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Association of patient experience of care and radiation therapy initiation among women with early stage breast cancer

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Abstract

Background: For women diagnosed with early-stage breast cancer, lumpectomy followed by radiation therapy (RT) has been a guideline-recommended treatment. However, lumpectomy followed by hormonal therapy (HT) is also an approved treatment for certain women. It is unclear what patient-driven factors are related to decisions to receive RT. This study examined relationships between patient-reported experience of care, an important dimension of health care quality, and receipt of RT following lumpectomy.

Methods: We used NCI Surveillance, Epidemiology, and End Results (SEER) data linked to the Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) responses (SEER-CAHPS) to examine experiences of care among women diagnosed with local/regional stage breast cancer 2000–2017 who received lumpectomy, were enrolled in fee-for-service Medicare, completed a CAHPS survey 18 months following diagnosis, and survived for this study period. Experience of care was assessed by patient-provided scores for physicians, doctor communication, care coordination, and other aspects of care. Multivariable logistic regression models assessed associations of receipt of external beam RT with care experience and patient sociodemographic and clinical characteristics.

Results: The study population included 824 women; 655 (79%) received RT. Women with higher experience of care scores for their personal doctor were significantly more likely to have received

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Research data used for this study are from the NCI SEER-CAHPS data resource. Information on obtaining data from this resource is available at <https://healthcaresdelivery.cancer.gov/seer-cahps/obtain/>

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any RT (odds ratio [OR] 1.18, $p=0.033$). Non-significant trends were observed for associations of increased RT with higher CAHPS measures of doctor communications (OR 1.15, $p=0.055$) and care coordination (OR 1.24, $p=0.051$). In contrast, women reporting higher scores for Part D prescription drug plans were significantly less likely to have received RT (OR 0.78, $p=0.030$).

Conclusions: Patient experience of care was significantly associated with receipt of RT following lumpectomy among women with breast cancer. Health care organization leaders may want to consider incorporating experience of care into quality improvement initiatives and other activities that aim to improve patient decision-making/care and outcomes.

Introduction

Breast cancer is the most frequently diagnosed cancer among women in the U.S., with an estimated 287,850 women being diagnosed in 2022.¹ Treatment for women diagnosed with early stage breast cancer (cT1–T3, cN0, M0 disease) often involves breast conserving surgery (BCS), also known as lumpectomy.^{2,3} Treatment recommendations have specified the use of adjuvant radiation therapy (RT) for all women following lumpectomy⁴, and post-lumpectomy RT had been used as a quality indicator for breast cancer care.⁵ Multiple factors have been reported to affect receipt of RT following lumpectomy; these factors include patient age, race/ethnicity, insurance, income, tumor characteristics, type and location of health care facility, and rural/urban residence status.^{5–7}

However, more recent studies have explored use of hormonal therapy (HT) rather than RT following lumpectomy among older women with small, hormone-receptor positive cancer.^{4,8} Several studies have reported similar survival rates for selected women who received HT with or without RT as adjuvant therapy following lumpectomy.^{9–11} The most recent breast cancer treatment guidelines from the National Comprehensive Cancer Network (NCCN) include consideration of omitting breast irradiation following lumpectomy in select women at low risk of adverse outcomes (those age ≥ 70 with negative axillary nodes and ER-positive, pT1 tumors who receive adjuvant endocrine therapy).² However, a recent study using SEER-Medicare data reported that treatment with RT alone (i.e., without HT) among women with stage I ER-positive breast cancer was not associated with increased risk for second breast cancer events, while treatment with HT alone (i.e., without RT) was associated with higher risk.¹² In the PRIME II study, women receiving whole-breast radiotherapy had decreased risk of ipsilateral breast tumor recurrence compared with those who received no radiotherapy, but no significant difference was observed in regional recurrence, distant metastases, contralateral breast cancers, new cancers, or breast cancer-specific survival.^{13,14}

Multiple factors may influence patient treatment decisions, including the decision to initiate RT following lumpectomy for breast cancer. One important factor may be patient experience of care. Experience of care is an important component in quality of care assessment and has been linked to clinical outcomes including mortality.^{15,16} Previous studies have demonstrated associations of patient experience of care with health care utilization, such as adherence to surveillance following colorectal cancer treatment¹⁷ and emergency department use among adults diagnosed with leukemia and lymphoma.¹⁸

To enhance receipt of patient-centered care and improve outcomes for women diagnosed with breast cancer, it is important to understand what factors may influence treatment decisions post-lumpectomy. This study examined the relationships between patient-reported experience of care and receipt of radiation therapy following lumpectomy among women with breast cancer.

