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Shared Care during Breast and Colorectal Cancer Treatment: Is it Associated with Patient-Reported Care Quality?

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Abstract

There is growing evidence that shared care, where the oncologist, primary care physician, and/or other specialty physicians jointly participate in care, can improve the quality of patients' cancer care. This cross-sectional study of breast and colorectal cancer patients (N=534) recruited from the New Jersey State Cancer Registry examined patient and health system factors associated with receipt of shared care during cancer treatment into the early survivorship phase. We also assessed whether shared care was associated with quality indicators of cancer care: receipt of

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comprehensive care, follow-up care instructions, and written treatment summaries. Less than two-thirds of participants reported shared care during their cancer treatment. The odds of reporting shared care were 2.5 (95% CI: 1.46,4.17) times higher for colorectal than breast cancer patients and 52% (95% CI: 0.24,0.95) lower for uninsured compared with privately insured, after adjusting for other sociodemographic, clinical/tumor, and health system factors. No significant relationships were observed between shared care and quality indicators of cancer care. Given a substantial proportion of patients did not receive shared care, there may be missed opportunities for integrating primary care and non-oncology specialists in cancer care, who can play critical roles in care coordination and managing comorbidities during cancer treatment.

Keywords

Cancer; Quality of Health Care; Primary Health Care; Patient Care Management; Cancer Care Facilities

INTRODUCTION

In 2018, approximately 1.7 million adults in the United States (U.S.) will be diagnosed with cancer.¹ High-quality cancer care for the growing cancer population requires comprehensive, coordinated care among medical providers. A team of providers delivering medical care may include oncologists (e.g., medical, surgical, and/or radiation oncologists) and non-oncology providers such as primary care physicians (PCP) (e.g., family medicine, internists) and other specialists (e.g., endocrinologist, cardiologists, nephrologist), referred to as shared care.²⁻⁴ Shared care, which is also known as collaborative care or team-based care, is a concept that has been around for over three decades for health conditions such as diabetes.⁵ It is a model theorized to improve the quality of patient care by integrating the delivery of medical services within and across health systems and enhancing communication between providers.⁶⁻¹¹

For many cancer patients, of which 30–50% may have at least one other chronic health condition,¹²⁻¹⁴ care coordination becomes increasingly important to manage the cancer, comorbidities, and symptom management of cancer and its possible effects on the underlying comorbidity.¹⁵ The management of patients' routine health care and comorbidities is traditionally assigned to the PCP, while the oncologist manages the cancer.^{2,8} However, a survey among PCPs and oncologists found that over two-thirds of PCPs reported to actively assist patients in determining their initial cancer treatment and almost a third of oncologists reported to actively manage their patients' comorbidities; suggesting changes in providers traditionally assumed roles.¹⁶ Yet, there is scarce information on the involvement of PCPs and specialty physicians during cancer care and its association with quality of cancer care. Evaluating the quality of cancer care is important and timely given the greater significance placed on symptom management and control and supportive care during active cancer treatment from a range of cancer and non-oncology specialists.

Studies have shown that shared care improved care coordination, patient outcomes (i.e., morbidity and mortality), and specifically for cancer patients, improved symptom

management, treatment initiation, and treatment adherence.^{5,7,10,17} The Commission on Cancer (CoC), a standard-setting organization for high-quality cancer care, accredits cancer programs based on the provision of patient-centered care. Specifically, one of the CoC standards requires “coordination of care among many medical disciplines, including physicians ranging from primary care providers to specialists in all oncology disciplines.¹⁸” While there are many position statements and guidelines regarding shared care for longer-term cancer survivors, little is known about shared care during active cancer treatment.^{19–22} Additionally, few publications discuss the health system environment (i.e., accreditation standards and health system integration) that promotes shared care for patients with complex, chronic health conditions who are undergoing active cancer.^{23–25}

Given the fragmentation of the U.S. healthcare system and the challenges faced with the rising number of elderly cancer patients with comorbid conditions, it is important to understand the types of providers involved in care during cancer treatment and the health system environment that facilitates shared care.^{26,27} This cross-sectional study of diverse breast and colorectal cancer patients recruited from New Jersey’s population-based cancer registry examined: (1) patient and health system level factors associated with shared care during cancer treatment into the early survivorship phase and (2) whether shared care is associated with patient-report quality of cancer care, defined as: patient receipt of comprehensive care during treatment, follow-up care instructions, and written treatment summaries.

METHODS

Study Design and Participants

The *Improving Patient Access to Quality Cancer Treatment (IMPACT) Pilot Study* is a cross-sectional population-based study conducted to evaluate access to care, treatment patterns, comorbid conditions, and outcomes among a cohort of breast, colorectal, prostate, and cervical cancer cases diagnosed in New Jersey during the early Affordable Care Act (ACA) implementation period (2012–2014). Eligible cancer cases were identified by the New Jersey State Cancer Registry (NJSCR) based on age at diagnosis (21–79 years), diagnosis between 2012 and 2014, residence of New Jersey, English-speaking, and living at time of contact. This study restricted the analysis to first primary, non-metastatic breast and colorectal cancer cases. Cervical and prostate cases were excluded due to low sample size, differential patterns of care, and disease severity. Per NJSCR patient contact policies, eligible cases were excluded if they were enrolled in another study, patient requested not to be contacted, or the patient’s physician indicated the patient was not able to participate. Medicaid-insured and uninsured cases were targeted for inclusion in an effort to increase variability in insurance status and health care access within the study sample.

