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Symptom Prevalence in Lung and Colorectal Cancer Patients

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Abstract

Context—Relatively few data are available about symptoms among cancer patients.

Objectives—To describe the prevalence and severity of symptoms among a large, representative cohort of newly diagnosed cancer patients.

Methods—We collected survey data about symptoms (pain, fatigue, depression, nausea/vomiting, cough, dyspnea, diarrhea) from 5422 patients with incident lung and colorectal cancer from the diverse, nationally representative Cancer Care Outcomes Research and Surveillance (CanCORs) Consortium cohort. We described the prevalence of any symptoms and moderate/severe symptoms approximately four to six months following diagnosis. We used logistic regression to identify patient and clinical characteristics associated with symptoms, and calculated adjusted proportions of patients with symptoms.

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Results—In total, 5067 (93.5%) patients reported at least one symptom in the four weeks before their survey, with 51% reporting at least one moderate/severe symptom. Lung cancer patients reported more symptoms than colorectal cancer patients. Patients who received treatment or had more comorbidities were more likely to report symptoms. For example, after adjustment, patients who received chemotherapy during the six weeks before the survey were more likely than others to report at least one symptom (97.3% vs. 90.8%, $P<0.001$), and at least one moderate/severe symptom (56.8% vs. 46.2%, $P<0.001$). After adjustment, early vs. late stage patients did not differ in reports of at least one symptom (93.6% vs. 93.4%, $P=0.853$) and differed only slightly in reports of at least one moderate/severe symptom (53.3% vs. 49.6%, $P=0.009$).

Conclusion—Most recently diagnosed lung and colorectal cancer patients have cancer-related symptoms regardless of stage, and more than half have at least one moderate/severe symptom.

Keywords

Cancer; symptoms; prevalence; colorectal neoplasms; lung neoplasms

Introduction

Quality of life is increasingly recognized as an important outcome for cancer patients both in research and in clinical practice (1–6), and quality of life is integrally related to the symptoms that patients experience. In classic medical training, symptoms are important because they provide subjective information that leads to the diagnosis of medical problems and treatment of disease (7). Often, treatment of disease is aimed at cure or prolonged survival, and resolution of symptoms is a valued byproduct of the treatment. However, in a patient-centered approach to disease, symptoms are the patient's experience of a disease and, therefore, become more central in the overall treatment plan for the patient. This is especially important in cancer patients where symptoms are often caused by both the disease itself and the side effects and toxicities of treatment.

In 2002, a National Institutes of Health *State of the Science Report* on management of cancer symptoms, including pain, fatigue and depression, identified the need for research on the occurrence, assessment, and treatment of cancer symptoms occurring alone and together (8). Although several studies have assessed symptoms in a cancer population, most are relatively small and geographically limited (9–18). A systematic review of studies assessing symptoms in patients with incurable cancer not undergoing active treatment found that patients with advanced cancer described many symptoms, most notably pain and fatigue (3). A recent Canadian study linked routinely collected Edmonton Symptom Assessment System (ESAS) data with administrative data to describe one of the first estimates of symptom prevalence in a population-based cohort of cancer patients (19). Although this study filled important gaps in our knowledge by providing estimates of the prevalence of symptoms in a heterogeneous cohort of cancer patients attending an oncology clinic for treatment or survivorship care, it did not include data on stage of disease, timing of assessment relative to treatment, and other factors that may influence the burden of symptoms across the continuum of cancer care. Similarly, a 2013 study by Cleeland et al. assessed symptoms for patients presenting for an ambulatory clinic visit during any point in their disease trajectory using the M. D. Anderson Symptom Inventory (MDSI) (20).

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Using data from the diverse, nationally representative Cancer Care Outcomes Research and Surveillance (CanCORs) study, we assessed the prevalence and severity of self-reported symptoms, including pain, fatigue, depression, nausea/vomiting, cough, dyspnea, and diarrhea, among patients approximately four to six months after diagnosis with lung or colorectal cancer. This multisite incident cohort provides the opportunity to analyze a large number of patients at approximately the same point in time of their disease trajectory. Using these data, we present prevalence data adjusted for patient characteristics, including stage of disease and types of treatments received.

