

# Differences in Colorectal Cancer Treatment Costs by Treatment Phase, Cancer Site, and Stage at Diagnosis: Evidence from Linked SEER-Medicare Data

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## Background

- Colorectal cancer (CRC) is the third-most common cancer type in the United States<sup>1</sup>
- There were about 153,760 new cases of CRC in 2007 and 52,180 deaths<sup>1</sup>
- A study estimated the total annual burden of CRC in the US to be \$5.7 billion<sup>2</sup>
- Understanding costs by treatment phase is useful when conducting health economic evaluations of CRC
- The objective of this study was to estimate colorectal cancer treatment costs by treatment phase, cancer site, and stage at diagnosis

## Methods

- Used the linked SEER-Medicare database (1996-2005)
- Patient selection:
  - Patients aged  $\geq 65$  years
  - Newly diagnosed with colon cancer (CC) or rectal cancer (RC) in a SEER registry between 1996 and 2002
  - Matched 1:1 by age, sex, and geographic region to non-cancer patients from a 5% Medicare sample
- Cancer-related costs were defined as the difference in costs (i.e., excess costs) between CRC patients and non-cancer matches
- Initial costs included the period up to one year after diagnosis for patients with at least 13 months' survival
- Continuing costs included the period between the first and last year of life for patients with at least 25 months of survival, annualized to reflect costs per year
- Terminal costs were assigned first and included costs in the final year of life (all costs for patients who lived < 13 months)
- Costs were expressed in 2006 US dollars

**Table 1. Patient Characteristics**

Variable	Colon Cancer	Rectal Cancer	Combined CRC Cohort	Comparison Cohort
N	41,256	15,582	56,838	56,838
Age*				
Mean ( $\pm$ SD)	77.9 (7.1)	77.1 (7.1)	77.7 (7.1)	77.7 (7.1)
Median	77.0	76.0	77.0	77.0
IQR	72-83	71-82	72-83	72-83
Female (%)*	57.0%	50.5%	55.2%	55.2%
Race (%)				
White	85.6%	86.3%	85.8%	86.2%
African American	8.2%	6.6%	7.7%	6.7%
Hispanic	1.2%	1.4%	1.3%	2.1%
Other	5.0%	5.7%	5.2%	5.0%
Geographic region (%)*				
Northeast	21.9%	22.4%	22.0%	22.0%
Midwest	24.0%	23.3%	23.8%	23.8%
West	40.1%	40.8%	40.3%	40.3%
South	14.0%	13.5%	13.9%	13.9%
Location of residence (%)				
Metropolitan county	82.6%	81.8%	82.4%	82.6%
Non-metropolitan county	17.4%	18.2%	17.6%	17.3%
Missing	0.0%	0.0%	0.0%	0.1%
Stage at diagnosis (%)				
Stage 0	6.7%	8.1%	7.1%	-
Stage I	22.2%	27.6%	23.7%	-
Stage II	30.5%	20.7%	27.8%	-
Stage III	22.0%	18.2%	21.0%	-
Stage IV	14.5%	16.5%	15.1%	-
Unknown	4.1%	8.9%	5.4%	-