A 45-minute cancer-specific English-language questionnaire was mailed once to 2,366 eligible participants between September 2015 and August 2016, of whom 534 (23%) returned the survey (Figure 1). The final analytic cohort excluded cases without complete cancer treatment information (n=42). The questionnaire contained 75 previously validated items on health care access,²⁸ treatment patterns,²⁹ comorbid conditions,³⁰ health status,^{31–33} medication use,³⁴ and cancer care.^{28,29} Participants who returned a completed survey

were provided a \$15 gift card. This study was approved by the IRB of our institution and all participants provided informed consent.

Outcome Measures

Shared Care: Participants were asked in the survey to identify the types of physicians involved in their cancer-related care. Response items included: PCP (e.g., internal medicine and family practice), cancer specialist (e.g., medical, radiation, and surgical oncologist), obstetrician/ gynecologist (OB/GYN), urologist, gastroenterologist, and other (write in response, which included cardiologist and pulmonologist). Specialist included any response for OB/GYN, urologist, gastroenterologist, and write in responses for cardiologist and pulmonologist. The responses were then dichotomized as: oncologist only (i.e., cancer specialist) and shared care (either oncologist-PCP, oncologist-specialist, or oncologist-PCP-specialists).

Quality of Cancer Care: Participants were asked to report receipt of (1) all necessary medical care, tests, or treatments believed necessary by the patient or doctor since cancer diagnosis, (2) instructions for routine care after cancer treatment from any doctor, and (3) a written cancer treatment summary. Unknown or missing responses were recoded as not received. These questions were adapted from other national population health surveys.^{28,29}

Main Predictors

Health System Level Factors—Participants were asked to identify the date (month, year), facility name, and location (city, state) for each treatment type received (i.e. chemotherapy, radiation therapy, and surgery). The following health system factors were created from this information: number of unique treatment facilities, receipt of all treatments within the state of New Jersey, CoC accreditation of the first treatment facility and for any treatment facility, and whether the treatment facility was part of a health system or independent practice. CoC accreditation status for each facility reported by the participant was abstracted from the 2017 American College of Surgeons website.³⁵

Patient Level Factors—Sociodemographic measures in the IMPACT survey included: race/ethnicity, sex, marital status, education, household income as a percentage of the federal poverty level based on household income/size, and insurance status at treatment. Insurance status included: no insurance, private insurance only, Medicaid only or in combination with private insurance or Medicare, Medicare only or in combination with private insurance, and other insurance type (i.e. Veteran's Health, Indian Health Services, other multiple insurance types, or unknown). Clinical characteristics included patient-reported comorbid conditions (e.g., hypertension, diabetes, asthma, and kidney disease). Tumor characteristics were obtained from the NJSCR including: age at diagnosis, year of diagnosis, American Joint Committee on Cancer (AJCC) tumor stage, and initial treatments received.

Statistical Analysis

Descriptive statistics were generated to describe the characteristics of the study population. Covariates were tested for bivariate associations and were considered for the adjusted models if the p-values of the bivariate associations were less than 0.20 or if they are known

confounders based on prior knowledge. Multivariable logistic regression models were used to identify factors associated with reporting shared care and receipt of comprehensive cancer care after accounting for the effects of sociodemographic, clinical (tumor and comorbidities), and health system factors. Odds ratios (OR) were reported along with 95% confidence intervals (CIs). Statistical significance was considered at $p < 0.05$. Analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC).

RESULTS

A total of 492 breast and colorectal cancer cases (297 breast and 195 colorectal) were included in the final analytic cohort (Table 1). The majority of the participants in the sample were Non-Hispanic White (67%), female (83%), married (57%), and educated beyond high school (64%). Uninsured participants (11%) and Medicaid enrollees (20%) were well represented. At cancer diagnosis, most participants were under the age of 65 (73%), stage I/II (76%), and had at least one comorbid condition (57%) with hypertension (30%) being the most common. Over half (54%) of all participants reported receiving all their cancer treatments at one health care facility and most facilities were part of a health care system (83%). Most participants received their first cancer treatment (83%) or any treatment (92%) at a CoC accredited facility.

Shared Care

More than half of participants (58%) reported receiving shared care during cancer treatment, including 17% who reported oncologist-PCP involvement, 20% with oncologist-specialist involvement, and 21% with oncologist-PCP-specialist involvement. Shared care varied by cancer type: 50% for breast and 71% for colorectal cancer cases. In the bivariate models, males, higher education, colorectal cancer, advanced stage, and comorbidities were positively associated with patient-reported shared care while no insurance was negatively associated compared with privately insured (Table 2). In the adjusted model, the odds of reporting shared care were 2.46 (95% CI: 1.46,4.17) times higher for participants with colorectal cancer compared with those with breast cancer and 52% (95% CI: 0.24,0.95) lower for uninsured participants compared with privately insured. Treatment at any CoC accredited facility was not significantly associated with patient-reported receipt of shared care (OR: 0.78; 95% CI: 0.39,1.56).