Methods

Study Population

Details regarding the Surveillance, Epidemiology, and End Results–Consumer Assessment of Healthcare Providers and Systems (SEER–CAHPS) data resource have been described in previous studies.^{17, 19} Briefly, SEER–CAHPS contains information from Medicare beneficiaries who responded to the CAHPS survey and were diagnosed with their first recorded primary cancer while residing in SEER regions. This data resource includes data from SEER Cancer Registries, the Medicare CAHPS survey, and for individuals enrolled in fee-for-service Medicare, Medicare claims data. For this analysis, the study population consisted of women in SEER–CAHPS diagnosed 2000–2017 with local or regional stage breast cancer (per SEER data) who received a lumpectomy (partial mastectomy) within 18 months following their cancer diagnosis. Receipt of lumpectomy was defined by Medicare claims in the Medicare Provider Analysis and Review (MEDPAR), Outpatient, and National Claims History (NCH) files using ICD-9, ICD-10, and CPT procedure codes presented in Supplement Table 1.

Women who received a total mastectomy during the study period were excluded from the study. Women with data from the Idaho, New York, and Massachusetts SEER registries were also excluded as the SEER cancer stage variable *Summary Stage 2000* was unavailable for several of the earlier study years for records from those registries.

To evaluate patient-reported experience of care associated with the acute treatment phase of cancer care, women were included in the study population only if they completed a Medicare CAHPS survey in the 18 months following their cancer diagnosis and survived for the study period. To have complete Medicare claims data for this period, individuals included in the study were required to have been continuously enrolled in fee-for-service (FFS) Medicare Parts A and B without any Medicare Advantage enrollment for the study period. In addition, a small number of women with missing general health status (n=27) or mental health status (n=6), two regression analysis covariates, were excluded from the study population.

Radiation Therapy Treatments

The primary objective of the study was to evaluate the association of experience of care with receipt of external beam radiation therapy treatment. Only external beam radiation therapy was included, defined using Medicare claims in the MEDPAR, Outpatient, and NCH files that included:

- CPT/HCPCS codes: 77385–77386, 77401, 77402–77416, 77418, 77424–77425, 0073T, G6003–G6016;

- ICD-9 procedure codes: 92.22, 92.24, 92.25, 92.41; and/or
- ICD-10 procedure codes: all codes beginning DM000, DM001, DM002, DM003, DM010, DM011, DM012, or DM013.

All other forms of radiation therapy (e.g., brachytherapy, proton therapy) were seen infrequently in Medicare claims for the study population and women who received other forms of radiation therapy at or after lumpectomy during the study period were excluded from the study (n=15).

Study Measures

The study outcome measure was receipt of any external beam radiation therapy treatment (yes/no) as described above. The primary independent variables were measures of self-reported experience of care determined from the Medicare CAHPS survey. This survey asks respondents about experience of care received within the last six months. Study analyses include ten CAHPS measures as independent variables: five global ratings (overall care, personal doctor, specialist physician, Medicare FFS, and prescription drug plan) scored 0 (worst possible rating) to 10 (best); and five composite measure scores (Doctor Communication, Care Coordination, Getting Needed Care, Getting Care Quickly, and Getting Needed Drugs), which include multiple survey items and are each transformed to a 0–100 scale. The Care Coordination composite is only available in CAHPS since 2012; analyses of this measure therefore included a smaller sample. In addition, the survey questions for the Getting Needed Drugs composite were completed only by women enrolled in Medicare Part D and therefore also included a smaller sample.

