Published in final edited form as:

Support Care Cancer. 2017 May ; 25(5): 1431–1438. doi:10.1007/s00520-016-3539-x.

Quality of life of older African American breast cancer survivors: a population-based study

Harveshp D. Mogal¹, Marissa Howard-McNatt¹, Rebecca Dodson¹, Nora F. Fino², Clancy J. Clark¹

¹Division of Surgical Oncology, Department of General Surgery, Wake Forest University Baptist Medical Center, Medical Center Blvd., Winston-Salem, NC 27157, USA

²Department of Biostatistical Sciences, Wake Forest University, Baptist Medical Center, Winston-Salem, NC, USA

Abstract

Introduction—Factors associated with lower health-related quality of life (HRQOL) among older African American (AA) breast cancer survivors (BCS) have not been elucidated.

Methods—Using the Surveillance, Epidemiology, and End Results-Medicare Health Outcome Survey linked dataset, all resected AA BCS over 65 were identified. Using the most recent survey after diagnosis, individuals with a VR12 physical (PCS) or mental (MCS) component score 10 points lower than the median were categorized as having poor HRQOL. Univariate and multivariate (MV) analyses identified predictors of poor HRQOL.

Results—Of 373 AA BCS (median age 74.6), median time from diagnosis to survey was 68.4 months with median follow-up of 138.6 months. Median PCS was 35.9 (IQR 28.5–44.5) with 76 (20.1%) reporting poor PCS. Median MCS was 50.6 (IQR 41.3–59.1) with 101 (27.1%) reporting poor MCS. Predictors of poor PCS included advanced age, larger tumor size, 2 comorbidities, inability to perform >2 of 6 activities of daily living (ADLs), modified/radical mastectomy, infiltrating lobular carcinoma, and stage III or IV disease (all $p < 0.05$). Comorbidities 2 and inability to perform >2 of 6 ADLs ($p < 0.05$) predicted poor MCS. Inability to perform >2 of 6 ADLs was the only independent predictor of poor PCS (OR 10.9, 95% CI 3.0–39.3; $p < 0.001$) and MCS (OR 7.6, 95% CI 4.3–13.3; $p < 0.001$).

Conclusion—In elderly AA BCS, poor HRQOL was not associated with socioeconomic status or tumor-specific factors but rather impairment in ADLs.

Clancy J. Clark cjclark@wakehealth.edu.

Author contributions Harveshp Mogal: Design of the manuscript, interpretation of data, drafting the article and critical revisions, final approval, and agreement to be accountable for all aspects of the work.

Marissa Howard-McNatt: Interpretation of data, critical revision of the article, final approval, and agreement to be accountable for all aspects of the work.

Rebecca Dodson: Critical revision of the article and final approval.

Nora F. Fino: Analysis and interpretation of the data, critical revisions, and final approval.

Clancy J. Clark: Conceptualization and design, analysis and interpretation of the data, critical revisions, final approval, and agreement to be accountable for all aspects of the work.

Compliance with ethical standards

Ethics statement An Institutional Review Board approval was obtained for the study.

Conflict of interest The authors declare that they have no conflicts of interest.

Condensed abstract

Physical and mental HRQOL in African American breast cancer survivors is not dependent on socioeconomic or tumor-related characteristics, but rather on inability to perform ADLs.

Keywords

HRQOL; African American; Breast cancer survivor; PCS; MCS

Introduction

In 2014, more than 3.1 million women were alive after breast cancer diagnosis and treatment, with 72% over the age of 60 [1]. For African American women, 27,060 new cases of breast cancer and 6080 deaths were expected to occur in 2013 [2, 3]. With continued improvements in breast cancer survival and an aging population, the number of older breast cancer survivors will only increase. Care of the breast cancer survivor (BCS) has shifted from focusing on treatment and recurrence to other factors including monitoring for long-term treatment-related effects, general health-maintenance, diagnosis and treatment of existing and new comorbidities, addressing psychosocial aspects of cancer recovery, and assessment of health-related quality of life (HRQOL) impairments [4]. The sequelae of treatments that threaten quality of life in breast cancer survivors (BCS) include physical and cognitive impairments, psychosocial and emotional distress, impairments with role functioning, and a decreased sense of overall health status and well-being [5].