Source: SEER-Medicare data, 1996-2005

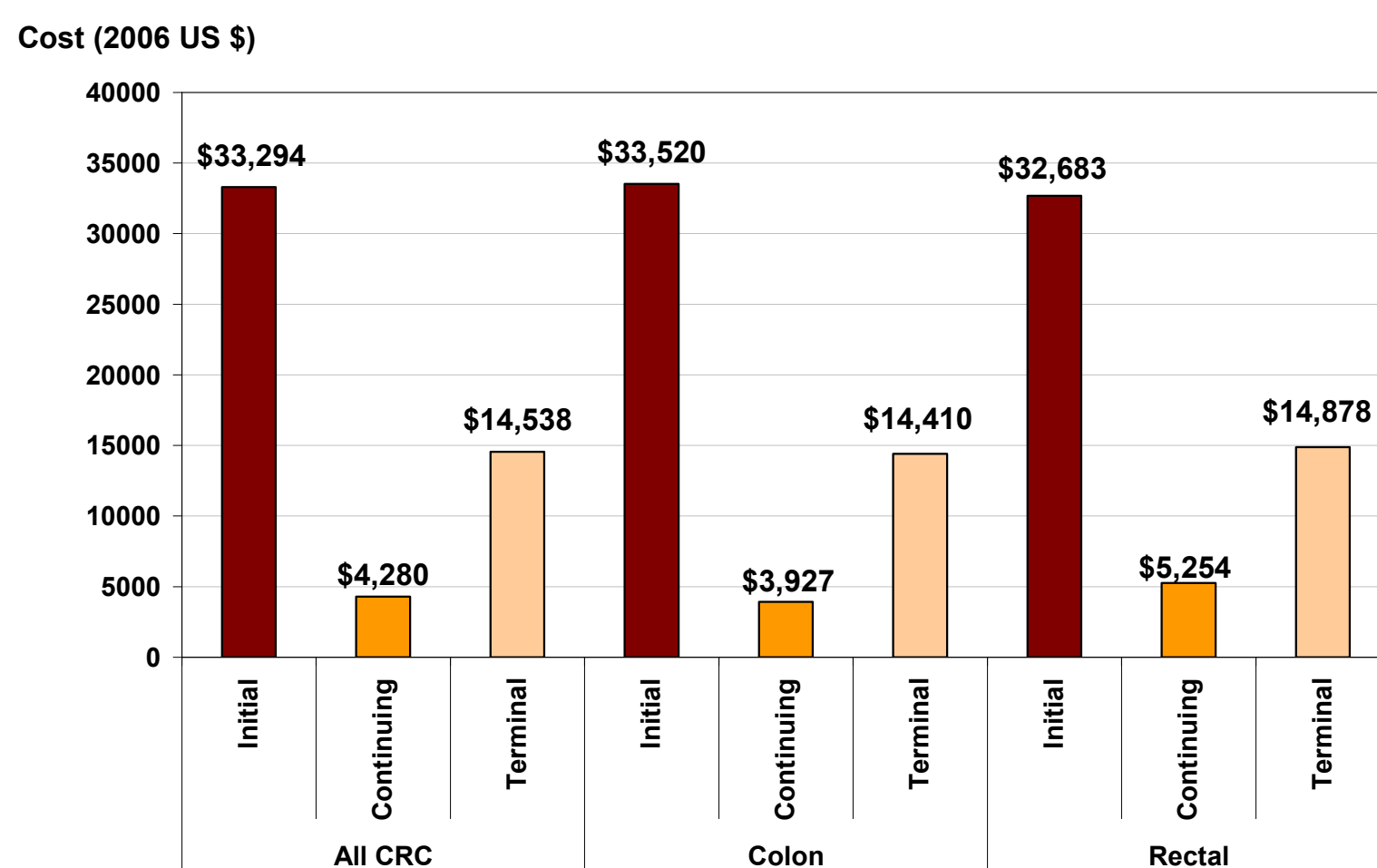
\*Variables used in matching cohorts

Note: '-' means data not available

## Results

- 56,838 patients were in the CRC cohort, 41,256 of them CC patients (Table 1)
- Cancer-related treatment costs for the overall CRC cohort were \$33,294 in the initial phase, \$4,280 per year in the continuing phase, and \$14,538 in the terminal phase (Fig. 1)
- Initial- and terminal-phase costs were similar for CC and RC, but continuing-phase costs were roughly 1/3 higher for RC
- Stage IV RC patients had slightly higher continuing-phase costs and much lower terminal costs than CC patients, possibly due to variations in patient characteristics and/or treatment modalities
- Costs were highest in all phases for the youngest patients (aged 65-74 years) and higher in Stage IV than any other stage for continuing and terminal costs (Table 2)

**Figure 1. Initial, Continuing, and Terminal Phase Costs**



Source: SEER-Medicare data, 1996-2005

**Table 2. Initial, Continuing, and Terminal Phase Costs**

	Initial			Continuing (per year)			Terminal		
	Colon Cancer Patients	Rectal Cancer Patients	All Patients	Colon Cancer Patients	Rectal Cancer Patients	All Patients	Colon Cancer Patients	Rectal Cancer Patients	All Patients
All patients	\$33,520	\$32,683	\$33,294	\$3,927	\$5,254	\$4,280	\$14,410	\$14,878	\$14,538
Stage									
Stage 0	\$18,052	\$13,954	\$16,762	\$2,374	\$1,744	\$2,175	\$7,103	\$7,161	\$7,121
Stage I	\$27,783	\$25,659	\$27,099	\$2,347	\$3,341	\$2,665	\$7,774	\$9,641	\$8,371
Stage II	\$35,055	\$40,217	\$36,092	\$2,750	\$5,126	\$3,216	\$11,731	\$16,741	\$12,755
Stage III	\$41,222	\$43,518	\$41,796	\$5,768	\$7,142	\$6,109	\$18,417	\$20,255	\$18,854
Stage IV	\$42,401	\$39,436	\$41,562	\$19,987	\$22,039	\$20,582	\$27,898	\$20,625	\$25,714
Unknown	\$27,841	\$28,500	\$28,132	\$3,737	\$6,179	\$4,788	\$12,785	\$12,147	\$12,496
Age									
65 to 74	\$33,980	\$35,002	\$34,282	\$5,334	\$6,828	\$5,775	\$16,788	\$16,491	\$16,699
75 to 84	\$33,401	\$31,741	\$32,967	\$3,277	\$4,166	\$3,503	\$13,457	\$14,273	\$13,675
85+	\$32,966	\$27,982	\$31,869	\$2,261	\$3,534	\$2,502	\$12,273	\$12,571	\$12,346

Source: SEER-Medicare data, 1996-2005

## Limitations

- Lack of generalizability to non-Medicare beneficiaries
- Relies on retrospective claims, so subject to coding errors and incomplete data

## Conclusions

- Excess costs associated with CRC are striking and vary considerably by treatment phase, cancer site, and stage at diagnosis
- Interventions aimed at earlier diagnosis and prevention have the potential to reduce cancer-related healthcare costs

## References

- American Cancer Society. Cancer Facts & Figures. 2007. [http://www.cancer.org/docroot/STT/STT\\_0.asp](http://www.cancer.org/docroot/STT/STT_0.asp). Accessed July 9, 2007.
- Brown ML, Lipscomb J, Snyder C. The burden of illness of cancer: economic cost and quality of life. *Annu Rev Public Health*. 2001;22:91-113.