Methods

Study Population

Data for this study were collected as part of the CanCORS study, a demographically representative national study of the care and outcomes experienced by approximately 10,000 patients diagnosed with lung or colorectal cancer between 2003 and 2005 (21–23). The CanCORS study enrolled patients from five geographic areas, including Alabama, Iowa, Los Angeles County, eight counties in northern California, and 22 counties in central and eastern North Carolina, five integrated health care delivery systems from the Cancer Research Network, and 15 Veteran Administration hospitals. Information about study design and procedures has been published previously (21, 23). The human subjects committees at all participating institutions approved the study.

Patients aged 21 and older diagnosed with lung or colorectal cancer were identified within weeks of their diagnosis through rapid case ascertainment. Collaborative stage (24) at diagnosis was obtained from medical records (available for 87% of patients) or cancer registries if medical records were unavailable. Patients were considered late stage if they had stage IV colorectal cancer or stage IIIb or IV lung cancer. Patients (or their surrogates if they were deceased or too ill to participate) were interviewed by telephone approximately three to six months after diagnosis, after informed consent. Survey instruments were translated into Spanish and Chinese and administered by bilingual interviewers for patients who preferred these languages. The American Association for Public Opinion Research survey response rate was 51.0% (25) and the cooperation rate was 59.9%. We restricted this analysis to the 5422 patients who completed the full baseline interview themselves, as the brief and surrogate versions of the survey did not include questions about the patient’s symptoms (Fig. 1). Data collection procedures for the study of symptom prevalence soon after diagnosis of lung and colorectal cancer were established in advance of data collection, included in sections 8 and 9 of the patient survey, and approved by CanCORS investigators (21,26).

Survey Instrument

Interviewers queried patients about the prevalence of symptoms including pain, fatigue, depressive symptoms, nausea/vomiting, cough, dyspnea, and diarrhea during the four weeks prior to the survey (survey instrument available at http://www.cancors.org/public).

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Data on demographics (age, gender, race), language spoken at home, education, insurance status, wealth, marital status, comorbidity count (adapted from the self-administered Charlson Index and the comorbidity questions from the Prostate Cancer Outcomes Study [PCOS]) and treatment (receipt of chemotherapy, radiation, or surgery within the past six weeks) also were collected with the survey instrument (26,27). Wealth was assessed by asking the question, "If you lost all of your current sources of income and had to live off of your savings, how long could you continue to live at your current address and standard of living?"

Symptom Prevalence

Overall symptom prevalence was estimated using the purposefully low threshold of any report of a symptom during the four weeks before the patient survey. Those who screened positive for a symptom were queried further about symptom severity using validated scales: European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ) questions for nausea/vomiting, dyspnea, cough, and diarrhea (28–30); SF-36® vitality scale for fatigue (31); the Center for Epidemiologic Studies Depression Scale (CESD-8) for depressive symptoms (32, 33); and the Brief Pain Inventory (BPI) for pain (34). Dyspnea and cough questions were only asked of lung cancer patients and diarrhea questions were only asked of colorectal cancer patients (26).

Pain was considered present if the patient described either "pain beyond every day kinds of pain (minor headaches, sprains, and toothaches)" or "use of treatments or medications for pain." *Depressive symptoms* were considered present if patients replied that they were experiencing any of the symptoms included in the CESD-8 (32). *Fatigue* was considered present if patients reported "a lot of energy" only some of the time (middle option) or less frequently using a five-point Likert scale. Patients were considered to have had *nausea/ vomiting, dyspnea, cough, or diarrhea* in the past four weeks if they reported having at least "a little bit."

Moderate to Severe Symptoms—

The following criteria were used to classify symptoms as moderate to severe. For symptoms calculated from the SF-36 or EORTC items, we converted scores to a 0–100 range scale:

- A score of 5 or greater (out of 10) on the BPI for pain (34, 35).
- A score of 6 or greater on the CESD-8 for depressive symptoms (32, 33).
- A score of less than 40 on a 0 to 100 range scale derived from the SF-36 vitality scale (31) for fatigue to indicate a value that is one standard deviation or more below published norms (36).
- A score of greater than 66 on a 0 to 100 range scale for nausea and vomiting (from EORTC QLQ-C30) (28).
- A score of greater than 66 on a 0 to 100 range scale for cough (from EORTC QLQ-LC13) (29).
- A score of greater than 66 on a 0 to 100 range scale for dyspnea (from EORTC QLQ-LC13) (29).