Other covariates included in analyses were age group (<65, 65–69, 70–74, 75–79, 80–84, 85+), race/ethnicity (collapsed due to small numbers to Hispanic, non-Hispanic other, and non-Hispanic White, where non-Hispanic other included all non-Hispanic women who self-identified as races other than White); education (less than high school graduate; high school graduate/GED; some college/2 year degree; college graduate; or missing); self-reported general health status (collapsed based on available response categories to excellent/very good, good, or fair/poor); self-reported mental health status (collapsed based on available response categories to excellent, very good, good, or fair/poor); year of diagnosis (2000–2008, 2009–2013, 2014–2017); and SEER stage (local vs. regional). Self-reported general health status and mental health status were also obtained from the CAHPS survey. Several of these covariates are case mix adjustment variables used for analyses of CAHPS measures as dependent variables (https://healthcaresdelivery.cancer.gov/seer-cahps/researchers/adjustment_guidance.html). Individuals with missing responses for a CAHPS rating or composite were excluded from analysis of that measure. Technical specifications of the Medicare CAHPS are available at <https://www.ma-pdpcahps.org/en/>.

Statistical Analyses

Chi-square tests were used to compare categorical or ordinal variables; Mann-Whitney tests were used to compare continuous variables. We performed multivariable logistic regression analyses to examine association of receipt of any radiation therapy treatment with each of the ten CAHPS measures using SAS's PROC LOGISTIC. As the five CAHPS global

measures are scored on a 0–10 scale and the five CAHPS composite measures on a 0–100 scale, we divided the CAHPS composite scores by 10 to use in regression analysis to produce comparable regression coefficients (i.e., all CAHPS measures examined in regression analyses on a 0–10 scale). Secondary analyses were conducted among only the women who received at least one external beam radiation therapy treatment to examine the associations of whether external beam radiation therapy was started within two different time windows from lumpectomy (60 days and 90 days) and the ten CAHPS measures, again using SAS’s PROC LOGISTIC.

Both sets of regression models also controlled for all the covariates listed above. The number of women with dual Medicare/Medicaid coverage or who had missing dual eligible status in the “no external beam radiation therapy” group was small. This led to lack of convergence of the regression coefficient for this variable in multivariable analyses; dual eligible status was therefore excluded from regression models. Analyses were performed using SAS version 9.4.

Results

Study Population Characteristics and Experience of Care Responses

Table 1 presents the sociodemographic characteristics of the study population overall and separately for the populations of women who did vs. did not receive any external beam radiation therapy following lumpectomy. The total study population consisted of 824 women; 655 (79.5%) received at least one external beam radiation therapy treatment. The youngest age group is presented in this Table as 69 to suppress small cell sizes. A majority of the women were between 65 and 74 at diagnosis; however, those who received radiation therapy were significantly younger at diagnosis than were those who did not ($p<0.0001$). More than 80% of the women in both study population groups were non-Hispanic White and more than half had some college or were college graduates. Both groups showed similar distributions across the self-reported General Health and Mental Health categories. However, women who received external beam radiation therapy were more likely to have been diagnosed in earlier years ($p=0.0091$) and to have regional rather than local stage disease at diagnosis ($p<0.0001$). There were no significant differences in the proportions of women with Medicare Part D coverage or dual eligible (Medicare/Medicaid coverage) between the two study groups. As discussed in the notes for this table, several cells had small sample sizes (<11) and have been suppressed in concordance with recommendation from the Centers for Medicare and Medicaid Services (<https://resdac.org/articles/cms-cell-size-suppression-policy>).

Table 2 presents the CAHPS global ratings and composite scores for the overall study population and the two radiation therapy sub-populations as well as the number of individuals contributing to each rating/score. As ratings for prescription drug plan were provided only by beneficiaries enrolled in Medicare Part D, the number of individuals providing this rating is substantially smaller than that for the other listed ratings. Differences in CAHPS ratings/scores between women who did vs. did not receive external beam radiation therapy are non-significant except for ratings for prescription drug plan. The mean rating for prescription drug plan (on a scale of 0–10) is significantly higher among women

who did not receive radiation therapy than among those who did (8.75 vs. 8.08 respectively, $p < 0.05$).