Similar to disparities in cancer-specific outcomes among African American breast cancer patients, recent studies have identified significant disparities in HRQOL between African American and white BCS [6–12]. For instance, compared to their White counterparts, African American BCS expressed more concerns about physical symptom distress including fatigue, pain and menopausal symptoms, psychosocial well-being including body image concerns, stigma of breast cancer and concerns about breast cancer recurrence, and provider-patient relationships, but were better adapted to use their spirituality as a way to cope with breast cancer [11]. Importantly, few studies have focused on the HRQOL of AA BCS or investigated specific factors associated with worse HRQOL among AA BCS [11, 13]. In addition, we have limited understanding of HRQOL in older AA BCS.

The aim of the present study was to characterize HRQOL among African American breast cancer survivors and identify potential factors associated with poor physical and mental HRQOL using a population-based cohort.

Methods

We performed a retrospective cohort study using the Surveillance, Epidemiology and End Results-Medicare Health Outcomes Survey (SEER-MHOS) linked dataset from 1998 to 2014. The SEER Program includes 18 registries that collect information on newly diagnosed cancer cases within SEER geographic regions and includes 26% of the US population [14]. The Medicare Health Outcomes Survey is a self-administered, mailed survey with telephone

follow-up developed by CMS and measures functional status, chronic health conditions, and physical and mental health of Medicare managed care beneficiaries. Details for each MHOS are available at www.cms.gov/hos. The MHOS dataset contains patient demographics, socioeconomic data, and self-reported chronic health conditions. MHOS was initially intended to track and objectively assess outcomes of care provided by healthcare organizations to Medicare beneficiaries. Every year, a random sample of Medicare beneficiaries in managed care plans are administered the survey. Respondents are requested to complete a baseline survey followed up by another survey administered 2 years later. SEER-MHOS linked data includes participants from multiple MHOS cohorts, with baseline and 2-year follow-up surveys. The SEER-MHOS linked dataset also provides population-based insight into self-reported HRQOL of US adults with cancer. Quality of life measures include the Short Form-36 (SF-36) from 1998 to 2005 then the Veterans RAND 12 Item Health Survey (VR-12) from 2006 onwards [15]. Physical and mental component scores are then derived from these measures. Institutional review board approval was obtained for this study.

Inclusion criteria

Using the SEER-MHOS linked dataset from 1998 to 2014, we identified all African American female patients over 65 years old with a pathologically proven diagnosis of invasive breast cancer including invasive ductal and lobular carcinoma that completed a MHOS survey after diagnosis. All study participants had undergone surgical resection.

Exclusion criteria

Patients with the following were excluded: patients with prior cancer diagnosis; missing or unknown procedure type or follow-up; disabled or institutionalized patients; cancer reported at the time of autopsy; non-infiltrating ductal or lobular carcinoma pathological subtypes or death within 6 months of completing survey. Figure 1 details the study cohort selection.

Study variables and definitions

Patient demographics, socioeconomic data, tumor characteristics, and HRQOL data were collected from the SEER-MHOS dataset. Demographic and socioeconomic data included age, education, income, marriage status, and homeownership. Tumor characteristics included tumor size, lymph node status, stage, receptor status, and type of surgery. Number of comorbidities was based on totaling responses to self-reported comorbidity questions in the MHOS. Activities of daily living were derived from the MHOS. Initially defined and standardized by Katz et al., ADLs are self-care activities including eating, bathing, dressing and undressing, grooming, walking, getting in and out of bed, and ability to control bowel function [16]. The VR-12 was scored using published algorithms to convert the survey responses to the Physical Component Summary (PCS) and the Mental Component Summary (MCS) scores [17]. For each 0–100 summary score, a higher score represents better HRQOL. As no standard definition exists specifying the difference in PCS or MCS points that would translate into a clinically significant difference in quality of life, we used 10 points or 1 standard deviation as a conservative estimate [18]. Patients with a VR12 physical (PCS) or mental (MCS) component score 10 points lower than the median PCS/MCS score were categorized as having poor HRQOL. Analysis of QOL subdomains found in SF-36

could not be performed given conversion from SF-36 to VR-12 and required independent analysis of PCS and MCS.