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- A score of greater than 66 on a 0 to 100 range scale for moderate to severe diarrhea based on seven questions from the EORTC QLQ-CR29 including stool frequency during day and night, stool urgency, stool incontinence and other bothersome symptoms such as bloody stool, painful and difficult bowel movements (30).

Statistical Analysis

Patient Factors Associated With Symptom Prevalence and Severity—We conducted bivariate analyses to study the relationship between patient characteristics (age, race/language, gender, wealth, insurance status, cancer type, stage, comorbidity, marital status), treatment status, and symptom prevalence. We also tested whether timing of survey administration relative to diagnosis was associated with symptom prevalence. We used multivariable logistic regression to study patient factors associated with the patient reporting any symptom or any moderate to severe symptom in two separate models. Item non-response was less than 1% for variables used in our study with the exception of wealth, which had a 16% non-response rate. We used multiple imputations to account for missing data for the independent variables in the multivariable model (37). We calculated proportions of patients with symptoms for patient subgroups defined by each covariate, adjusted for all other covariates, by direct standardization under the regression model (38). Specifically, using the regression coefficients, we computed the predicted probability for each subject with and without the characteristics of interest, holding all other characteristics at their observed value. We report the average of these predicted probabilities. Data management and descriptive analyses were performed using SAS software, v. 9.3 (SAS Institute, Inc., Cary, NC), and modeling using the multiply-imputed data was conducted in Stata 12 (StataCorp LP, College Station, TX).

Results

Study Population

The 5422 patients who completed the symptom survey comprised 51% of the entire CanCORS cohort (Fig. 1) and were similar to the overall demographically representative cohort except that they were less likely to have lung cancer and more likely to have earlier stage cancer (23).

Prevalence of Any Symptoms and Moderate to Severe Symptoms

Overall, 5067 (93.5%) patients in our analytic cohort reported at least one symptom (pain, fatigue, depression, nausea/vomiting, cough, dyspnea, diarrhea) of any severity in the four weeks prior to the survey, and for 50.7% of our analytic cohort, at least one of these symptoms was moderate or severe. The prevalence of symptoms of any severity for patients with lung cancer ranged from 32.9% for nausea/vomiting in early-stage patients to 84.1% for cough in late-stage patients. The prevalence of symptoms among colorectal cancer patients ranged from 32.4% with nausea/vomiting in early-stage patients to 79% for depressive symptoms in late-stage patients (Table 1).

The prevalence of symptoms reported to be moderate to severe varied with cancer type and by stage (Table 2). Moderate to severe cough was frequently reported among lung cancer

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patients with both early-stage (39.6%) and late-stage (44.5%) disease. Moderate to severe pain was present in 18.4% of lung cancer and 12.4% of colorectal cancer patients. Moderate to severe fatigue was more prevalent in lung cancer than colorectal cancer patients in early stage (36.9% v. 24.7%) and late stage (43.4% v. 28.6%). Moderate to severe depressive symptoms occurred in 15% of patients. Moderate to severe nausea was infrequent (6% overall) (Table 2).

Patient Factors Associated with Symptom Prevalence

In bivariate analyses, symptoms were significantly more likely to be reported for female, younger, unmarried, less educated, less wealthy, uninsured patients; patients with more comorbidity; and for those who recently received treatment or those with late stage or lung cancer (Table 3). Moderate to severe symptoms also were more likely to be reported in these patient subgroups as well as among Hispanic or Latino patients. There was no significant difference between the timing of the survey in relation to diagnosis and having any symptom or any moderate to severe symptom (data not shown).