Associations of Patient-Reported Experience of Care and Receipt of Any External Beam Radiation Therapy

Figure 1 presents multivariable logistic regression analysis results for the association of patient experience of care and receipt of any external beam radiation therapy treatment. This figure presents the odds ratio from multivariable logistic regression analyses (as discussed in Methods) and the 95% confidence interval for the association of each CAHPS measure with receipt of any external beam radiation therapy treatment. Women who reported higher CAHPS ratings for their personal physician had greater odds of having received any radiation therapy treatment (odds ratio [OR] 1.18, $p = 0.033$). In contrast, among women who were enrolled in Medicare Part D (as well as Parts A and B), higher ratings for prescription drug plan were associated with decreased odds of having received any radiation therapy treatment (OR 0.78, $p = 0.030$). None of the other associations between experience of care and receipt of any radiation therapy treatments were statistically significant (at $p = 0.05$) in multivariable logistic regression models. However, non-significant trends were observed for the associations of receipt of external beam radiation therapy with higher scores for CAHPS measures of doctor communications (OR 1.15, $p = 0.055$) and care coordination (OR 1.24, $p = 0.051$).

Table 3 presents the association of other covariates included in regression models with receipt of any external beam radiation therapy in the absence of any CAHPS measure. Compared with women younger than age 65, those age 65–69 had more than three times greater odds of receiving any radiation therapy treatments, while those age 85 and older had significantly lower odds of having received radiation therapy. Women who did not complete high school and those who had missing education status both had significantly decreased odds of receiving any radiation therapy treatments compared with women who had graduated college. Compared with women diagnosed in the earliest time period (2000–2008), those diagnosed later had significantly lower odds of having received any radiation therapy treatments. Finally, women diagnosed with regional stage disease had 3.4 times the odds of receiving any radiation therapy treatment as those diagnosed with local stage disease.

Secondary Analyses: Associations of Patient-Reported Experience of Care and Time to Receipt of External Beam Radiation Therapy

As discussed in Methods, we also evaluated associations of CAHPS measures with time to start of external beam radiation therapy among the study population who received any external beam radiation therapy ($n = 655$). Two outcome measures were used: start of radiation therapy within 60 days of lumpectomy and start of radiation therapy within 90 days of lumpectomy. Multivariable logistic regression analyses were performed to examine association of experience of care and time to start of radiation therapy, including the same covariates as the previous models with a dichotomous (yes/no) variable of radiation therapy starting within the specified time windows replacing the “any radiation therapy received

(yes/no)” variable. None of these associations between experience of care and time to start of radiation therapy were statistically significant at $p = 0.05$ (data not shown).

Discussion

Using the SEER-CAHPS data resource, we demonstrated that two domains of patient experience of care are significantly associated with initiation of RT following lumpectomy for breast cancer. Women who rated their experience with their personal physician more highly were more likely to initiate radiation therapy. For the purposes of the CAHPS survey, “A personal doctor is the one you would talk to if you need a check-up, want advice about a health problem, or get sick or hurt.” It is difficult to ascertain which doctor the respondent is reflecting on. While this may be a primary care doctor, it is possible that, for women diagnosed with breast cancer, respondents could be referring to their oncologist; for many individuals diagnosed with cancer, their oncologist becomes their primary care provider, at least during the acute treatment period.²⁰ Having a higher experience of care personal doctor rating may reflect increased trust with this individual; increased comfort in seeking out their advice; and/or increased access to or familiarity with their office and procedures. These could lead to greater patient-physician interactions, discussing the potential benefits of RT following lumpectomy, and help patients make optimal treatment decisions and feel more positive after these decisions. The non-significant trends of patient experience domains “doctor communication” and “care coordination” with RT following lumpectomy may also suggest this scenario.