Quality of Cancer Care: Receipt of Comprehensive Care and Written Treatment Summaries

Receipt of all necessary cancer-related care (92%), instructions for routine cancer care (93%), and written treatment summaries (40%) did not differ between participants with shared care versus non-shared care, but they differed by cancer type (Figures 2a-b). In the adjusted model (Table 3), the odds of reporting receipt of instructions for routine cancer care was 75% (95% CI: 0.10,0.60) lower for participants with colorectal cancer compared with participants with breast cancer and 2.77 (95% CI: 1.12,6.86) times higher for participants who received cancer treatment at two or more unique treatment facilities compared with only one facility. Perceptions of receiving all necessary care and receipt of treatment summaries were not significantly associated with comorbidity status, insurance status, or CoC accreditation status of any treatment facility.

LIMITATIONS

Some limitations of our study should be noted. First, physician involvement and quality of cancer care were patient-reported. Both measures could not be verified with medical records or administrative databases. Second, we could not determine where in the cancer treatment continuum non-oncology physicians were involved in cancer care or what type of care they provided. Participants may have interpreted this question related to time at cancer diagnosis and/or early survivorship phase as being part of their cancer treatment. Third, the response rate was low (23%) given the limited scope of the pilot study to conduct additional mailings, follow-up calls, or translate materials. However, participants were recruited from a population-based registry, which increases the generalizability of our findings. Fourth, letters and surveys were mailed in English only, so reported rates of shared care and receipt of comprehensive care and written treatment summaries may be higher. Lastly, we assigned CoC accreditation status based on 2017 data, which may be different from when participants were treated (2012 to 2014).

DISCUSSION

To our knowledge, this is the first study among breast and colorectal cancer patients to assess patient and health system factors associated with oncology and non-oncology physicians' involvement during cancer treatment. Less than two-thirds of participants reported shared care during their cancer treatment, with cancer type and insurance coverage being the only two predictors of shared care after adjusting for other sociodemographic, clinical/tumor, and health system factors. Differences in shared care between colorectal and breast cancer patients may be a reflection of the underlying differences in the processes of care at diagnosis and treatment or other unique differences between the two populations not measured in this study. The lack of association between shared care and comorbidity status may be an indication of cancer exceptionalism, often referred to in the literature when a patient transitions into active cancer treatment and the majority of medical care is led by oncologists with limited encounters with other providers.^{36,37} Or it could be that many of the comorbidities did not require active care by a specialist (for example, 30% of participants reported hypertension and 25% reported high cholesterol). It is also important to note, however, that our measure of comorbidities was limited to the number of comorbid conditions as reported by the patient and not verified through medical records. We also recognize that comorbidities represent many disease types with varying severities, which were not accounted for and could have biased our finding if potential participants had competing health needs that limited their ability to complete a survey. Since these results were derived through a pilot study, we plan to address these limitations in future studies.

Our findings that CoC accreditation for the first treatment facility or any treatment facility were not significantly associated with shared care was surprising given that CoC accreditation standards include care coordination with a multi-disciplinary team during cancer treatment.^{18,38} A reason for this finding may be that participants who do not have a PCP at cancer diagnosis may be more likely to seek care at a CoC accredited facility, which often includes academic and teaching hospitals that serve the uninsured and underinsured.³⁹ We found that participants with no insurance, a population with less access to primary

care, were less likely to receive shared care.⁴⁰ There may be missed opportunities for integrating primary care at CoC cancer programs, especially for the uninsured and those with comorbidities.

We also found that shared care during cancer treatment was not associated with indicators for quality cancer care. Over 90% of participants reported they received all necessary medical care since cancer diagnosis as well as instructions for routine care post-cancer treatment, which is similar to national estimates.⁴¹ The lack of association between shared care and quality of cancer care may indicate that participants' care needs are being met or participants may be unaware of other necessary health care needed during and post cancer treatment. We did find a 9% difference of reported receipt of instructions between colorectal and breast cancer participants, possibly because breast cancer patients are more active in seeking information than other cancer patients.⁴² The unique side effects and cancer subtypes during and after cancer treatments would make receipt of instructions particularly important for colorectal cancer patients.⁴³ Additionally, insurance status, comorbidities, and tumor biology may explain this difference by cancer type, which warrants further investigation. Participants who were treated at more than one facility were also more likely to report receipt of instructions. This finding may be possibly due to their increased interactions with the health care system and therefore increased opportunity to receive quality cancer care.

Interestingly, participants with a comorbidity who received shared care were not significantly more likely to report receipt of a written treatment summary. Since the 2005 Lost in Transition report,⁴⁴ a written treatment summary/ survivorship care plan has been advocated as a measure of quality cancer care. CoC accreditation includes patient-receipt of a written treatment summary/ survivorship care plan,¹⁸ and the National Comprehensive Cancer Network and the American Society of Clinical Oncology also promote that patients receive a summary of treatment received/ survivorship care plan with follow-up care information.⁴⁵⁻⁴⁷ Although receipt of a written treatment summary was very low for the entire cohort, participants with comorbidities and those seeing multiple providers may need this tool to communicate their cancer treatment and follow-up care needs.⁴⁸ Treatment summaries/ survivorship care plans may improve the quality of cancer care through enhanced patient-provider communication and increased patients' knowledge and self-efficacy for care, yet research to date shows little evidence that treatment summaries/ survivorship care plans improve quality of cancer care.⁴⁹⁻⁵¹ Many PCPs continue to report that communication from oncologists regarding their patients' needs during and after treatment remain inadequate.³⁷ Even if participants received a written treatment summary, but reported they did not, the fact that they are unaware of this tool illustrates a missed opportunity for quality cancer care.

