Original Article

The Personal Financial Burden of Complications After Colorectal Cancer Surgery

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BACKGROUND: Patients with colorectal cancer (CRC) may suffer significant economic hardship during treatment. Complications are common after surgery for CRC and may exacerbate the financial burden of CRC even further. **METHODS:** Within a population-based survey of patients with stage III CRC, the authors investigated the effects of disease and treatment on personal finances and computed a composite measure of financial burden. Correlations were examined between components of financial burden and patient-reported postoperative complications using chi-square analyses, and Mantel-Haenszel chi-square tend tests were used to evaluate correlations between composite financial burden scores and surgical complications, controlling for patient characteristics and other factors by using multivariable Poisson regression. **RESULTS:** Among 937 respondents, 224 (24%) reported complications after surgery. Those with complications had significantly higher composite financial burden ($P < .001$ for trend): they were more likely to spend savings (40% vs 31%; $P = .01$), borrow or take loans (18% vs 11%; $P = .007$), fail to make credit card payments (18% vs 11%; $P = .005$), reduce spending for food or clothes (38% vs 27%; $P = .001$), and decrease recreational activities (41% vs 33%; $P = .03$). They took significantly longer to return to work ($P = .009$) and were more likely to experience significant worry about finances (61% vs 52%; $P = .01$). **CONCLUSIONS:** Complications after surgery for CRC result in significant personal financial consequences as well as morbidity. Financial stress impairs quality of life and may prevent adherence to recommended treatments. Therefore, patients who suffer complications may require not just additional clinical care but also economic support and services. ***Cancer*** **2014;120:3074-81.** © *2014 American Cancer Society.*

KEYWORDS: colorectal cancer, colectomy, complications, patients, quality of life, survivorship, employment, finances, socioeconomic factors.

INTRODUCTION

Colorectal cancer (CRC) is the second leading cause of cancer-related death in the United States. Each year, approximately 140,000 Americans are diagnosed with CRC,[1] and more than 250,000 colon resections are performed in the United States.[2] Surgery is the primary therapy for potentially curable colon cancer, but operative complications are common and incur significant morbidity.[3-5] Colectomy accounts for 10% of general surgery operations in the American College of Surgeons' National Surgical Quality Improvement Program but for 25% of the complications, making it the most common cause of postoperative death and prolonged hospitalization.[4] These complications substantially increase the costs of surgical care for both hospitals and payors.[6,7]

Beyond the clinical consequences, however, many patients with cancer also suffer significant economic hardship from their disease and its treatment.[8-11] Even among those with medical insurance, cancer therapies may require substantial out-of-pocket expenditures for medications, copayments for diagnostic testing, hospital and outpatient care, travel, and home care.[10-13] The financial impact of cancer can result in significant emotional and family stress and may impair

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overall quality of life.[11,14] Yet the personal economic effects of surgical adverse events, disability, and extended hospitalization have not been established.

Recognizing that prevention of complications and attention to patient-centered outcomes are priorities in ongoing quality-improvement initiatives in both surgery and oncology, we sought to understand the relation between perioperative complications and patient-reported personal financial burden associated with cancer treatment. For this analysis, we used data from a detailed population-based survey of patients with stage III CRC.

MATERIALS AND METHODS

Study Population

We identified all patients aged ≥21 years who underwent surgical resection for pathologic stage III colon or rectal cancer between August 2011 and March 2013 in the Surveillance, Epidemiology, and End Results (SEER) cancer registries of Metropolitan Detroit, Michigan and the State of Georgia. Patients were eligible for recruitment within 3 to 12 months after undergoing surgical resection for CRC. Exclusion criteria included stage IV disease, a change in diagnosis based on final histology, death, or residence outside of the catchment area. This analysis is nested within a broader survey examining patient decision-making around adjuvant therapy for CRC.

Data Collection

We identified physicians of record from pathology reports and notified them of our intention to contact the study patients. Allowing a brief response period for the physicians, patients were then contacted by mail and invited to participate in the survey. A modified version of the Dillman approach was used for recruitment, including sequential follow-up steps in the event of nonresponse.[15] Survey responses were accepted up to 1 year from the date of surgery. Upon receipt of surveys, extensive data checks for logic, errors, and omissions were performed, and patients were recontacted as necessary to obtain correct information.