Statistical analysis

Demographic and tumor characteristics were summarized overall by normal and low PCS and MCS. Differences in means and frequencies were assessed by ANOVA for continuous variables and chi-squared tests and Fisher's exact test for nominal variables. Univariate logistic regression was used to predict factors associated with lower PCS and MCS scores. Variables considered being clinically meaningful determinants of HRQOL and those with p values less than 0.10 were included in a multivariate logistic regression model. Variables missing more than 10% of data were not included in the multivariate model. To protect patient identity if count was less than 10, it is reported as less than 10. All analyses were performed in SAS version 9.4 (Cary, NC) and a 0.05 significance level was used throughout the analysis.

Results

Three hundred seventy-three African American breast cancer survivors who underwent surgical resection were identified. Median age was 74.6 (SD 6.5) at the time of the survey. Median time from diagnosis to HRQOL survey was 68.4 months (SD 56.2) with median follow-up of 138.6 months (SD 64.9). A higher percentage of women with lower MCS reported an income less than US\$30,000. Similarly, a higher percentage of women with poor PCS and MCS had >2 comorbidities or difficulty performing >2 ADLs. Tumor size, tumor type, and type of surgery differed between patients with low and normal PCS but not MCS scores. Demographic and tumor characteristics are summarized in Table 1.

Predictors of poor PCS

Median PCS was 35.9 (IQR 28.5–44.5) with 76 (20.1%) patients reporting poor PCS. Predictors of poor PCS included advanced age, larger tumor size, >2 comorbidities, inability to perform >2 of 6 activities of daily living (ADLs), modified or radical mastectomy, infiltrating lobular carcinoma, stage III or IV disease, and administration of radiation treatment (all $p < 0.1$). After adjusting for age, type of operation, radiation treatment, tumor size, type of tumor, stage, comorbidities, and time from diagnosis to survey, inability to perform >2 of 6 ADLs (OR 10.9, 95% CI 3.0–39.3; $p = <0.001$) was the only independent predictor of poor PCS (Table 2).

Predictors of poor MCS

Median MCS was 50.6 (IQR 41.3–59.1) with 101 (27.1%) patients with poor MCS. Predictors of poor MCS included income less than \$30 K per year, 2 or more comorbidities, and inability to perform >2 of 6 ADLs (all $p < 0.1$). Age, tumor type, and stage at presentation were not associated with lower MCS. After adjusting for number of comorbidities and time from diagnosis to survey, inability to perform >2 of 6 ADLs was independently associated with poor MCS (OR 7.6, 95% CI 4.3–13.3; $p < 0.001$) (Table 3). Sensitivity analyses were performed including the patients with income less than \$30 K and demonstrated no significant difference.

Discussion

Health-related quality of life is a multidimensional construct and encompasses the assessment of many essential aspects of a person's life including physical functioning, emotional well-being, role functioning, and social functioning [19, 20]. Several studies involving evaluation of HRQOL in BCS are modeled on Brenner and colleagues' proximal and distal approach, which places outcomes of HRQOL on a continuum beginning with initial diagnosis and treatment [21]. Proximal domains pertain to disease-specific outcomes and distal domains focus on the overall global well-being of the survivorship spectrum. These studies have identified more concerns with proximal measures of HRQOL, such as greater fatigue, worse hot flashes, and worse sleep quality in AA BCS whereas they note relatively favorable outcomes on the more distal measures including heightened spirituality, ability to cope with the cancer, and overall global well-being [10, 11]. However, these studies were limited by their relatively small sample sizes, lack of adjustment for confounding factors such as socioeconomic status and education, and the fact that the tools used to assess HRQOL in BCS were historically developed and validated mostly for Caucasian patients [11]. Hence, it is unclear if the HRQOL variables, terms, and definitions used in these tools are equally applicable across different socioeconomic, ethnic, and racial groups, in whom HRQOL may be more appropriately represented by a different set of physical and psychosocial constructs. Even after adjusting for potential confounders, the sampling frame used to identify the study populations is limited in their applicability to the general population [10]. Additionally, these studies did not focus on older BCS, who have different HRQOL issues compared to younger women diagnosed and treated for breast cancer as has been documented in many studies that factor age differences in BCS [22–24]. These limitations have underscored the need for more population-based samples to study HRQOL issues among older BCS in racially and geographically diverse populations.