CONCLUSIONS

While it appears that participants with breast and colorectal cancer are receiving shared care, there may be missed opportunities for the delivery of high-quality cancer care. Uninsured participants were less likely to report shared care and receiving any treatment at a CoC accredited facility was not associated with shared care. Perhaps patients who do not have

a PCP at cancer diagnosis may be more likely to seek care at a CoC accredited facility or oncologists are assuming all cancer and non-cancer related care. We are also concerned about the low rates of written treatment summaries, although its utility in the context of shared care needs to be evaluated. Given the rising number of cancer patients with complex health needs, high-quality cancer care including shared care for patients in active treatment through survivorship has become increasingly important to address.

IMPLICATIONS

PCPs and other non-oncology specialists can play critical roles in care coordination and the management of comorbidities during cancer treatment. Future studies are needed to evaluate the multilevel influences on the management and delivery of care for both cancer and comorbidities during cancer treatment. Identifying and addressing gaps in care delivery from a health system perspective (e.g., interoperable electronic medical records, multidisciplinary care team, colocation of care services) could improve the quality of cancer care for the growing population of cancer patients, especially for patients with complex health needs, less access to care, and no health insurance. Additionally, a future study that abstracts medical records to compare documented share care would be important to evaluate disparities in cancer care and outcomes.

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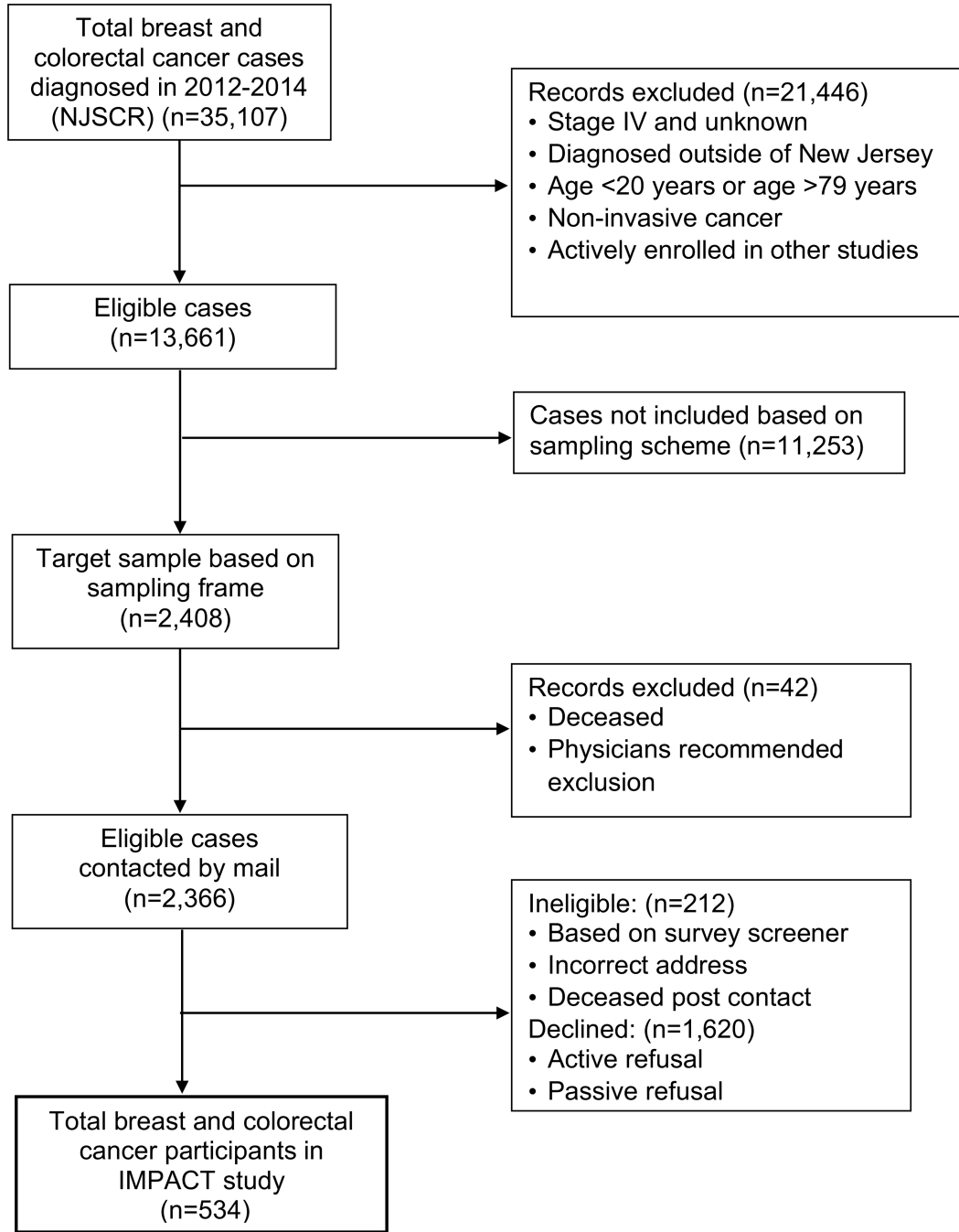