We also demonstrated that women who reported higher patient experience scores for their Part D prescription drug plan were significantly less likely to initiate RT following lumpectomy. As discussed in the Introduction, HT (without RT) is an alternative to RT (with or without HT) for post-lumpectomy adjuvant therapy. A factor influencing patient experience with Part D plans may be required out-of-pocket costs. All of the women in the present study who completed the prescription drug plan CAHPS rating were covered by the Medicare prescription drug benefit (i.e., Medicare Part D); however, patient costs for HT may differ among Part D plans.²¹ In an earlier SEER-Medicare study, among women diagnosed with hormone-receptor positive breast cancer who were enrolled in Medicare Part D, higher out-of-pocket costs were associated with non-adherence to HT.²² In the present study, women whose Part D plans required higher out-of-pocket costs may have reported worse experience and been less likely to pursue therapies covered by Part D (including HT) when alternatives were available.

The switch from RT for all women following lumpectomy to consideration/recommendation of HT alone for certain women based on tumor characteristics has been a major treatment change. As reported by Wallace et al.⁴, the proportion of women receiving HT rather than RT following lumpectomy has increased over time; this is in accord with our finding that the odds of receiving RT were greatest during the earliest part of the study period (Table 3). Wallace and colleagues also reported that a substantial proportion of patients who were eligible for HT alone rather than being recommended to receive RT nevertheless received RT. Meneveau and colleagues found that models developed using SEER-Medicare data were poorly predictive of initiation of HT among eligible women with breast cancer; these authors

concluded that reasons for HT initiation are “complex and individuals to the patient.”²³ The present study focusing on patient experience of care captures factors that are specifically individuals to the patient. Future research may want to investigate patient-centered factors related to this treatment choice, including patient-physician interactions, shared decision, and additional patient-reported outcomes.

We also found that none of the CAHPS measures were significantly associated with time from diagnosis to initiation of RT among women who received at least one external beam radiation therapy treatment. That is, once a treatment decision to receive RT has been made, factors other than experience of care dictate timing of treatment initiation. This is not surprising; it is likely that factors such as post-surgical recovery time; patients’ schedule and transportation issues; and health care organization factors (e.g., availability of radiation oncologists and radiation oncology facilities) would be the most critical in determining initiation of RT.

Other findings on univariate analysis, such as decreased receipt of adjuvant RT among women aged 85 and older compared with younger patients, were expected. Guidelines recommend omission of RT primarily in older patients, e.g., age > 70. However, it is unclear why there was decreased odds of receipt of RT in patients < 65 years of age compared to age 65–79 (Table 3), although the number of patients < 65 years of age was low. Previous studies have reported that women aged less than 65 with breast cancer are more likely to receive RT following lumpectomy than are women aged 65 and older.^{24, 25} The decreased rate of RT among women aged <65 in the present study may reflect the unique population of women younger than 65 who are enrolled in Medicare. These women qualify for Medicare before age 65 due to having permanent disability or a serious chronic condition such as end-stage renal disease. As such, they may have differences in treatment decision making compared with the broader population of women younger than age 65 not enrolled in Medicare.

As anticipated, patients with regional disease as opposed to localized disease were significantly more likely to receive RT, given the higher disease risk. One important finding was the significant association of lack of high school completion with decreased likelihood of RT initiation. Previous studies have reported that census-tract level education level (proportion of high school graduates) among women diagnosed with breast cancer was associated with decreased receipt of breast conserving surgery²⁶ but not associated with completion of radiation therapy.²⁷ The present study included individual-level (not census-tract level) education and therefore may provide a more direct assessment of this characteristic and of potential disparities based on education level in information regarding RT and/or access to RT. Education interventions prior to initiation of RT among women diagnosed with breast cancer have been shown to increase RT knowledge and lower patient anxiety/concerns.^{28, 29} Further research is needed to examine whether similar interventions may mitigate the observed association of decreased RT initiation with lower education levels.