In multivariable analyses controlling for patient characteristics, female patients and those who had less wealth, had lung vs. colorectal cancer, patients with two or more comorbidities and patients recently treated with chemotherapy or surgery were more likely than others to report any symptoms (Table 4). These same factors as well as younger age, less education, Hispanic or Latino ethnicity, non-private insurance, being unmarried, early vs. late stage cancer, and reporting recent radiation were associated with reporting moderate or severe symptoms. Many of these differences, although statistically significant, reflected relatively small absolute differences in adjusted proportions, whereas others had greater absolute differences (Table 4). After adjustment, there was no difference in report of at least one symptom among early vs. late stage patients (93.6% vs. 93.4%, $P=0.85$), and only a small difference in report of at least one moderate to severe symptom (53.3% vs. 49.6%, $P=0.01$). However, controlling for other variables, patients who received chemotherapy during the six weeks before the survey were more likely to report at least one symptom (97.3% vs. 90.8%, $P<0.001$), and at least one moderate/severe symptom (56.8% vs. 46.2%, $P<0.001$). Lung cancer patients were much more likely than colorectal cancer patients to report moderate to severe symptoms (66.3% vs. 38.5%, $P<0.001$), as were patients with two or more vs. 0–1 comorbidities (60.4% vs. 44.5%, $P<0.001$).

Discussion

This is the first, large scale study to report estimates of the prevalence of symptoms in a nationally representative incident cohort of cancer patients. Strikingly, we found that almost all patients – 93.5% – reported experiencing symptoms in the past four weeks, with more than half experiencing moderate to severe symptoms. Cancer symptoms are known to be prevalent among patients with advanced cancers who are dying, yet we found that symptoms were consistently prevalent in the six months following diagnosis across all stages of cancer in association with most treatments, and even among untreated patients

Although we found many patient factors statistically associated with the presence of symptoms or moderate to severe symptoms, the absolute difference in adjusted proportions

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varied. Some factors, such as recent receipt of cancer-directed treatment, having two or more comorbidities, younger age, less wealth and lung vs. colorectal cancer were associated with a greater than 10 percentage point difference in adjusted prevalence of symptoms, suggesting that these factors are more clinically significant compared with other factors such as stage, education and marital status.

Although receipt of recent treatment was one of the most influential patient factors associated with moderate to severe symptoms, more than 40% of patients not receiving treatment reported at least one such symptom. The high rates of symptom burden in all patients emphasize the pervasive need for symptom management and palliation throughout the trajectory of disease.

In the setting of limited time during routine follow-up visits for most cancer patients, the development of tools to systematically screen for symptoms and protocols to enable assessment outside the clinic visit warrant further evaluation. The ESAS has been incorporated into routine care in Ontario and findings to date are positive and suggest that routine screening with rapid cycle change quality improvement processes may improve symptom management for cancer patients. However, there has been some resistance by physicians to incorporating such models into care, because of concerns about efficiency and time constraints (39–41). Other innovative methods of symptom monitoring that may be more suitable for physician work flow include nurse-assisted and automated telephone symptom management tools, both of which have been shown to reduce symptom severity for patients (42–44) and may be cost saving (45).

Patient-reported data are increasingly being used to evaluate and improve the quality of supportive care for patients with cancer (46). Prospectively monitoring symptoms and other patient reported outcomes in clinical care and research is likely to lead to a better understanding of the patient experience of disease and help guide interventions for improvement that will have an important impact on quality of life for patients (47,48).

Consistent with a recent Canadian study (19), we found fatigue was prevalent in three-quarters of our cohort, pain was present in about half of the patients, and nausea and vomiting was present in less than half of the patients. Depressive symptoms as well as cough and dyspnea among lung cancer patients also were highly prevalent. Unadjusted prevalence rates for moderate to severe fatigue, pain and depressive symptoms also were similar to those rates found in Cleeland et al.'s study (20).

Controlling for other variables, in our cohort of newly diagnosed patients, we found that recent treatment with chemotherapy was associated with a higher adjusted prevalence for moderate to severe symptoms (56.8% vs. 46.2%, $P<0.001$). It is also interesting to note that a common side effect of chemotherapy, nausea, was infrequently moderate to severe (6%), which may reflect highly effective prophylactic pharmacological interventions (49). Further work should investigate if a higher prevalence of symptoms among patients receiving tumor-directed therapy could be addressed with available prophylactic and therapeutic regimens. This reflects a target area for quality improvement.