The study protocol was approved by the institutional review boards of the University of Michigan, Wayne State University, Emory University, the State of Michigan, and the State of Georgia Department of Public Health. The research information sheet in the survey packet included a statement of the study purpose, risks and benefits of participation, and patient confidentiality.

Measures

The survey components pertinent to this analysis are included in Supporting Figure 1 (see online supporting information). The primary outcome in this study was personal financial burden, which was assessed through a series of 7 binary questions asking patients about how CRC or its treatment affected finances. Respondents were given a checklist and asked to indicate which, if any, of the following they had experienced: "I had to use savings," "I had to borrow money or take out a loan," "I could not make payments on credit cards or other bills," "I cut down on spending for food and/or clothes," "I cut down on spending for health care for other family members," "I cut down on recreational activities," and "I cut down on expenses in general." We also asked patients how much cumulative time they missed work as a consequence of their cancer and its treatment. These measures were derived from the national Consumer Bankruptcy Project[16,17] and have been used previously in studies of financial burden associated with the care of patients with cancer.[18]

The primary exposure was the occurrence of 1 or more postoperative complications. This measure was determined by response to the query, "Did you have any unexpected complications after your surgery?" Additional covariates in the survey included SEER catchment area, self-reported demographics (age at diagnosis, sex, race, and marital status), socioeconomic status (based on measures defined by the National Health Interview Survey, including measures of education and income), type of health insurance, receipt of chemotherapy, overall health status, and comorbid conditions. Respondents with missing income data were grouped in a separate category.

Next, we computed a composite measure of financial burden (score range, 0-7, with higher scores denoting increased financial burden) by summing responses to 7 questions. The composite measure was internally evaluated against a binary question on global financial burden ("My illness has had no impact on my finances") and a single question about financial worry ("How much do you worry about financial problems that have resulted from your colorectal cancer and its treatment?" Worry was evaluated on a 5-point Likert scale that we dichotomized in accordance with our previous work (in which scores of 1-3 were considered *low*, and scores of 4-5 were considered *high*).[19] The results from this assessment of internal consistency of the financial burden composite score are presented below.

Statistical Analyses

We evaluated associations between financial burden, complications, and other covariates using chi-square tests, and

TABLE 1. Respondent Characteristics and Reported Complications

Characteristic	No. of Patients (%)		P[a]
	No Complications, N = 713 (76)	Complications, N = 224 (24)	
SEER Catchment Area			.18
Georgia	480 (67)	140 (63)	
Metropolitan Detroit	233 (33)	84 (38)	
Age at diagnosis, y			.47
<50	116 (16)	33 (15)	
50-64	269 (38)	78 (35)	
65-74	158 (22)	61 (27)	
≥75	170 (24)	52 (23)	
Sex			.87
Men	377 (53)	118 (54)	
Women	331 (47)	101 (46)	
Race			.16
White	502 (70)	168 (75)	
Black	163 (23)	47 (21)	
Other	48 (7)	8 (4)	
Marital status			.15
Not married/partnered	293 (41)	80 (36)	
Married/partnered	420 (59)	144 (64)	
Education			.65
<High school	111 (16)	35 (16)	
High school	179 (26)	48 (22)	
Some college	230 (33)	74 (33)	
≥College graduate	181 (26)	64 (29)	
Annual Income			.75
≥$90,000	102 (14)	40 (18)	
$50,000-$89,999	160 (22)	45 (20)	
$20,000-$49,999	193 (27)	59 (26)	
<$20,000	119 (17)	42 (19)	
Missing	139 (20)	40 (18)	
Insurance			.16
Private	306 (43)	88 (40)	
Medicare	311 (44)	110 (50)	
Medicaid	24 (3)	11 (5)	
None	66 (9)	13 (6)	
Chemotherapy			.63
Yes	611 (86)	189 (84)	
No	102 (14)	35 (16)	
Overall health			.43
Excellent	105 (15)	29 (13)	
Very good	203 (29)	66 (30)	
Good	250 (36)	84 (38)	
Fair	104 (15)	24 (11)	
Poor	42 (6)	18 (8)	
Comorbidities			< .001
None	199 (28)	33 (15)	
1	219 (31)	73 (33)	
≥2	295 (41)	118 (53)	