Figure 1.
CONSORT Diagram

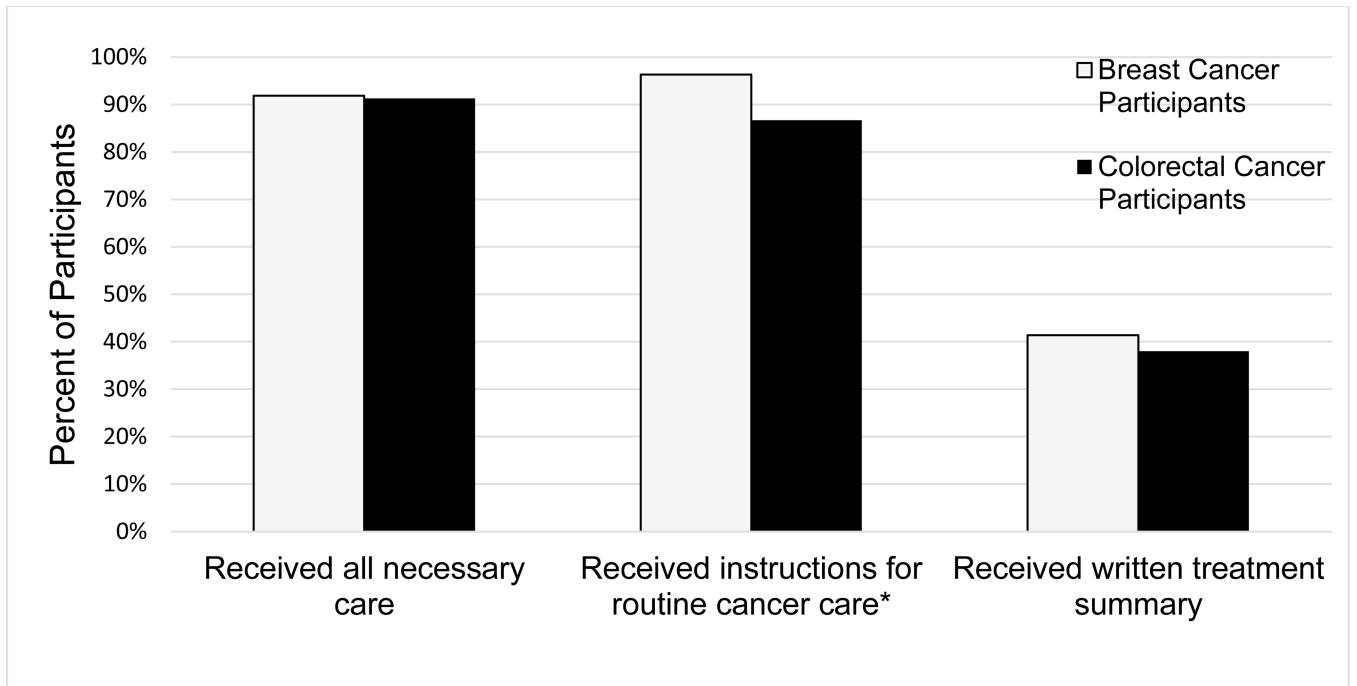


Figure 2a.
Quality Indicators of Cancer Care by Cancer Type¹
* P-value < 0.05

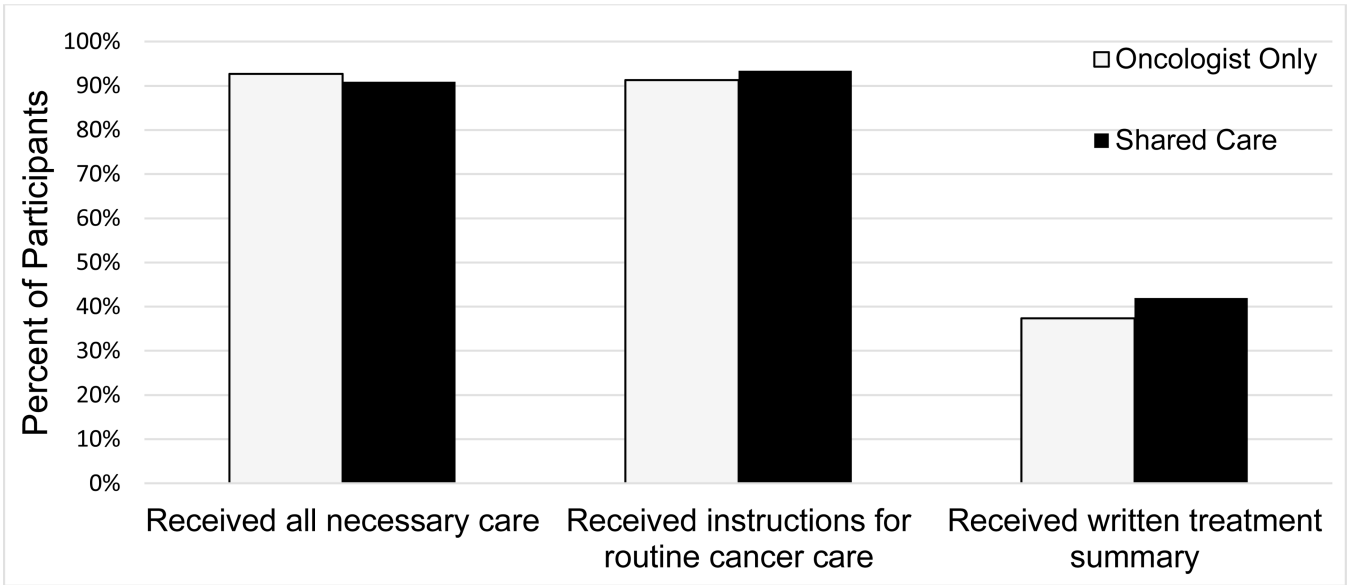


Figure 2b.
Quality Indicators of Cancer Care by Type of Physician Involvement¹

¹ Questions asked in survey: (1) At any time since you were first diagnosed with cancer, did you get all of the medical care, tests, or treatments that you or your doctor believed were necessary? (2) After completing your cancer treatment, did you ever receive instructions from a doctor, nurse or other health professional about when you should return or who you should see for routine cancer checkups after completing your cancer treatments? (3) After completing your cancer treatment, did any doctor, nurse or other health professional ever give you a written summary of the cancer treatments you received?

Table 1.

Sociodemographic, Clinical Tumor, and Health System Characteristics by Type of Physician Involved during Cancer Care among Breast and Colorectal Cancer Patients, 2012–2014 (N=492)

Characteristics	Total		Oncologist Only		Shared Care		P-value
	N=492		n=206		n=286		
	<i>Row Totals</i>						
	N	%	n	%	n	%	
SOCIODEMOGRAPHIC							
Race/Ethnicity							0.81
Hispanic	70	14.2	31	44.3	39	55.7	
NH-White	327	66.5	132	40.4	195	59.6	
NH-Black	34	6.9	15	44.1	19	55.9	
NH-API/Other/Unknown	61	12.4	28	45.9	33	54.1	
Sex							0.008
Female	406	82.5	181	44.6	225	55.4	
Male	86	17.5	25	29.1	61	70.9	
Marital Status							0.07
Married	279	56.7	107	38.4	172	61.6	
Not Married	213	43.3	99	46.5	114	53.5	
Education							
High school	149	30.3	74	49.7	75	50.3	0.04
> High school	314	63.8	118	37.6	196	62.4	
Unknown	29	5.9	14	48.3	15	51.7	
Household %FPL							0.04
<100% FPL	67	13.6	31	46.3	36	53.7	
100–250%	116	23.6	58	50.0	58	50.0	
250–400%	60	12.2	21	35.0	39	65.0	
>400%	174	35.4	60	34.5	114	65.5	
Missing	75	15.2	36	48.0	39	52.0	
Insurance at Treatment							0.048