In this population-based study of older AA BCS, we found that over a fifth of patients reported poor physical (20.1%) and mental (27%) HRQOL. Advanced age, tumor size, >2 comorbidities, inability to perform >2 of 6 ADLs, modified or radical mastectomy, infiltrating lobular carcinoma, advanced stage of disease, and administration of radiation treatment were all associated with poorer PCS. We used multivariable analysis to control for potential confounders and identified inability to perform ADLs as the only significant risk factor associated with poorer physical HRQOL. Comorbidities, inability to perform ADLs, and lower income were associated with poorer mental QOL. After controlling for other factors, only inability to perform ADLs was noted to be independently associated with poorer mental HRQOL. The median time from diagnosis to survey was 68.4 months, which allowed us to assess long-term effects of survivorship but prevented evaluation of early cancer-specific effects on HRQOL.

Our study findings are similar to larger published studies of factors influencing HRQOL scores in patients undergoing various treatments for breast cancer [25–27]. In these studies, type of surgery and radiation had little impact on long-term HRQOL outcomes for breast cancer survivors. Neuner et al., in their recently published population-based study of 3083 community-dwelling BCS older than 65 years of age, from four representative US states, demonstrated sociodemographic variables (including income and education), comorbidity,

and breast cancer stage as being important variables that negatively impact HRQOL in older BCS. However, no significant long-term effects of different breast cancer treatments on general as well as breast cancer-specific HRQOL scores were reported [28]. Development of lymphedema was noted to be associated with substantial reductions in physical and mental HRQOL with the impact of lymphedema on physical dimensions of quality of life being significantly higher than the impact of age increase and similar to having a major comorbid illness. However, less than 5% of their cohort was AA. Stover et al. used the SEER-MHOS linked databases to study the HRQOL of older BCS over time based on different treatment strategies. Although declines in both physical and mental QOL were noted within the first 6 months of treatment, these differences waned after 12 months. Importantly, the declines were comparable across different treatment types irrespective of treatment strategy (surgery with or without radiation) employed [29]. As noted above, only 6% of their patients were AA BCS who traditionally have been reported to have different QOL outcomes compared to Caucasian patients. In a more recent study by Pinheiro et al., the same group underscored this differential impact of race on changes in QOL before and after a cancer diagnosis and found that although prior to cancer diagnosis there are significant differences in HRQOL measures between Caucasian and ethnic minorities, after cancer diagnosis, these differences tend to be less pronounced, likely because of the effect that treatment and exposure to the health system has in leveling these differences [30]. However, this study included both male and female patients with other cancers besides breast cancer. Additionally, African American patients made up only 8% of the study population.

The effect of chronic disease burden and comorbidities on HRQOL has not been well elucidated. Data from population-based surveys indicate that chronic disease burden is associated with deficits in physical and social functioning aspects of HRQOL rather than cancer diagnosis itself [31–33]. However, some of these studies failed to address the higher prevalence of comorbidities noted in general in AA women as they focused on populations that were largely younger and Caucasian. These studies also did not account for potential confounders like ADLs which could have attributed to poorer HRQOL in patients with more comorbidities[31]. In our study, a higher proportion of patients with poor PCS and MCS scores were noted to have multiple comorbidities (47.4 and 40.6%, respectively). Even though we noted an association of poorer physical and mental HRQOL with increased comorbidities, the effect was not independently noted on multivariate analysis. One explanation is that outcomes for patients in the SEER-MHOS database are self-reported by survey respondents, and therefore, it is likely that the effect of comorbidities on HRQOL was largely mediated by the respondents' inability to perform key ADLs. Therefore, even though traditionally reported comorbidities may not have had a significant impact on HRQOL, other comorbid conditions such as lymphedema and specific long-term treatment-related effects from endocrine therapy or chemotherapy which are not specifically captured by SEER-MHOS may have led to a decline in ADLs leading to poorer PCS and MCS scores. This interplay between comorbidities and ADLs has important implications with respect to targeting specific measures to improve the HRQOL of BCS. As survivorship after breast cancer treatment continues to increase, it is essential not only to screen for and treat comorbidities in a timely manner but also to recognize that interventions designed to improve performance of essential ADLs may be as important in improving HRQOL.