Abbreviations: SEER, Surveillance, Epidemiology, and End Results.
[a] P values are derived from chi-square tests. Proportions may not add to 100% because of rounding or missing data.

compared the composite financial burden score against the summary financial burden and financial worry items using the Mantel-Haenszel chi-square trend test. Because the distribution of scores was weighted toward the lowest counts, we then used multivariable Poisson regression to control for covariates in the correlations between composite financial burden and complications and to compute adjusted financial burden scores. All statistical tests were 2-sided, and P values $< .05$ were considered statistically significant. All analyses were conducted using the SAS version 9.3 software package (SAS Institute, Inc., Cary, NC).

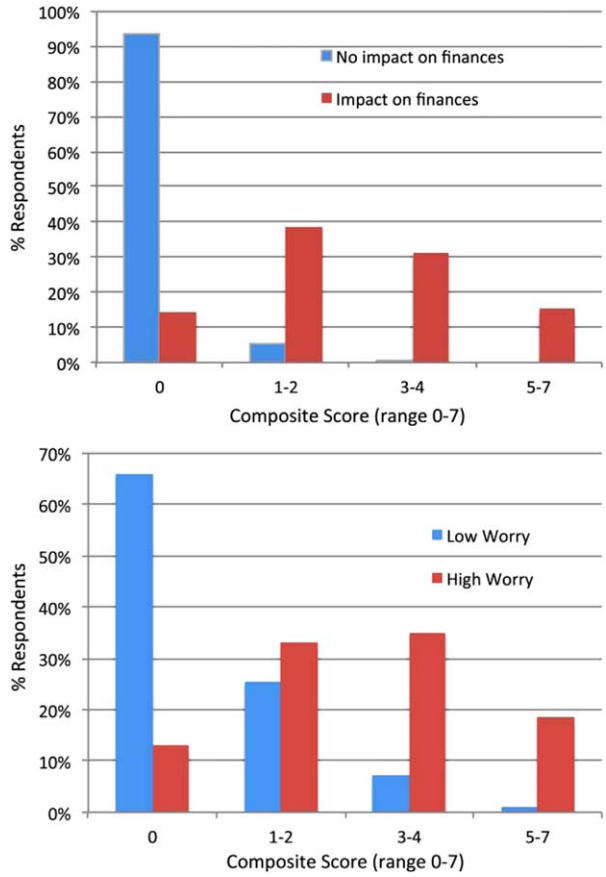

Figure 1. These charts illustrate an internal consistency evaluation of the composite financial burden score. (*Top*) This chart illustrates the association of financial burden scores with responses to the statement, "My illness has had no impact on my finances." Respondents who reported no impact on their finances had significantly lower composite financial burden scores ($P < .001$). (*Bottom*) This chart illustrates the association of financial burden scores with the level of worry about finances. Respondents who reported high levels of worry had significantly higher composite financial burden scores ($P < .001$).

RESULTS

Study Sample and Response Rate

A flowchart of enrollment and survey completion is provided as Supporting Figure 2 (see online supporting information). Among 1563 eligible patients, 119 (8%) could not be located, and 488 (31%) were located but did not complete or return the survey. There were 956 completed surveys available for evaluation (response rate, 66%). We excluded from all analyses 19 of the 956 patients (2%)

who did not answer the question about complications (the primary exposure), leaving a final analytic sample of 937 respondents.

Respondent Characteristics and Complications

Postoperative complications were reported by 224 of the 937 patients (24%). Correlations between the incidence of complications and the demographics, socioeconomic factors, and health status of respondents are displayed in Table 1. Patients with complications were significantly more likely than those without complications to report 2 or more comorbid conditions (53% vs 41%; $P < .001$). There was no statistically significant difference in the likelihood of complications according to SEER catchment area age, sex, race, marital status, education, income, insurance, receipt of chemotherapy, or self-reported health.