No insurance	53	10.8	29	54.7	24	45.3	
Private insurance only	166	33.7	59	35.5	107	64.5	
Medicaid only	98	19.9	43	43.9	55	56.1	
Medicare only	113	23.0	43	38.1	70	61.9	
Other insurance	62	12.6	32	51.6	30	48.4	
CLINICAL TUMOR							
Cancer Type							<0.001
Breast	297	60.4	149	50.2	148	49.8	
Colorectal	195	39.6	57	29.2	138	70.8	
Age at Diagnosis							0.74
<49 years	128	26.0	52	40.6	76	59.4	
50–64 years	232	47.2	95	40.9	137	59.1	

Characteristics	Total		Oncologist Only		Shared Care		P-value
	N=492		n=206		n=286		
	N	%	n	%	n	%	
65+ years	132	26.8	59	44.7	73	55.3	
Year of Diagnosis							0.92
2012	182	37.0	76	41.8	106	58.2	
2013	152	30.9	62	40.8	90	59.2	
2014	158	32.1	68	43.0	90	57.0	
AJCC Stage at Diagnosis							0.03
Stage I	198	40.2	97	49.0	101	51.0	
Stage II	176	35.8	68	38.6	108	61.4	
Stage III	118	24.0	41	34.7	77	65.3	
Count of Comorbidities							0.049
None	211	42.9	99	46.9	112	53.1	
1 or more	281	57.1	107	38.1	174	61.9	
Comorbidity Type							
Hypertension	147	29.9	59	40.1	88	59.9	0.61
High cholesterol	123	25.0	55	44.7	68	55.3	0.46
Diabetes	52	10.6	20	38.5	32	61.5	0.60
Asthma	35	7.1	16	45.7	19	54.3	0.63
COPD	32	6.5	14	43.8	18	56.3	0.82
Heart disease	27	5.5	9	33.3	18	66.7	0.36
Kidney disease	21	4.3	8	38.1	13	61.9	0.72
First Treatment Received							0.19
Surgery	395	80.3	173	43.8	222	56.2	
Chemotherapy	82	16.7	27	32.9	55	67.1	
Radiation	15	3.0	6	40.0	9	60.0	
All Treatment(s) Received							
Surgery	478	97.2	200	41.8	278	58.2	0.94
Chemotherapy	295	60.0	111	37.6	184	62.4	0.02
Radiation	268	54.5	116	43.3	152	56.7	0.49
HEALTH SYSTEM							
Unique Treatment Facilities							0.41
1	263	53.5	117	44.5	146	55.5	
2 or more	229	46.5	89	38.9	140	61.1	
Any Treatment Facility Outside NJ							0.20
Yes	56	11.4	19	33.9	37	66.1	
No	436	88.6	187	42.9	249	57.1	
Treatment Facilities Part of Health System							0.19
Yes	407	82.7	165	40.5	242	59.5	
No	85	17.3	41	48.2	44	51.8	
CoC Accreditation of First Treatment Facility							0.30