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The strengths of this study include identifying symptom burden at a defined time in the patient's disease course with validated tools for symptom assessment among a large nationally representative cohort of cancer patients. In order to increase the reliability of patient self-reports on their symptom experiences and to limit recall bias, we only asked about symptoms in the four weeks prior to the survey (50,51). Therefore, this is only a snapshot of the prevalence of symptoms in a cohort of cancer patients for a period of one month, suggesting that over the entire trajectory of a cancer patient's experience, symptom prevalence is higher. Also, because this was part of a larger survey with many research objectives, there was limited opportunity to include questions related to symptom prevalence in the survey design. Therefore, not all symptoms are addressed here; for example, rates of dyspnea were studied in lung but not in colorectal cancer patients, and other symptoms such as constipation were not assessed. In addition, these estimates likely underestimate the overall prevalence of symptoms in the population, as patients who were too ill to participate or who died shortly after diagnosis did not provide data on their experiences.

Understanding the prevalence and severity of symptoms that patients face across the continuum of cancer and which patients are at higher risk for these symptoms is a critical first step to identifying the needs of this population. Prevalence data can inform efforts to implement strategies for management of distressing symptoms and inform efforts to transform the health delivery system to deliver high quality patient-centered care. We found that symptoms were nearly universal in this population-based cohort of patients with newly diagnosed lung and colorectal cancer, suggesting that efforts to better manage symptoms should be of high priority.

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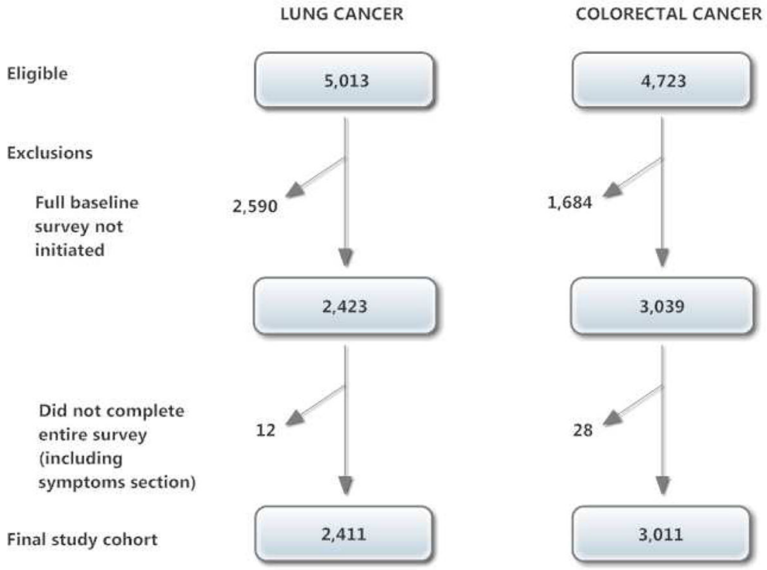

Fig. 1.

Flowchart for study cohort derived from CanCORS sampled patients.

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Table 1

Symptoms in Early and Late Stage Lung and Colorectal Cancer (*N*=5422)

Symptom	**Presence of Symptom *N* (%)**			
	Lung Cancer (*N*=2411)		**Colorectal Cancer (*N*=3011)**	
	Early Stage (*N*=1295)	**Late Stage (*N*=1116)**	**Early Stage (*N*=2426)**	**Late Stage (*N*=585)**
Any Symptom	1272 (98.2%)[a]	1100 (98.6%) [b]	2151 (88.7%) [a, c]	544 (93.0%)[b, c]
Pain	756 (58.4%) [a]	650 (58.2%) [b]	939 (38.7%)[a, c]	269 (46.0%)[b, c]
Fatigue	964 (74.4%) [a, c]	885 (79.3%)[b, c]	1519 (62.6%) [a, c]	402 (68.7%)[b, c]
Depressive symptoms	1030 (79.5%)[a, c]	935 (83.8%) [c]	1717 (70.8%) [a, c]	462 (79.0%) [c]
Nausea/vomiting	426 (32.9%) [c]	481 (43.1%) [c]	786 (32.4%) [c]	276 (47.2%) [c]
Cough	1055 (81.5%)	939 (84.1%)	N/A	N/A
Dyspnea	1052 (81.2%)	890 (79.8%)	N/A	N/A
Diarrhea	N/A	N/A	1015 (41.8%)	272 (46.5%)
Total	6555	5880	8127	2225

[a] $P<0.01$ Comparison between early stage lung and early stage colorectal.