Financial Burden, Worry, and Composite Financial Burden Scores

Among all respondents, 356 (38%) did not endorse any of the 7 measures of financial burden: 274 (29%) endorsed 1 or 2, 208 (22%) endorsed 3 or 4, and 99 (11%) endorsed ≥5. Figure 1 provides comparisons of composite financial burden scores against overall measures of financial burden and worry. Among 284 respondents who reported that their illness had "no impact on (their) finances," 266 respondents (94%) had a composite financial burden score of zero. Likewise, 272 of respondents (66%) who reported low levels of worry about finances had composite financial burden scores of zero. Higher financial burden scores were significantly more common among those who reported that cancer did have an impact on their finances ($P < .001$) and among those who reported high levels of worry ($P < .001$).

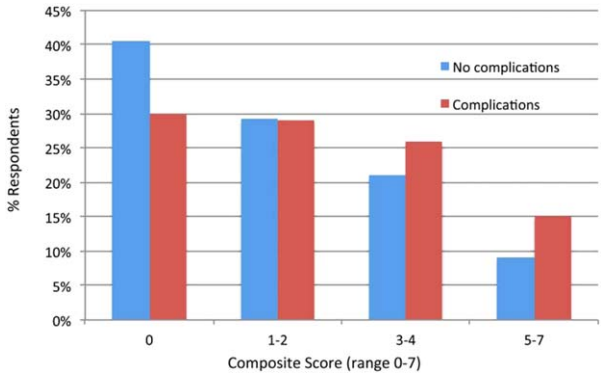

Figure 2. Financial burden scores are illustrated according to reported postoperative complications. Patients who reported complications had significantly higher composite financial burden scores ($P < .001$ for trend) and were less likely to report none of the elements of financial burden.

Financial Burden and Postoperative Complications

Table 2 displays the associations between patient-reported aspects of financial burden and the occurrence of postoperative complications. Respondents who experienced postoperative complications were significantly more likely to report that their cancer and/or its treatment forced them to use their savings (40% vs 31%; $P = .01$), borrow money or take out loans (18% vs 11%; $P = .007$), fail to pay credit cards or other bills (18% vs 11%; $P = .005$), reduce spending on food or clothes (38% vs 27%; $P = .001$), and reduce recreational activities (41% vs 33%; $P = .03$). There were no significant associations between surgical complications and reduced spending on health care for other family members or on general expenses.

Compared with respondents who had an uncomplicated postoperative course, those with complications were significantly less likely to endorse none of the measures of personal financial burden (30% vs 41%), and they were significantly more likely to endorse 3 or 4 (26% vs 21%) or ≥5 (15% vs 9%; $P < .001$ for trend) of the 7 measures of financial burden (Fig. 2). In multivariable Poisson regression (Table 3), SEER region, age, income, receipt of

TABLE 2. Association of Reported Complications With Financial Burden and Worry

Survey Item	No Complications, N = 713 (76%)	Complications, N = 224 (26%)	P[a]
"I had to use savings"	223 (31)	90 (40)	.01
"I had to borrow money or take out a loan"	81 (11)	41 (18)	.007
"I could not make payments on credit cards or other bills"	79 (11)	41 (18)	.005
"I cut down on spending for food and/or clothes"	191 (27)	86 (38)	.001
"I cut down on spending for health care for other family members"	34 (5)	15 (7)	.26
"I cut down on recreational activities"	237 (33)	92 (41)	.03
"I cut down on expenses in general"	336 (47)	115 (51)	.27

[a] *P* values are derived from chi-square tests.

chemotherapy, and health status were all related independently to composite financial burden. However, controlling for these covariates and for sex, race, marital status, education, and comorbidities did not significantly attenuate the relation between financial burden scores and complications (crude scores: 2.15 vs 1.66; $P = .03$; adjusted scores: 2.21 vs 1.69; $P < .001$).

Complications and Worry About Finances

Consistent with the greater frequency of reported financial burden, respondents who reported complications also were significantly more likely to report high levels of worry about their financial circumstances (61% vs 52%; $P = .01$).

Complications and Return to Work

Patients who experienced complications were significantly more likely to have delayed return to work ($P = .009$ for trend), as illustrated in Figure 3. Whereas 50% of patients without complications returned to work within 3 months, just 37% of those who reported complications returned to work in that interval. This differential persisted at 6 months (71% vs 59%) and 12 months after surgery (85% vs 76%); and, ultimately, those with complications were significantly more likely to stop working altogether (24% vs 15%; $P = .04$).