Our study has several limitations. First, the SEER-MHOS database captures data only on elderly breast cancer patients and not all breast cancer survivors. In addition, since the study cohort included only patients enrolled in a Medicare Advantage program, findings may not be applicable to all older African Americans. Second, acute effects of cancer treatment or details of endocrine treatment or chemotherapy, which could have contributed to the outcomes noted in our analysis, are not reported in SEER-MHOS. Third, MHOS uses general HRQOL measures (SF-36 and more recently the VR-12) which may not be sufficiently specific for breast cancer survivors. Lastly, we did not compare HRQOL in AA patients before and after their cancer diagnosis. Therefore, we were unable to assess if deficits in HRQOL measures were pre-existent or induced by breast cancer diagnosis and treatment.

Conclusion

Health-related quality of life in older African American breast cancer survivors, although influenced by socioeconomic factors and comorbidities, is mainly dependent on ability to perform activities of daily living. Interventions focused on improving long-term HRQOL of breast cancer survivors should not only consider assessment and treatment of comorbidities but also develop measures to improve daily functional living.

Acknowledgments

Supported by: Wake Forest University Biostatistics shared resource NCI CCSG P30CA012197.

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Fig. 1. Patient selection workflow—describes the outline of how patients were selected for the study cohort

Table 1

Descriptive statistics overall and by low physical and mental component scores

Variable	Overall (N = 373)			Low PCS (n = 76)			Normal PCS (n = 297)			Low MCS (n = 101)			Normal MCS (n = 272)			p value
	N/mean	%/SD		N/mean	%/SD		N/mean	%/SD		N/mean	%/SD		N/mean	%/SD		
Age	74.6	6.5		76.2	7		74.2	6.3		75.2	6.9		74.4	6.3		0.272
High school education	243	65.9	46	60.5	197		67.2	67.2		61	61.6		182	67.4		0.299
Income <\$30 K per year	223	82.3	46	88.5	177		80.8	80.8		69	89.6		154	79.4		0.047
Home ownership	237	69.3	51	76.1	186		67.6	67.6		62	66.7		175	70.3		0.519
Married	94	25.7	20	26.3	74		25.5	25.5		29	29.3		65	24.3		0.336
Current smoker, missing n = 34	40	10.7	10	13.2	30		10.1	10.1		13	12.9		27	9.9		0.512
Alive >12 months from survey	366	98.1	74	97.4	292		98.3	98.3		98	97.0		268	98.5		0.343
>2 comorbidities	107	28.7	36	47.4	71		23.9	23.9		41	40.6		66	24.3		0.002
>2 ADLs	81	21.7	37	48.7	44		14.8	14.8		51	50.5		30	11.0		<0.001
Tumor type—IDC	318	85.3	56	73.7	262		88.2	88.2		87	86.1		231	84.9		0.727
Type of surgery																
Partial mastectomy	193	51.7	29	38.2	164		55.2	55.2		55	54.5		138	50.74		0.808
Simple mastectomy	72	19.3	15	19.7	57		19.2	19.2		18	17.8		54	19.9		
Modified or radical mastectomy	108	29	32	42.1	76		25.6	25.6		28	27.7		80	29.4		
Radiation therapy	172	46.6	28	37.3	144		49	49		48	48		124	46.1		0.745
ER status +, missing = 53 *	242	64.9	47	61.8	195		65.7	65.7		62	61.4		180	66.2		0.159
PR status +, missing = 64 *	193	51.7	34	44.7	159		53.5	53.5		46	45.5		147	54.0		0.040
Tumor size (mm)	20.7	14.8	24.7	18.5	19.7		13.5	13.5		21.21	15.0		20.5	14.7		0.689
Node positive, missing = 23	129	36.9	32	45.7	97		34.6	34.6		34	35.1		95	37.6		0.670
AJCC 6th ed. stage																
I	177	47.45	31	40.79	146		49.16	49.16		48	47.52		129	47.73		0.633
II	153	41.02	28	36.84	125		42.09	42.09		38	37.62		115	42.28		
III	40	10.72	15	19.74	25		8.42	8.42		14	13.86		26	9.56		
IV	<10	0.8	<10	2.63	<10		0.34	0.34		<10	0.99		<10	0.74		
Number of months from first cancer to survey in SEER	68.4	56.2	60.1	51.5	70.6		57.3	57.3		64.8	52.3		69.8	57.6		0.454
Number of months from first cancer to last follow-up	138.6	64.9	119.8	63	143.4		64.6	64.6		125.1	58.6		143.5	66.5		0.015