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Characteristics	Total		Oncologist Only		Shared Care		P-value
	N=492		n=206		n=286		
	N	%	n	%	n	%	
Yes	409	83.1	167	40.8	242	59.2	
No	83	16.9	39	47.0	44	53.0	
CoC Accreditation of Any Treatment Facility							0.54
Yes	451	91.7	187	41.5	264	58.5	
No	41	8.3	19	46.3	22	53.7	

NH= Non-Hispanic; COPD= Chronic obstructive pulmonary disease; AJCC= American Joint Committee on Cancer; NJ= New Jersey; CoC= Commission on Cancer

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Table 2.

Predictors of Shared Care among Breast and Colorectal Cancer Patients, 2012–2014 (N=492)

Characteristics	Shared Care			
	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
SOCIODEMOGRAPHIC				
Race/Ethnicity				
NH-White	1.00	Ref.	1.00	Ref.
Hispanic	0.85	0.51, 1.43	1.07	0.60, 1.93
NH-Black	0.86	0.42, 1.75	0.80	0.38, 1.71
NH-API/Other/Unknown	0.80	0.46, 1.38	0.88	0.48, 1.59
Sex				
Female	1.00	Ref.	1.00	Ref.
Male	1.96	1.18, 3.25	0.97	0.51, 1.84
Marital Status				
Married	1.00	Ref.	-	-
Not Married	0.72	0.50, 1.03	-	-
Education				
High school	1.00	Ref.	1.00	Ref.
> High school	1.64	1.11, 2.43	1.52	0.99, 2.34
Unknown	1.06	0.48, 2.34	1.04	0.45, 2.42
Household %FPL				
<100% FPL	1.00	Ref.	-	-
100–250%	0.86	0.47, 1.57	-	-
250–400%	1.60	0.78, 3.27	-	-
>400%	1.64	0.92, 2.90	-	-
Missing	0.93	0.48, 1.81	-	-
Insurance at Treatment				
Private insurance only	1.00	Ref.	1.00	Ref.
No insurance	0.46	0.24, 0.86	0.48	0.24, 0.95
Medicaid only	0.71	0.42, 1.18	0.88	0.51, 1.52
Medicare only	0.90	0.55, 1.47	1.46	0.74, 2.88
Other insurance	0.52	0.29, 0.93	0.72	0.38, 1.37
CLINICAL TUMOR				
Cancer Type				
Breast	1.00	Ref.	1.00	Ref.
Colorectal	2.44	1.66, 3.58	2.46	1.46, 4.17
Age at Diagnosis				
<49 years	1.00	Ref.	1.00	Ref.
50–64 years	0.99	0.64, 1.53	0.83	0.52, 1.35
65+ years	0.85	0.52, 1.39	0.52	0.26, 1.03

Characteristics	Shared Care			
	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
AJCC Stage at Diagnosis				
Stage I	1.00	Ref.	1.00	Ref.
Stage II	1.53	1.01, 2.30	1.41	0.90, 2.20
Stage III	1.80	1.13, 2.89	1.26	0.74, 2.14
Count of Comorbidities				
None	1.00	Ref.	1.00	Ref.
1+	1.44	1.001, 2.07	1.29	0.88, 1.90
HEALTH SYSTEM				
Unique Treatment Facilities				
1	1.00	Ref.	-	-
2 or more	1.261	0.88, 1.81	-	-
Any Treatment Facility Outside NJ				
Yes	1.00	Ref.	-	-
No	0.68	0.38, 1.23	-	-
Treatment Facilities Part of Health System				
Yes	1.00	Ref.	-	-
No	0.73	0.46, 1.17	-	-
CoC Accreditation of First Treatment Facility				
Yes	1.00	Ref.	-	-
No	0.78	0.49, 1.25	-	-
CoC Accreditation of Any Treatment Facility				
Yes	1.00	Ref.	1.00	Ref.
No	0.82	0.43, 1.56	0.78	0.39, 1.56

OR= odds ratio; CI= confidence interval; NH= Non-Hispanic; AJCC= American Joint Committee on Cancer; NJ= New Jersey; CoC= Commission on Cancer

Table 3.