DISCUSSION

In this study of patient-reported clinical and economic outcomes after surgery for stage III CRC, we observed significantly greater personal financial burden among patients who experienced postoperative complications. Nearly 25% of respondents experienced complications after surgery—a rate consistent with most other series.[20-23] Survey respondents who reported complications experienced longer time off work and were more likely to never resume working. They were more likely to cut back on spending for food, clothes, and recreation and to accumulate debt or be unable to pay bills. They were also more likely to experience high levels of worry about finances.

These patient-reported outcomes are consistent with estimates from national databases suggesting that, beyond the direct costs of cancer treatment, the average CRC patient invests nearly $5000 worth of personal time participating in their treatment plan.[24] Patients incur large out-of-pocket costs for their medications, physician visits, and hospital care.[10-13] Surgery, chemotherapy, and hospitalization cause work absences; lost wages and opportunity costs; and lost productivity, training, education, and job prospects for both patients and their family members.[10,11,25-27] Many cancer patients never return to work at all, even after completing treatment.[26,28-31] Indeed, the personal financial costs of cancer are a common cause of personal bankruptcy—patients with CRC are 3 times more likely to experience bankruptcy than healthy, age-matched individuals.[8]

Unfortunately, there is often little awareness of the financial burdens that patients with CRC may face during treatment. Less than half of patients with stage III CRC

TABLE 3. Multivariable Poisson Regression Model Predicting Level of Financial Burden Composite Score According to Patient Characteristics and Occurrence of Postoperative Complications

Parameter	Effect Estimate[a]	95% CI	*P*
Complications			
No	Reference		
Yes	0.31	0.20, 0.42	< .001
SEER region			
Metropolitan Detroit	Reference		
Georgia	0.28	0.17, 0.39	< .001
Age, y			
<50	Reference		
50-64	−0.22	−0.36, 0.10	< .001
65-74	−0.68	−0.83, −0.52	< .001
≥75	−1.00	−1.19, −0.80	< .001
Sex			
Women	Reference		
Men	0.08	−0.02, 0.18	.14
Race			
White	Reference		
Black	0.001	−0.11, 0.12	.09
Other	0.16	−0.02, 0.36	.09
Marital status			
Married/partnered	Reference		
Not married/partnered	−0.09	−0.20, 0.03	.13
Education			
<High school	Reference		
High school	0.03	−0.13, 0.19	.75
Some college	0.03	−0.13, 0.18	.75
≥College graduate	−0.07	−0.25, 0.10	.41
Income			
$90,000	Reference		
$50,000-$89,000	0.32	0.15, 0.50	< .001
$20,000-$49,000	0.65	0.46, 0.83	< .001
<$20,000	0.41	0.19, 0.63	< .001
Missing	0.12	−0.10, 0.34	.28
Chemotherapy			
No	Reference		
Yes	0.54	0.32, 0.75	< .01
Health status			
Excellent	Reference		
Very good	0.20	0.04, 0.37	.02
Good	0.23	0.06, 0.40	.007
Fair	0.30	0.10, 0.50	.003
Poor	0.18	−0.06, 0.43	.15
Comorbidities			
None	Reference		
1	−0.10	−0.24, 0.04	.16
≥2	−0.04	−0.18, 0.10	.58

Abbreviations: CI, confidence interval; SEER, Surveillance, Epidemiology, and End Results.
[a] Positive effect estimates denote higher composite financial burden.

