69.8		103	41.5	145	58.5	
Unknown*	69	19.2	42	20.0	27	18.1		12	17.4	57	82.6	
Chemotherapy indicated**												
Indicated	187	52.1	117	55.7	70	47.0	0.103	108	57.8	79	42.2	<0.001
Considered	172	47.9	93	44.3	79	53.0		33	19.2	139	80.8	
Comorbidities												
No comorbid disease	125	34.8	63	30.0	62	41.6	0.023	37	29.6	88	70.4	0.006
≥1 comorbid diseases	234	65.2	147	70.0	87	58.4		104	44.4	130	55.6	
Body mass index (BMI)												
Obese (≥ 30 kg/m^2)	128	37.6	96	50.3	32	21.5	<0.001	59	46.1	69	53.9	0.090
Not obese (< 30 kg/m2)	212	62.4	95	49.7	117	78.5		78	36.8	134	63.2	
Patient attitudinal factors												
Chemotherapy attitude												
Positive	176	49.4	99	47.4	77	52.4	0.352	89	50.6	87	49.4	<0.001

Table 1 continued

	Total $N = 359$		Black $N = 210$		White $N = 149$		*p* value	Chemotherapy Initiated				*p* value
								Yes $N = 141$		No $N = 218$		
	n	%	*n*	%	*n*	%		*n*	%	*n*	%	
Negative	180	50.6	110	52.6	70	47.6		51	28.3	129	71.7	
Medical mistrust scale: mean (SD)	11.5 (3.6)		12.8 (3.3)		9.6 (3.1)		<0.001	11.8 (3.4)		11.2 (3.7)		0.116
Perceived discrimination												
Any	116	32.3	92	43.8	24	16.1	<0.001	54	45.6	62	53.4	0.051
None	243	67.7	118	56.2	125	83.9		87	35.8	156	64.2	
Religiosity												
High	168	49.4	126	66.0	42	28.2	<0.001	75	44.6	93	55.4	0.106
Low	172	50.6	65	34.0	107	71.8		62	36.0	110	64.0	
Patient–MD relationship												
Trust in medical oncologist: mean (SD)	9.0 (1.5)		8.9 (1.8)		9.2 (1.1)		0.048	9.1 (1.3)		9.0 (1.7)		0.455
Chemotherapy communication												
High	180	50.4	98	47.1	82	55.0	0.140	86	47.8	94	52.2	0.001
Low	177	49.6	110	52.9	67	45.0		54	30.5	123	69.5	
Provider gender§												
Female	275	85.7	153	84.5	122	87.1	0.508	118	42.9	157	57.1	0.189
Male	46	14.3	28	15.5	18	12.9		15	32.6	31	67.4	
Information sources												
Internet												
Yes	203	63.6	106	57.9	97	71.3	0.014	77	37.9	126	62.1	0.132
No	116	36.4	77	42.1	39	28.7		54	46.6	62	53.4	
Radio/TV												
Yes	91	30.6	69	38.3	22	18.8	<0.001	131	40.3	194	59.7	0.999
No	206	69.4	111	61.7	95	81.2		4	40.0	6	60.0	
Treatment site												
NCI-designated Cancer Center	157	43.7	86	41.0	70	47.0	0.256	62	39.5	95	60.5	0.941
Non-NCI-designated	202	56.3	124	59.0	79	53.0		79	39.1	123	60.9	

p values are obtained from χ^2 tests and *t* tests

Percentages add up to 100 along the rows for chemotherapy initiation and along columns for the “total” and race categories

NCI National Cancer Institute, *ER* estrogen receptor, *SD* standard deviation

* No information regarding testing or test results in patients’ medical record

** Based on NCCN clinical guidelines

§ Oncologist or surgeon

for the indicated group as we did for the overall sample. Race-stratified multivariable analyses among women with more definitive indications for chemotherapy revealed a similar pattern of associations with chemotherapy initiation as in the overall group (Table 2). For example, among black women with indications for chemotherapy, those with greater chemotherapy communication (vs. less) were more likely to initiate chemotherapy (OR: 3.25, 95 % CI: 1.26, 8.39). Among whites with indications for chemotherapy, those who reported greater communication were again less likely to initiate therapy than those reporting less chemotherapy communication (OR: 0.17, 95 % CI: 0.03, 0.95). Finally, the results were similar for women regardless of recruitment modality (data not shown).