[b] $P<0.01$ Comparison between late stage lung and late stage colorectal.

[c] $P<0.01$ Comparison between early stage and late stage within cancer type.

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Table 2

Moderate to Severe Symptoms in Early and Late Stage Lung and Colorectal Cancer (*N*=5422)

Symptom	Symptom is Moderate/Severe *N* (%)			
	Lung Cancer (*N*=2411)		Colorectal Cancer (*N*=3011)	
	Early Stage (*N*=1295)	Late Stage (*N*=1116)	Early Stage (*N*=2426)	Late Stage (*N*=585)
Any Symptom	851 (65.7%) [a, b]	820 (73.5%) [a, c]	840 (34.6%) [a, b]	240 (41.0%) [a, c]
Pain	220 (17.0%) [b]	223 (20.0%)	278 (11.5%) [a, b]	94 (16.1%) [a]
Fatigue	478 (36.9%) [a, b]	484 (43.4%) [a, c]	598 (24.7%) [b]	167 (28.6%) [c]
Depressive symptoms	227 (17.5%) [b]	209 (18.7%)	306 (12.6%) [b]	82 (14.0%)
Nausea/vomiting	79 (6.1%) [a]	102 (9.1%) [a]	104 (4.3%) [a]	40 (6.8%) [a]
Cough	513 (39.6%)	497 (44.5%)	N/A	N/A
Dyspnea	289 (22.3%)	273 (24.5%)	N/A	N/A
Diarrhea	N/A	N/A	29 (1.2%)	11 (1.9%)
Total	2657	2608	2155	634

[a] *P*<0.01 Comparison between early stage and late stage within cancer type.

[b] *P*<0.01 Comparison between early stage lung and early stage colorectal.

[c] *P*<0.01 Comparison between late stage lung and late stage colorectal.

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Table 3

Unadjusted Prevalence and Severity for at Least One Symptom by Patient Characteristics

N=5422	Patient Characteristics	Any Symptom		Any Moderate to Severe Symptom	
	N (%)	%	*P*-value	%	*P*-value
Gender					
Male	2888 (53.3%)	92.6%		47.5%	
Female	2534 (46.7%)	94.5%	0.004	54.4%	<0.001
Age (yrs)					
21–59	1840 (33.9%)	95.7%		55.0%	
60–69	1584 (29.2%)	93.1%		51.6%	
70–79	1424 (26.3%)	91.4%		47.8%	
80+	574 (10.6%)	92.3%	<0.001	42.0%	<0.001
Race					
White	3870 (69.7%)	93.3%		50.9%	
Hispanic or Latino	371 (6.8%)	93.5%		55.0%	
African American	726 (13.4%)	94.8%		51.7%	
Other	545 (10.1%)	93.0%	0.48	45.3%	0.02
Education					
Less than high school	919 (16.9%)	94.5%		56.7%	
High school/some college	3153 (58.2%)	94.2%		52.9%	
College degree or more	1343 (24.8%)	91.0%	<0.001	41.7%	<0.001
(Missing)	7 (0.1%)				
Insurance status					
VA	634 (11.7%)	94.2%		60.7%	
Private	1910 (35.2%)	94.2%		48.7%	
Supplemental	1996 (36.8%)	92.1%		46.7%	
Public	622 (11.5%)	93.1%		56.6%	
None	214 (3.9%)	97.7%	0.007	57.0%	<0.001
(Missing)	46 (0.8%)				
Wealth (how much money saved to live at current cost of living)					