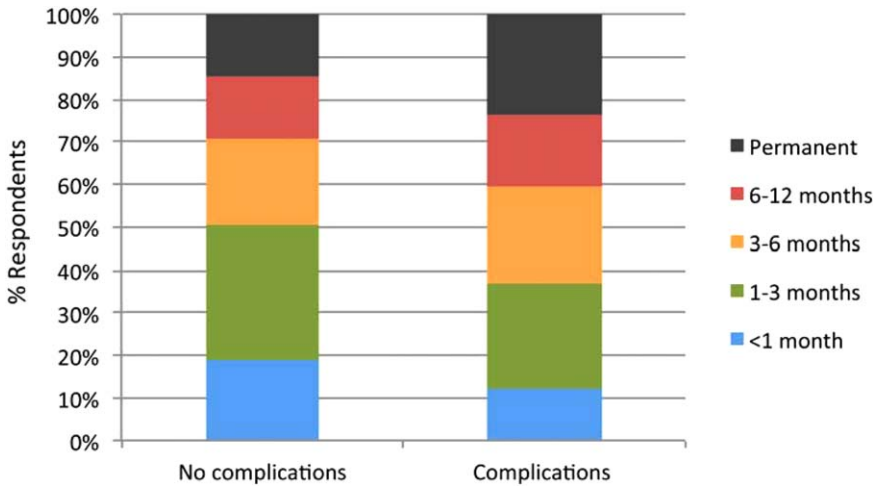

Figure 3. The amount of work missed because of colorectal cancer and/or its treatment is illustrated according to the reported incidence of complications. Patients who had complications were significantly more likely to be out of work for a longer duration ($P = .009$ for trend) and were more likely never to return ($P = .04$).

discuss problems of treatment costs with their physicians.[9] Furthermore, previous studies have not evaluated the role that treatment complications may play in patients' susceptibility to economic hardship. Therefore, surgeons and other providers need to be particularly aware that patients with CRC who suffer treatment-related complications are at increased risk for economic hardship during treatment.

The financial burden of surgical complications also may have broader implications for CRC outcomes. First, there is a strong association between financial and emotional strain and overall quality of life.[32] Patients who experience economic hardship during cancer treatment are significantly more likely to report emotional distress,[11,14,33] which has the potential to exacerbate their care needs, delay return to work, and, in turn, make the financial challenges even greater.[11,12] Second, personal finances are recognized as an important factor in patients' ability to receive optimal therapy for cancer.[34] Anywhere from 9% to 20% of cancer patients report missing essential medical care because of personal cost,[12,35,36] and the likelihood of economically-motivated nonadherence is even greater among cancer patients who are younger,[35] have the lowest incomes,[12] or are uninsured.[36] Furthermore, disease-related job loss and disability substantially increase nonadherence with recommended cancer therapy.[9] Therefore, if the personal economic consequences of adverse clinical outcomes from CRC surgery contribute to patients' failure to complete necessary therapy, then there may be an important decrement in long-term oncologic outcomes related to job loss and disability attributable to CRC surgery. In addition, patients who experience complications after surgery may require access to additional financial and logistical support to complete needed cancer therapies.

In this study, we relied on patient-reported clinical outcomes, which may limit precision regarding the definitions and types of surgical complications. However, patient-reported complications are generally highly valid[37] and strongly correlated with surgeon reports.[38] With increasing interest in patient-reported outcomes in surgery and cancer care,[39] the value of insight into patients' perceptions and experiences from our survey outweighs loss of clinical detail. We also rely on respondents' reporting of their financial burden, which is inherently subjective, and we cannot specifically assess the causal relations between complications, cancer treatment, and the objective financial effects—patients with cancer could cut back on discretionary spending because of financial burden or just because their disease and treatment limit their activities. In addition, this study was limited to patients with stage III CRC, because it was nested within a broader survey of patient decision-making around adjuvant therapy. Nevertheless, there is little reason to believe that the population-based findings herein would not generalize to other patients who undergo surgery for CRC and other solid tumors.

In summary, we observed that, for patients who undergo surgery for stage III CRC, postoperative complications are common and significantly affect patients'

personal financial burden and distress. Above and beyond the clinical consequences, therefore, the prevention and mitigation of surgical complications will be key measures to support patients' psychological well being, quality of life, recovery, and compliance with recommended therapy. To our knowledge, this correlation between the clinical and the personal economic outcomes of cancer surgery has not been previously recognized. Therefore, future policy advocacy should aim to encourage the widespread provision of job-related benefits that would compensate patients for lost work and ensure employability after recovery. Alternatively, patients who require surgery and/or chemotherapy for cancer might be made eligible for financial assistance, scaled in proportion to the extent of their treatments and the morbidities experienced. With increasing longevity and survival from cancer, these will be important contributors to the financial and clinical outcomes and quality of life for cancer survivors.

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CONFLICT OF INTEREST DISCLOSURES

The authors made no disclosures.

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