



Impact of Comorbidities on Treatment Choice for Colon Cancer Patients

Louisiana-CDC CER Project



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Introduction

Treatment plan for cancer patients depends on tumor stage and grade, patient's age, life expectancy, health condition, and preference. The surgical resection of the primary site and regional lymph nodes is the primary treatment for locoregional colon cancers with adjuvant chemotherapy recommended for colon cancer patients with stage III.¹ Studies have demonstrated that stage III colon cancer patients benefited from adjuvant chemotherapy after surgical resection by reducing the risk of tumor recurrence and improving survival;²⁻⁴ however, stage III colon cancer patients with comorbidities were less likely to receive adjuvant chemotherapy than those without comorbid condition.⁵ Radiation therapy is not a common treatment option for colon cancer and it is often used to shrink tumor before surgery. For stage IV patients, chemotherapy and radiation were used mainly as palliative therapy.¹

Objectives

We examined the association between comorbid condition(s) and treatment choice for stage I-IV colon cancer patients. Specifically we assessed comorbid condition(s) and adjuvant chemotherapy for stage III patients.

Data and Methods

Data sources

Stage I-IV colon cancer cases, diagnosed in 2011, were obtained from the Louisiana Tumor Registry, one of ten CDC Comparative Effectiveness Research (CER) Project participating registries. CER registries were required to collect detailed and timely treatment for breast, colorectal and CML cases diagnosed in 2011 as well as complete comorbidities for all cancer sites.

Comorbid Condition

The comorbidities selected in this study were diseases used in the Charlson comorbidity index (CCI)⁶ as indicated in Table 1; the higher the index score the more severe the disease. We grouped comorbidities based on the number of comorbid conditions colon cancer patient had: none, one comorbidity, and two or more comorbidities. We also categorized type of comorbidities based on the disease severity into: mild (CCI = 1) and moderate (CCI=2, 3) to severe (CCI= 6).

Treatment and Demographic variables

Treatment includes surgery, adjuvant chemotherapy (yes, no), and adjuvant radiation (yes, no). Three patient demographic variables were included: race (white, black), sex (male, female), and age group (<64, 65-79, ≥80).

Statistical Analysis

The logistic regression was used to examine the association between comorbidity and treatment and to identify factors associated with treatment decision making. Statistical analyses were carried out using SAS 9.0.3.

Table 1. Charlson comorbidity index and prevalence of comorbid conditions

Condition	Score	Count	%
Myocardial Infarction	1	39	5.9
Congestive heart failure	1	71	10.8
Chronic obstructive pulmonary disease	1	113	17.1
Peptic ulcer disease	1	18	2.7
Peripheral vascular disease	1	44	6.7
Mild liver disease	1	9	1.4
Cerebrovascular disease	1	30	4.5
Rheumatologic Disease	1	9	1.4
Diabetes	1	255	38.6
Dementia	1	7	1.1
Hemiplegia and Paraplegia	2	0	0.0
Moderate to severe renal disease	2	48	7.3
Diabetes with end organ damage	2	14	2.1
Cancer including Lymphoma and Leukemia	2	0	0.0
Moderate to severe liver disease	3	0	0.0
Metastatic solid tumor	6	0	0.0
AIDS (not only HIV positive)	6	3	0.5

Results

A total of 1,514 eligible stage I-IV colon cancer patients were included in this analysis and 1,083 (71.5%) had comorbidity information. Among these patients, 45% had at least one Charlson comorbid condition and others had non-Charlson comorbidities. Diabetes is the most common Charlson comorbidity (38.6%) followed by chronic obstructive pulmonary disease (17.1%) and congestive heart failure (10.8%) (Table 1).

Figure 1 shows the distribution of comorbid grouping based on Charlson list. Out of 1,514 colon cancer patients, 486 patients had Charlson comorbid condition(s). About 23% of colon cancer patients diagnosed in 2011 had one comorbidity, 27.9% of patients had mild comorbid disease, and less than 5% of patients had moderate to severe disease.

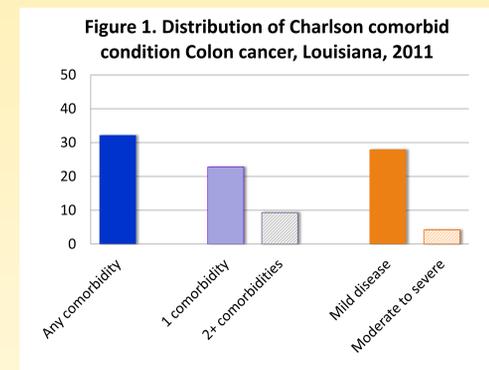
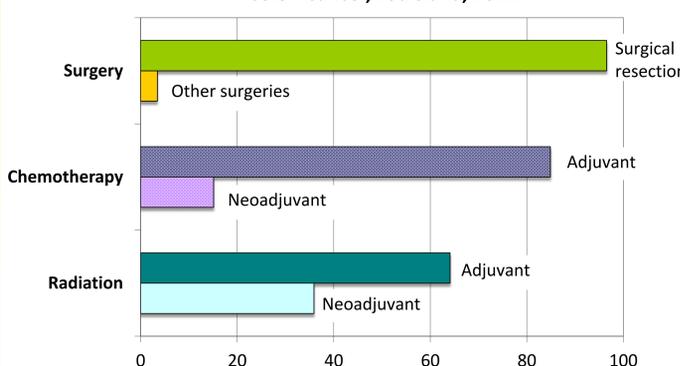