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N=5422	Patient Characteristics	Any Symptom		Any Moderate to Severe Symptom	
	***N* (%)**	**%**	***P*-value**	**%**	***P*-value**
< 1 month	1034 (19.1%)	96.4%		63.7%	
1–2 months	568 (10.5%)	96.3%		62.3%	
3–6 months	574 (10.6%)	95.1%		51.6%	
7–12 months	359 (6.6%)	95.5%		49.0%	
More than one year	2019 (37.2%)	90.7%	<0.001	42.1%	<0.001
(Missing)	868 (16.0%)				
Marital Status					
Not married	2259 (41.7%)	94.7%		56.2%	
Married	3160 (58.3%)	92.6%	0.001	46.8%	<0.001
(Missing)	3 (0.1%)				
Cancer Type					
Lung	2411 (44.5%)	98.4%		69.3%	
Colorectal	3011 (55.5%)	89.5%	<0.001	35.9%	<0.001
Stage					
Early	3721 (68.6%)	92.0%		45.4%	
Late	1701 (31.4%)	96.7%	<0.001	62.3%	<0.001
Surgery in last 6 weeks					
Not received	5204 (96.0%)	93.4%		50.4%	
Received	218 (4.0%)	95.0%	0.36	59.6%	0.007
Radiation in last 6 weeks					
Not received	4808 (88.7%)	92.8%		47.9%	
Received	614 (11.3%)	98.7%	<0.001	73.3%	<0.001
Chemotherapy in last 6 weeks					
Not received	3085 (56.9%)	90.4%		45.1%	
Received	2337 (43.1%)	97.4%	<0.001	58.2%	<0.001
Comorbidity					
0–1	3286 (60.6%)	91.7%		42.9%	
2+	2125 (39.2%)	96.2%	<0.001	62.8%	<0.001

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***N*=5422**	**Patient Characteristics**	**Any Symptom**		**Any Moderate to Severe Symptom**	
	***N* (%)**	**%**	***P*-value**	**%**	***P*-value**
(Missing)	11 (0.2%)				

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Table 4

Adjusted Rates of Symptoms in Patients

N=5422	Any Symptom		Any Moderate to Severe Symptom	
	Adjusted Proportions for Patients with Any Symptoms	***P*-value**	**Adjusted Proportions for Patients with Any Moderate to Severe Symptoms**	***P*-value**
Gender				
Male (reference)	92.7%		47.2%	
Female	94.3%	0.02	54.7%	<0.001
Age (yrs)				
21–59	95.3%	0.31	57.7%	<0.001
60–69	92.5%	0.17	49.3%	0.04
70–79	91.7%	0.03	45.7%	0.61
80+ (reference)	94.2%		44.6%	
Race				
White (reference)	93.4%		51.1%	
Hispanic or Latino	93.4%	0.97	56.2%	0.04
African American	93.9%	0.61	48.5%	0.17
Other	93.3%	0.93	47.5%	0.09
Education				
College degree or more (reference)	92.6%		48.2%	
High school/some college	93.8%	0.12	51.4%	0.04
Less than high school	93.9%	0.23	52.3%	0.05
Insurance status				
Private (reference)	93.4%		48.3%	
VA	93.4%	0.95	58.3%	<0.001
Supplemental	93.6%	0.90	50.3%	0.31
Public	92.4%	0.41	53.0%	0.05
None	96.4%	0.16	48.4%	0.99
Wealth (how much money saved to live at current cost of living)				
More than one year (reference)	91.9%		46.2%	
7–12 months	95.4%	0.03	50.5%	0.10
3–6 months	94.4%	0.06	51.0%	0.04
1–2 months	95.1%	0.03	56.2%	<0.001
< 1 month	95.3%	0.001	56.9%	<0.001
Marital Status				
Not married (reference)	94.0%		53.2%	
Married	93.1%	0.23	49.0%	0.001
Cancer Type				
Colorectal (reference)	90.2%		38.5%	

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***N*=5422**	**Any Symptom**		**Any Moderate to Severe Symptom**	
	Adjusted Proportions for Patients with Any Symptoms	***P*-value**	**Adjusted Proportions for Patients with Any Moderate to Severe Symptoms**	***P*-value**
Lung	98.2%	<0.001	66.3%	<0.001
Stage				
Early (reference)	93.4%		49.6%	
Late	93.6%	0.85	53.3%	0.01
Surgery in last 6 weeks				
Not received (reference)	93.3%		50.0%	
Received	96.2%	0.05	65.6%	<0.001
Radiation in last 6 weeks				
Not received (reference)	93.3%		49.5%	
Received	96.2%	0.08	61.0%	<0.001
Chemotherapy in last 6 weeks				
Not received (reference)	90.8%		46.2%	
Received	97.3%	<0.001	56.8%	<0.001
Comorbidity				
0–1	92.0%		44.5%	
2+	95.9%	<0.001	60.4%	<0.001