Time to chemotherapy initiation

Among those who started chemotherapy, time from last definitive surgery to initiation of chemotherapy ranged from 19 to 180 days (66.3 ± 32.9 days). Black women had a greater mean number of days to initiation than whites (71.8 vs. 55.0 days, $p = 0.005$). In bivariate analyses, two other variables were positively associated with greater time to initiation: single status (73.5 vs. 58.0 days, $p = 0.013$)

Table 2 Adjusted odds ratios of chemotherapy initiation in breast cancer patients by race

Variable	All patients, eligible for chemotherapy ($N = 359$)		Chemotherapy indicated* ($N = 187$)	
	Black ($n = 210$) OR; 95 % CI	White ($n = 149$) OR; 95 % CI	Black ($n = 117$) OR; 95 % CI	White ($n = 70$) OR; 95 % CI
Age (per one year increase)	0.99 (0.95, 1.03)	0.90 (0.84, 0.95)[‡]	1.00 (0.95, 1.04)	0.86 (0.79,94)
Education				
Some college (vs. ≤HS)	0.44 (0.17, 1.09)	0.13 (0.02, 1.04)	0.65 (0.21, 2.00)	0.03 (0.01, 0.61)
Bachelor's degree+ (vs. ≤HS)	0.25 (0.09, 0.68)[‡]	0.26 (0.05, 1.49)	0.27 (0.09, 0.85)	0.31 (0.03, 2.89)
ER-negative (vs. ER-positive)	4.22 (1.70, 10.47)[‡]	1.54 (0.44, 5.41)	–	–
Positive nodes (vs. negative)	4.35 (1.93, 9.79)[‡]	3.93 (1.34, 11.48)[†]	–	–
≥2 cm tumor size (vs. <2 cm)	2.65 (1.21, 5.80)[†]	4.44 (1.53, 12.85)[‡]	2.06 (0.79, 5.39)	4.54 (1.06,19.45)
≥1 Comorbid diseases (vs. 0)	1.93 (0.73, 5.09)	2.02 (0.64, 6.43)	1.67 (0.54, 5.14)	1.26 (0.27, 6.00)
Positive attitude (vs. negative)	2.58 (1.16, 5.71)[†]	2.99 (1.05, 8.48)[†]	1.58 (0.61, 4.07)	1.33 (0.29, 6.11)
Communication—greater (vs. less)	3.26 (1.51, 7.06)[‡]	0.22 (0.07, 0.73)[†]	3.25 (1.26, 8.39)	0.17 (0.03, 0.95)
C-statistic	0.85	0.87	0.78	0.88
H–L goodness-of-fit	$p = 0.467$	$p = 0.755$	$p = 0.402$	$p = 0.384$

Models controlled for treatment site, time from diagnosis, and HER2 status

HS high school

[†] p value < 0.05

[‡] p value < 0.01

* Indicated per NCCN guidelines

and lower trust in oncologists ($r = -0.30$; $p = 0.004$). In multivariable analyses, race was no longer significantly related to time to initiation after controlling for marital status and trust. This model (Table 3) explained 19.6 % of the variability in time to chemotherapy initiation.

Delay in chemotherapy initiation of ≥90 days

Twenty-one percent of participants who initiated chemotherapy had ≥90 day delay: 27 % of blacks versus 8.3 % of whites ($p = 0.024$). In bivariate analyses, only three factors were associated with a ≥90 day delay: race, marital status, and religiosity. About one-third (32.2 %) of the single women delayed treatment compared to only 7.8 % of those married ($p = 0.002$). More women with high religiosity delayed initiation (vs. low) (31.6 vs. 8.2 %; $p = 0.003$). Table 3 displays results from multivariable models for ≥90 day delay; race was not significant after considering covariates, but marital status and religiosity remained significant.

Table 3 Associations of characteristics with time to chemotherapy initiation and ≥90 days chemotherapy delay

Characteristic	Days to chemotherapy initiation estimated coefficients	≥ 90 days delay odds ratio, 95 % CI
Race		
Black	7.6	1.15 (0.25, 5.40)
White	Ref	Ref
Marital status		
Unmarried	14.9[†]	6.54 (1.81, 23.55)[‡]
Married/living as married	Ref	Ref
Trust in oncologist (per one point increase)	−7.9[‡]	–
Religiosity		4.94 (1.29, 18.99)[†]
High (vs. low)	–	
Model F statistic	$F_{(4,85)} = 6.4$; $p < 0.001$	H–L goodness-of-fit, $p = 0.300$
Adjusted R^2 (%)	19.6	C-statistic = 0.78

"–" indicates variable not significant in the bivariate analysis

* Models controlled for treatment site and time since diagnosis

[†] $p < 0.05$

[‡] $p < 0.01$

Discussion

This study is among the few that reports across- and within-race variations in the use and timeliness of initiation of chemotherapy and how the "art of care" affects chemotherapy utilization. Measures of the patient–physician relationship were important for initiation, but varied in the direction of their effect by race group. Greater patient–physician communication was associated with higher odds of starting chemotherapy among black women but with lower odds of initiation among whites. This pattern was also true in the sub-set of black and white women with definitive clinical indications for chemotherapy. Black women were also more likely to have longer mean times to the start of chemotherapy than whites, but this race effect was moderated by trust in providers. In addition, black women were more likely to have a $\geq$90 day initiation delay, but this was no longer significant after considering marital status and religiosity.