To our knowledge, this is the first study to use the SEER-CAHPS data resource to examine the association of patient-reported experience of care with initiation of radiation therapy. Previous studies using the larger SEER-Medicare data resource have examined RT among

women diagnosed with early-stage breast cancer. These studies have focused on questions such as cost-effectiveness of radiotherapy;³⁰ type of RT received;³¹ effects of RT on breast preservation, recurrence, survival;^{12, 32–35} treatment complication rates;^{36, 37} and treatment completion.²⁷ However, as SEER-Medicare does not include patient-reported data, studies using SEER-CAHPS can provide information on critical aspects of patient-centered care. As women with certain types of breast cancer have clinically appropriate choices regarding receiving or not receiving RT, this study provides insight for radiation oncologist on patient factors related to these choices.

This study has a number of limitations. The Medicare CAHPS survey is cross-sectional, and the data in the SEER-CAHPS resource does not allow us to explore changes in experience of care over time. Related to this, the analyses are meant to provide only associations, not causal inferences; it cannot be determined whether experience of care ratings influenced subsequent RT treatment decisions and/or RT treatment decisions influenced experience of care ratings, and CAHPS survey completion may have occurred before or after initiation of RT in the 18-month post-diagnosis study window. As stated in the Discussion section, we are unable to determine the specialty of the “personal doctor” that is the subject of SEER-CAHPS ratings associated with initiation of RT. This may differ between women who did vs. did not receive RT, as women who did not receive RT may never have met with a radiation oncologist.

In addition, there are limitations on the generalizability of the study population. Only 824 women met study inclusion criteria, all of whom lived in regions that participated in the program and were enrolled in fee-for-service Medicare at the time of breast cancer diagnosis and for the following 18 months. As individuals enrolled in Medicare Advantage plans were not included in this study (as they do not have claims data available to assess receipt of radiation therapy), results may not be applicable to the overall Medicare population. There is also a strong ceiling effect in the responses to the CAHPS survey, as observed in the data presented in Table 2; the vast majority of respondents indicate positive experiences of care across multiple domains. The data on receipt of external beam radiation therapy treatment is based on Medicare claims; any treatment not covered by Medicare or not coded as treatment would not have been captured for this study. Finally, it was not feasible to determine whether patients have completed their “course of RT”, as the number of fractions that constitute a complete course of treatment is variable and the typical number of fractions given has changed over the course of the study period.

Despite these limitations, we are able to conclude that two domains of patient experience of care are significantly associated with receipt (or lack of receipt) of RT following lumpectomy among women with Medicare fee-for-service coverage who were diagnosed with local or regional stage breast cancer. Experience of care is increasingly being demonstrated as a critical measure for health care systems and medical care professionals; it provides insight into elements of health care processes that are more important to patients and therefore most likely to influence subsequent patient activities, including medical care utilization. Questionnaires evaluating patient-reported experience of care may be worthwhile to understand more directly the reasoning behind patient decision-making. Health care organization leaders may want to more fully evaluate the relationships of experience of