Figure 2. Percentage of Treatment Received by Treatment Type Colon Cancer, Louisiana, 2011



About 92% (1,388) of all colon cancer patients received surgery, almost exclusively had surgical resection. For colon cancer patients who received chemotherapy, the majority of them (84.9%) received adjuvant chemotherapy. Only 39 colon cancer patients received radiation, 35.9% of them received neoadjuvant (pre-operative) radiation (Figure 2).

Table 2 shows the distribution of treatment combination by AJCC stage. The majority of stage I and II patient received surgery only, 92.7% and 78.7%, respectively. Stage III patients receiving adjuvant chemotherapy were three-fold higher than stage II patients (67.8% vs. 19.1%); and only 1.8% of stage II/III patients received adjuvant radiation. Less than 1% of stage I-III colon cancer patients and 14.2% of stage IV patients received non-surgical treatment (Table 2).

Table 2. Frequency distribution of treatment type by AJCC stage

Treatment group	AJCC 7th Stage								Total	
	Stage I		Stage II		Stage III		Stage IV			
	N	%	N	%	N	%	N	%	N	%
No/Unknown treatment	24	6.5	1	0.2	1	0.3	49	14.8	75	5.0
Surgery only	343	92.7	329	78.7	118	29.9	76	22.9	866	57.2
Surgery and adjuvant chemotherapy	0	0.0	80	19.1	267	67.8	147	44.3	494	32.6
Surgery and adjuvant radiation	0	0.0	1	0.2	0	0.0	0	0.0	1	0.1
Surgery with adjuvant chemotherapy & radiation	0	0.0	6	1.4	8	2.0	13	3.9	27	1.8
Chemotherapy and /or radiation	3	0.8	1	0.2	0	0.0	47	14.2	51	3.4
Total	370	100.0	418	100.0	394	100.0	332	100.0	1514	100.0

For all colon cases combined, both the number and severity of comorbid conditions were not associated with the decision for surgical treatment. For stage III patients, the severity of comorbidity was significantly associated with the receipt of adjuvant chemotherapy in both unadjusted and adjusted (Table 3). Stage III colon patients with moderate to severe comorbidity were less likely to receive adjuvant chemotherapy than those without

comorbidity. Age is also an important factor related to adjuvant chemotherapy. Patients aged 65-79 years-old or 80 and older were less likely to receive adjuvant chemotherapy than patients aged 64 or younger (p -value < 0.05). There was no significant association between comorbidity and adjuvant radiation therapy for stage IV patients (Table 3).

Table 3. Odd Ratios of Adjuvant Treatment for Stage III and IV Colon Cancer Patients, Louisiana, 2011

		Adjuvant Chemotherapy Stage III	Adjuvant Radiation Stage IV
		Odds Ratios (95% CI)	Odds Ratios (95% CI)
Unadjusted			
Number of comorbidity	No comorbidity	1.00 (Referent)	1.00 (Referent)
	1 comorbidity	0.81 (0.49-1.35)	1.57(0.66-3.74)
	2 or more	0.67 (0.30-1.49)	0.94 (0.21-4.16)
severity of comorbidity	No comorbidity	1.00 (Referent)	1.00 (Referent)
	Mild	0.92 (0.56-1.51)	1.28 (0.54-3.06)
	Moderate to severe	0.24 (0.08-0.74)	1.97 (0.44-8.83)
Adjusted for sex, race, and age group			
Number of comorbidity	No comorbidity	1.00 (Referent)	1.00 (Referent)
	1 comorbidity	0.95 (0.53-1.70)	1.77 (0.73-4.26)
	2 or more	1.24 (0.47-3.28)	1.22 (0.27-5.51)
severity of comorbidity	No comorbidity	1.00 (Referent)	1.00 (Referent)
	Mild	1.23 (0.69-2.18)	1.43 (0.80-2.56)
	Moderate to severe	0.27 (0.07-0.99)	0.27 (0.03-2.12)

Conclusions

Surgery remains the primary treatment choice for colon cancer patients and is not affected by the patient's comorbid conditions. Adjuvant chemotherapy is used to destroy remaining cancer cells and to prevent the cancer recurrence; and adjuvant radiation is used mainly when the cancer has attached to an internal organ, the lining of abdomen wall or has metastasized to other organs.⁷ Our study shows comorbidity impacts the decision of additional adjuvant chemotherapy for stage III colon cancer patients. However, we did not observe a significant relationship between comorbidities and received adjuvant radiation for stage IV patients.

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