The differential impact of communication by race in chemotherapy initiation has not been studied before and could have several explanations. Black and white patients may have different needs and/or preferences for patient–physician communication [26]. Indeed, Ashton et al. [40] noted that preferences for the style of communication can vary by race. One study with primarily white breast cancer patients found that women who preferred to make their own decisions about chemotherapy were less likely to choose it [41]. Thus, black women may have preferred to rely on providers while whites may have preferred to make decisions with less input from providers. Reports regarding cancer patients' information needs suggest that black patients report the need for more information from providers [42–44]. Manfredi et al. [45] found that even when black breast cancer patients asked more questions than whites, they received less information. Thus, if black women relied more on their physicians in making decisions and received desired communication, their decisions may have been positively impacted.

The association between greater chemotherapy communication and lower initiation in whites further underscores the complexities of patient–provider communication. In breast cancer patients, some data suggest that being white and having a higher income and education is associated with seeking information outside of the patient–provider relationship to inform decisions [46–48]. White women in our study reported receiving more information from the internet than blacks. Indeed, highly educated white women who reported having greater communication were the least likely to initiate therapy (data not shown). Our findings may also reflect differences in preferences for a self-efficacy decision style (emphasis on weighing options and controlling decisions) versus a medical expert style (more driven by physician's provided information) [49]. Finally, despite high ratings of communication, there may have been differences in the content of information provided by race. For instance, black women may have received more messages about the severity of their disease and whites more information about side effects, so that whites made decisions to forego chemotherapy more often [41, 50]. Future research should include direct observation of encounters and mixed methods to better understand the differential effect of communication on chemotherapy uptake by race.

Even when women choose to receive chemotherapy, treatment delays can affect survival [17]. Similar to our results, others have found that black women tend to have longer initiation delay of systemic therapy than whites [13, 18, 51, 52]. Reasons for the observed delays have been underexplored. Our results suggest that the trust in providers may partly explain part these patterns. Women with less trust may delay care to seek additional opinions, or initially reject their physician's recommendations [53–55]. Findings also suggest that being married decreases time to initiation and treatment delay, as noted by others. For instance, Lipscomb et al. [24] found that the impact of race on completion of chemotherapy was influenced by women's marital status. Unmarried women may have less support to initiate therapy than their married counterparts.

Religiosity also appears to be associated with greater delay. This result may indicate that women who reported greater religiosity sought guidance through prayer or within their religious community before starting therapy, or they may have delayed their disclosure to others. Gullatte et al. [56] found that when black women disclosed their breast symptoms to another person (vs. to God only), they were less likely to delay seeking initial care.

All participants would have been eligible for chemotherapy. Overall, it was reassuring that initiation rates were higher among the sub-set with the strongest clinical indications for therapy. However, based on guidelines [27, 28], use remained suboptimal, suggesting the need to better understand and address initiation among those with the clearest indications for chemotherapy. The lower use in whites was unexpected, and might be related to variations in tumor characteristics that we did not measure (e.g., tumor grade). Also, the sample size was too small to analyze all the subgroups within the white sample.

The strengths of this study include the collection of primary data from patients, the high representation of black patients, that supported race-stratified analyses, consideration of two dimensions of initiation, treatment data from medical records, assessment of initiation by clinical subgroups, and ascertainment of psychosocial variables related to chemotherapy.

Despite these considerable strengths, there are some limitations to be considered. We relied on patient reports of patient–physician communication. We do not know the actual content of the interactions, including the amount or quality of information or the oncologist's recommendations. Studies that observe encounters will be important to extend our results and determine if actual communication differs by race. The sample was not population-based and information about non-responders, particularly those who self-referred, is limited. The generalizability of our results may also be restricted as most participants were insured and recruited from cancer centers. These women may differ systematically from patients with low insurance coverage and/or cared for in community practices. Finally, we did not collect primary data about physicians (e.g., race, etc.); this will be important to further understand interactions between providers and patients about cancer care.

Overall, the differential impact of trust and communication in chemotherapy initiation and delay suggests that additional research is needed to understand this “communication paradox” to examine preferences for decision-making, actual interactions with providers, and information needs across race groups [41]. Until then, the robustness of our results suggests that the patient–physician dyad represents a good leverage point for interventions to improve chemotherapy patterns in black women and ultimately, to reduce race disparities in breast cancer mortality.

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Conflict of interest Claudine Isaacs: Genetech and Glaxo Smith Kline (consultation). All remaining authors have declared no conflicts of interest.

Ethical standards The study complies with the current laws of the country in which it was performed.

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