care with quality assessment/quality improvement initiatives and other activities that aim to improve patient care and outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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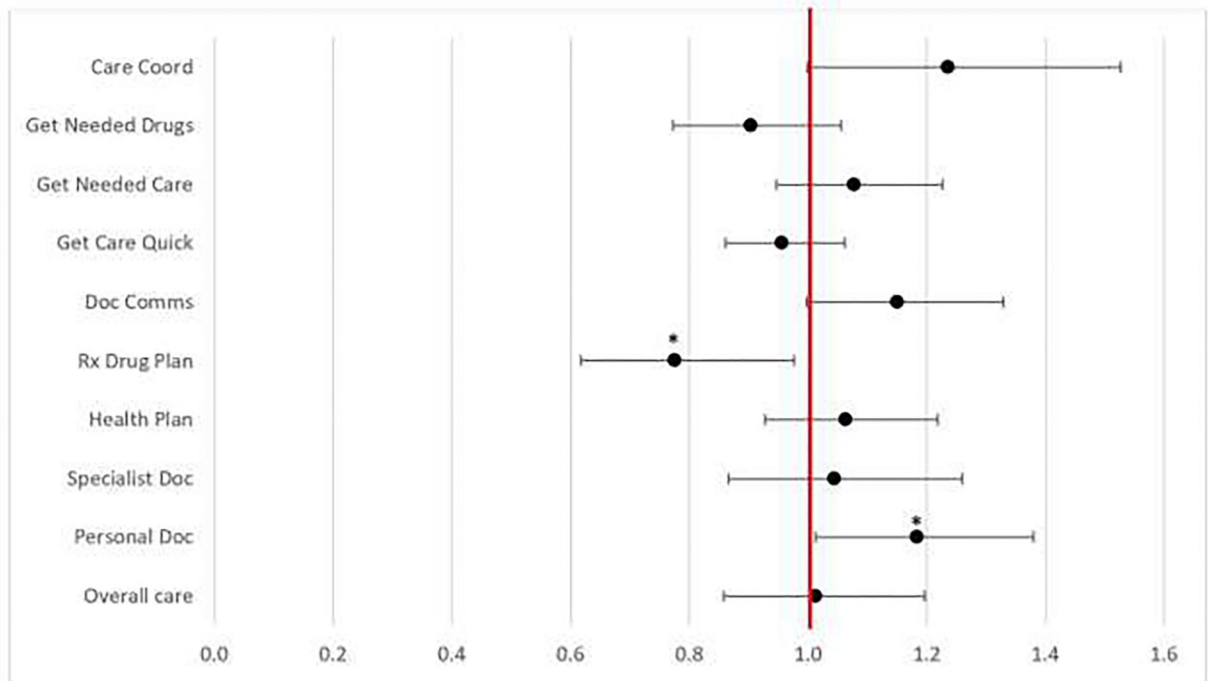


Figure 1:

Adjusted odds ratios (95% confidence intervals) for association of CAHPS measures and having received any external beam radiation therapy. Odds ratios and 95% confidence intervals from multivariable logistic regression analyses examining associations of CAHPS measures and having received any external beam radiation therapy are presented. Regressions controlled for age group, race/ethnicity, education, self-reported general health status, self-reported mental health status, year of diagnosis, and SEER stage (local vs. regional). The asterisk represents associations that are statistically significant at $p < 0.05$.

Table 1:

Characteristics of Study Population, Overall and by Receipt of Any Radiation Therapy Treatment

	Received Any External Beam Radiation Therapy				
	Yes		No		P-value
	N	Column %	N	Column %	
All	655	100	169	100	
Age at cancer diagnosis					
69	235	35.8	31	18.3	<.0001
70 to 74	182	27.8	27	16	
75 to 79	136	20.8	34	20.1	
80 to 84	70	10.7	38	22.5	
85 or older	32	4.9	39	23.1	
Race / ethnicity*					
Hispanic / Non-Hispanic other	117	17.9	21	12.4	0.0915
Non-Hispanic White	538	82.1	148	87.6	
Education					
< high school graduate	71	10.8	22	13	0.0675
High school graduate or GED	202	30.8	49	29	
Some college or 2-year degree	176	26.9	50	29.6	
4-year college graduate or more	188	28.7	37	21.9	
Missing	18	2.7	11	6.5	
General health					
Excellent / very good	183	27.9	50	29.6	0.4261
Good	264	40.3	59	34.9	
Fair / poor	208	31.8	60	35.5	
Mental health					
Excellent	186	28.4	38	22.5	0.3945
Very good	219	33.4	64	37.9	
Good	169	25.8	48	28.4	
Fair / poor	81	12.4	19	11.2	
Year of diagnosis					
2000–2008	281	42.9	51	30.2	0.0091
2009–2013	214	32.7	71	42	
2014–2017	160	24.4	47	27.8	
Summary Stage**					
Localized	535	81.7	>158	>93.5	<.0001
Regional	120	18.3	<11	<6.5	
Part D coverage any time during study period					
No	301	46	74	43.8	0.614

	Received Any External Beam Radiation Therapy				
	Yes		No		P-value
	N	Column %	N	Column %	
Yes	354	54	95	56.2	
Dual eligible[#]					
No / Missing	597	91.1	157	92.9	0.4658
Yes	58	8.9	12	7.1	

*. For Race/ethnicity, Hispanic and Non-Hispanic Other race/ethnicity are combined in this table to suppress cells with small sample sizes (i.e., <11). These two race/ethnicity categories were included separately in multivariable regression analyses.