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Italic represents statistically significant values

SD standard deviation, *PCS* physical component score, *MCS* mental component score, *ADL* activities of daily living, *IDC* infiltrating ductal carcinoma

* *p* value based on Fisher's exact test

Table 2

Factors predicting low PCS scores

Variable	Univariate model			Multivariate model		
	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI
Age, per year	1.1	1.0	1.1	0.020	1.0	0.9
High school education						
No (Ref)						
Yes	0.9	0.9	1.0	0.792		
Income <\$30 K per year						
No (Ref)						
Yes	1.8	0.7	4.5	0.200		
Home ownership						
No (Ref)						
Yes	1.5	0.8	2.8	0.179		
Married						
No						
Yes	1.0	0.6	1.9	0.887		
Current smoker (yes/no)						
No (Ref)						
Yes	1.5	0.7	3.2	0.321		
>2 comorbidities						
No (Ref)						
Yes	2.9	1.7	4.9	<0.001	1.6	0.5
>2 ADLs						
No (Ref)						
Yes	5.5	3.1	9.5	<0.001	10.9	3.0
Tumor type						
Infiltrating ductal carcinoma (Ref)						
Infiltrating lobular carcinoma	2.1	0.9	4.4	0.065	3.9	0.7
Log tumor size	1.5	1.0	2.2	0.040	1.7	0.5
AJCC 6th ed. stage						

Variable	Univariate model				Multivariate model			
	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value
I and II (Ref)								
III and IV	3.0	1.5	5.9	0.001	0.6	0.1	3.1	0.518
Type of surgery								
Partial mastectomy (Ref)								
Simple mastectomy	1.5	0.8	2.9	0.260	2.8	0.5	16.4	0.936
Modified or radical mastectomy	2.4	1.4	4.2	0.003	1.1	0.1	8.8	0.256
Radiation therapy								
No (Ref)								
Yes	0.6	0.4	1.1	0.073	0.9	0.2	3.4	0.856
Number of months from first cancer to survey in SEER	0.9	0.9	1.0	0.148	0.9	0.9	1.0	0.481

Italic represents statistically significant values

OR odds ratio, *CI*/confidence interval, *Ref*/reference

Table 3

Factors predicting low MCS scores

Variable	Univariate models			p value	Multivariate model			p value
	OR	Lower 95% CI	Upper 95% CI		OR	Lower 95% CI	Upper 95% CI	
Age, per year	1.0	0.9	1.1	0.272				
High school or higher education								
No (Ref)								
Yes	0.8	0.5	1.3	0.299				
Income <\$30 K per year								
No (Ref)								
Yes	2.2	0.9	5.0	0.051	1.7	0.7	3.9	0.250
Home ownership								
No (Ref)								
Yes	0.9	0.5	1.4	0.519				
Married								
No (Ref)								
Yes	1.3	0.8	2.2	0.336				
Smoking								
No (Ref)								
Yes	1.4	0.7	2.8	0.366				
>2 comorbidities								
No (Ref)								
Yes	2.1	1.3	3.5	0.002	1.1	0.6	2.0	0.850
>2 ADLs								
No (Ref)								
Yes	8.2	4.8	14.2	<0.001	5.8	3.0	11.0	<0.001
Type of breast cancer								
Infiltrating ductal carcinoma (Ref)								
Infiltrating lobular carcinoma	0.8	0.3	1.7	0.690				
Log tumor size	0.9	0.7	1.3	0.884				
Type of surgery								

Variable	Univariate models				Multivariate model			
	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value
Partial mastectomy (Ref)								
Simple mastectomy	0.8	0.5	1.6	0.571				
Modified or radical mastectomy	0.9	0.5	1.5	0.632				
Radiation therapy								
No (Ref)								
Yes	1.1	0.7	1.7	0.745				
Number of months from first cancer to survey in SEER	0.9	0.9	1.0	0.453	1	1.0	1.0	0.995

Italic represents statistically significant values
OR odds ratio, *CI* confidence interval, *Ref* reference