Predictors of Quality of Cancer Care among Breast and Colorectal Cancer Patients, 2012–2014 (N=492)

	Received all necessary care				Received instructions for routine post-treatment care				Received written treatment summary			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Physician Involvement												
Oncologist only	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Shared care	0.79	0.41, 1.52	1.30	0.87, 1.93	1.35	0.69, 2.63	1.72	0.80, 3.68	1.21	0.84, 1.75	1.29	0.86, 1.91
Cancer Type												
Breast	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Colorectal	0.92	0.48, 1.76	0.73	0.47, 1.12	0.25	0.12, 0.52	0.25	0.10, 0.60	0.87	0.60, 1.25	0.76	0.49, 1.20
Age at Diagnosis												
<49 years	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
50–64 years	0.85	0.40, 1.82	1.06	0.66, 1.71	0.31	0.10, 0.91	0.40	0.12, 1.31	1.07	0.69, 1.66	1.04	0.64, 1.67
65+ years	1.68	0.63, 4.48	0.89	0.45, 1.77	0.36	0.11, 1.15	0.55	0.12, 2.45	0.81	0.49, 1.33	0.87	0.44, 1.73
Race/Ethnicity												
NH-White	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
Hispanic	1.22	0.45, 3.27	0.75	0.41, 1.37	1.19	0.40, 3.57	1.06	0.29, 3.87	0.76	0.44, 1.31	0.74	0.40, 1.37
NH-Black	1.50	0.34, 6.58	2.10	0.99, 4.48	0.75	0.21, 2.63	0.75	0.18, 3.08	2.22	1.08, 4.55	2.11	0.99, 4.49
NH-API/Other/Unknown	0.86	0.34, 2.17	1.08	0.59, 1.96	0.48	0.20, 1.13	0.45	0.17, 1.19	1.16	0.66, 2.01	1.08	0.59, 1.96
Education												
High school	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
> High school	0.43	0.19, 1.01	0.85	0.55, 1.31	1.38	0.68, 2.77	1.23	0.56, 2.71	0.95	0.63, 1.41	0.86	0.55, 1.33
Unknown	0.67	0.13, 3.38	4.01	1.62, 9.97	2.90	0.37, 22.98	3.59	0.41, 31.63	4.12	1.71, 9.91	4.08	1.64, 10.15
Insurance at Treatment												
Private insurance only	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
No insurance	0.50	0.17, 1.45	1.15	0.58, 2.30	1.04	0.32, 3.34	1.92	0.51, 7.29	1.02	0.55, 1.92	1.19	0.59, 2.37
Medicaid only	0.83	0.31, 2.27	0.99	0.58, 1.71	1.58	0.55, 4.58	1.55	0.49, 4.97	1.08	0.65, 1.79	0.99	0.58, 1.71
Medicare only	0.97	0.36, 2.63	0.92	0.47, 1.80	1.12	0.45, 2.79	1.35	0.38, 4.85	0.85	0.52, 1.39	0.94	0.48, 1.83
Other insurance	0.30	0.12, 0.74	0.89	0.47, 1.71	0.67	0.25, 1.76	0.65	0.22, 1.94	0.85	0.47, 1.55	0.91	0.48, 1.75
AJCC Stage at Diagnosis												
Stage I	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.

	<u>Received all necessary care</u>				<u>Received instructions for routine post-treatment care</u>				<u>Received written treatment summary</u>			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Stage II	0.50	0.24, 1.06	1.05	0.67, 1.65	0.70	0.33, 1.51	0.85	0.35, 2.04	1.03	0.68, 1.57	1.03	0.65, 1.61
Stage III	0.78	0.32, 1.91	1.42	0.84, 2.40	0.97	0.39, 2.41	1.45	0.49, 4.32	1.38	0.87, 2.20	1.34	0.78, 2.30
Count of Comorbidities												
None	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
1+	1.17	0.61, 2.21	0.96	0.65, 1.42	0.62	0.30, 1.26	0.61	0.28, 1.32	0.98	0.68, 1.41	0.96	0.65, 1.41
Unique Treatment Facilities												
1	1.00	Ref.	-	-	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
2 or more	1.57	0.81, 3.03	-	-	3.42	1.53, 7.65	2.77	1.12, 6.86	1.42	0.99, 2.04	1.22	0.81, 1.83
Any Treatment Facility Outside NJ												
Yes	1.00	Ref.	1.00	Ref.	-	-	-	-	1.00	Ref.	1.00	Ref.
No	2.42	1.09, 5.38	0.80	0.44, 1.45	-	-	-	-	0.88	0.50, 1.54	0.83	0.45, 1.51
Treatment Facilities Part of Health System												
Yes	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
No	0.72	0.33, 1.57	0.60	0.35, 1.03	0.46	0.22, 0.97	0.46	0.19, 1.09	0.61	0.37, 1.004	0.63	0.36, 1.11
CoC Accreditation of First Treatment Facility												
Yes	1.00	Ref.	-	-	1.00	Ref.	-	-	1.00	Ref.	-	-
No	1.20	0.49, 2.95	-	-	1.73	0.60, 5.03	-	-	1.33	0.83, 2.14	-	-
CoC Accreditation of Any Treatment Facility												
Yes	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.	1.00	Ref.
No	0.63	0.23, 1.69	1.27	0.64, 2.53	1.64	0.38, 7.08	2.24	0.47, 10.62	1.07	0.56, 2.04	1.32	0.66, 2.65

OR= odds ratio; CI= confidence interval; NH= Non-Hispanic; AJCC= American Joint Committee on Cancer; NJ= New Jersey; CoC= Commission on Cancer

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