** For Summary Stage, the number and proportion of women by stage who did not receive radiation therapy status has been coarsened to suppress a cell with sample size <11 as recommended by the Centers for Medicare and Medicaid Services (<https://resdac.org/articles/cms-cell-size-suppression-policy>).

[#]. For Dual eligible status, No and Missing are combined in this table to suppress cells with small sample sizes (i.e., <11). As discussed in Methods, dual eligible status was not included in multivariable regression analyses due to small cell sample sizes interfering with model convergence.

Table 2:

Patient-Reported Experience of Care Ratings/Scores of Study Population

	All				Received External Beam Radiation Therapy							
					Yes				No			
	N	Mean	Lower 95% CL	Upper 95% CL	N	Mean	Lower 95% CL	Upper 95% CL	N	Mean	Lower 95% CL	Upper 95% CL
Rate Health Care	640	9.07	8.96	9.17	523	9.07	8.96	9.18	117	9.04	8.77	9.32
Rate Health Plan	669	8.87	8.76	8.99	540	8.89	8.77	9.02	129	8.79	8.50	9.08
Rate Personal Doctor	601	9.15	9.04	9.26	491	9.19	9.07	9.30	110	9.01	8.70	9.31
Rate Specialist	582	9.35	9.26	9.45	468	9.37	9.26	9.47	114	9.29	9.06	9.52
Rate Prescription Drug Plan	250	8.22	7.98	8.46	197	8.08	7.80	8.36	53	8.75	8.34	9.17
Composite: Doctors Communication	604	90.14	88.89	91.40	491	90.55	89.20	91.90	113	88.37	85.08	91.67
Composite: Getting Care Quickly	663	74.41	72.78	76.04	537	73.99	72.18	75.80	126	76.19	72.46	79.92
Composite: Getting Needed Care	637	91.02	89.77	92.27	515	91.21	89.84	92.57	122	90.23	87.13	93.33
Composite: Getting Needed Prescription Drug	436	91.04	89.18	92.89	354	90.73	88.57	92.88	82	92.38	89.06	95.70
Composite: Care Coordination	237	86.86	84.71	89.01	192	87.83	85.68	89.97	45	82.72	75.96	89.48

Table 3:

Associations of other covariates with receipt of any radiation therapy treatment*

Covariate	OR	Lower 95% CI	Upper 95% CI	P-value
Age at cancer diagnosis (ref: <65)				
65 to 69	3.59	1.43	8.99	0.0065
70 to 74	2.30	0.95	5.57	0.0641
75 to 79	1.50	0.63	3.57	0.3644
80 to 84	0.68	0.28	1.65	0.3941
85 or older	0.26	0.11	0.66	0.0042
Race / ethnicity (ref: Non-Hispanic White)				
Hispanic	1.31	0.70	2.45	0.4062
Non-Hispanic other	2.10	0.79	5.58	0.1349
Education (ref: 4-year college graduate or more)				
< high school graduate	0.48	0.24	0.94	0.0313
High school graduate or GED	0.82	0.49	1.38	0.4580
Some college or 2-year degree	0.79	0.47	1.34	0.3858
Missing	0.29	0.11	0.74	0.0094
General health (ref: Excellent / very good)				
Good	1.45	0.89	2.36	0.1340
Fair / poor	1.02	0.60	1.75	0.9304
Mental health (ref: Excellent)				
Very good	0.64	0.39	1.05	0.0801
Good	0.77	0.44	1.33	0.3454
Fair / poor	1.07	0.51	2.22	0.8631
Year of diagnosis (ref: 2000–2008)				
2009–2013	0.52	0.33	0.81	0.0040
2014–2017	0.42	0.26	0.70	0.0008
Summary Stage 2000 (ref: Localized)				
Regional	3.40	1.64	7.06	0.0010

* Statistically significant associations (at p 0.05) are in bold.