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ORIGINAL REPORT

Quality of Nonmetastatic Colorectal Cancer Care in the Department of Veterans Affairs

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ABSTRACT

Purpose
The Veterans Affairs (VA) healthcare system treats approximately 3% of patients with cancer in the United States each year. We measured the quality of nonmetastatic colorectal cancer (CRC) care in VA as indicated by concordance with National Comprehensive Cancer Network practice guidelines (six indicators) and timeliness of care (three indicators).

Patients and Methods
A retrospective medical record abstraction was done for 2,492 patients with incident stages I to III CRC diagnosed between October 1, 2003, and March 31, 2006, who underwent definitive CRC surgery. Patients were treated at one or more of 128 VA medical centers. The proportion of patients receiving guideline-concordant care and time intervals between care processes were calculated.

Results
More than 80% of patients had preoperative carcinoembryonic antigen determination (ie, stages II to III disease) and documented clear surgical margins (ie, stages II to III disease). Between 72% and 80% of patients had appropriate referral to a medical oncologist (ie, stages II to III disease), preoperative computed tomography scan of the abdomen and pelvis (ie, stages II to III disease), and adjuvant fluorouracil-based chemotherapy (ie, stage III disease). Less than half of patients with stages I to III CRC (43.5%) had a follow-up colonoscopy 7 to 18 months after surgery. The mean number of days between major treatment events included the following: 26.6 days (standard deviation [SD], 38.2; median, 20 days) between diagnosis and initiation of treatment (in stages II to III disease); 64.9 days (SD, 54.9; median, 50 days) between definitive surgery and start of adjuvant chemotherapy (in stages II to III disease); and 444.1 days (SD, 182.1; median, 393 days) between definitive surgery and follow-up colonoscopies (in stages I to III disease).

Conclusion
Although there is opportunity for improvement in the area of cancer surveillance, the VA performs well in meeting established guidelines for diagnosis and treatment of CRC.

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INTRODUCTION

The Veterans Affairs (VA) healthcare system treats approximately 3% of patients with cancer in the United States (eg, > 43,000 people in 2005). As with the rest of the country,[1,2] CRC is the third most common cancer in VA. There were greater than 4,600 new occurrences of CRC entered onto the VA Central Cancer Registry in 2005 (11% of VA cancer occurrences).

As part of VA's focus on quality improvement,[3-7] a widespread pilot of improving and measuring the quality of VA cancer care, with a focus on CRC, began in the fall of 2005.[8-10] The purpose of this article is to describe the quality of CRC care in VA by measuring concordance with National Comprehensive Cancer Network (NCCN) guidelines[11,12] and the timeliness with which cancer care is provided.

PATIENTS AND METHODS

Data were abstracted from the VA electronic health record (EHR) for a sample of 2,492 patients with nonmetastatic CRC diagnosed between October 1, 2003, and March 31, 2006. Initial analyses done for the VA Office of Quality and Performance (OQP) were determined to be for quality improvement purposes according to the Durham VA Medical Center (VAMC) institutional review board (IRB) chairperson. Subsequent analyses were done under the approval of the Durham VAMC IRB.

Data Source

Between July and August 2007, a one-time, special, chart-abstraction study was conducted for the VA External Peer Review Program (EPRP).[13] Abstraction was done by the EPRP contractor, West Virginia Medical Institute, under the auspices of VA OQP to assess the quality of CRC care. Abstractors accessed the medical record remotely (off site) to collect data on care provided to individual patients across VA. Demographic information for 87% of the sample included in the VA Central Cancer Registry was obtained from the registry.

Patients

Patient identification was based on a search algorithm aimed at defining a representative sample of VA patients with CRC diagnosed between October 1, 2003, and March 31, 2006, by utilizing administrative diagnosis, procedure, and encounter data stored in the VA Decision Support System (a centralized VA data system).[14]

Eligible patients had an International Classification of Disease (9th revision) code for colon and/or rectal cancer[15] in VA administrative databases between 3 months before and 3 months after the diagnosis time period for the study. In addition, eligible patients had a clinic visit, procedure, or pathology report in VA corresponding to one or more the following combinations of medical services between 3 months prior and 3 months after the diagnosis time period for the study: medical oncology plus radiation oncology, surgery, hospice, pathology, gastroenterology, and/or colonoscopy; radiation oncology only; surgery plus medical oncology, radiation oncology, hospice, pathology, gastroenterology, and/or colonoscopy; hospice only; or pathology plus medical oncology, radiation oncology, surgery, and/or hospice. These combinations of services could have occurred in any temporal order.

To be included in the final analytic data set, patients had to meet the following additional inclusion criteria: stages I to III CRC; incident occurrence (ie, initial diagnosis of CRC during the study period); and receipt of definitive surgery for CRC. Definitive surgery was defined as a surgical intervention directly aimed at resecting the CRC, such as a partial colectomy. Diagnosis dates were based on the date of a signed pathology report that indicated diagnosis of invasive CRC (including staging information). If a complete pathology report was not available to the chart abstractor (eg, may have been the result of remote nature of chart abstraction and does not necessarily imply that pathology reports were not available during care), the date of the earliest physician documentation of the diagnosis was used. A surgical pathology report date was recorded for all patients included in this study. However, precise contents of those reports were not recorded in the data set.

Quality Indicators

Six quality indicators were based on the 2003 (ie, first year of patient inclusion) versions of the NCCN colon and rectal cancer guidelines.[11,12] NCCN guidelines are based on evidence when available and consensus opinion otherwise, so that a comprehensive treatment algorithm is developed.[16] All NCCN-based quality indicators used in this study are considered to have an evidence base and have uniform NCCN guideline-panel consensus (at least NCCN evidence category 2A).[17,18] In addition to the NCCN guideline-based measures, three timeliness indicators were developed. Although there is only limited evidence that timeliness of care impacts disease outcomes of CRC treatment,[19] there is general consensus among oncology societies that timeliness of cancer care is an important indicator of quality.[20]

Specific quality indicators for guideline concordance include the following: preoperative computed tomography (CT) scan, preoperative carcinoembryonic antigen (CEA), clear surgical margins, referral to a medical oncologist, FU-based chemotherapy, and surveillance colonoscopy.

Preoperative CT scan. Documented preoperative CT scan of the abdomen and pelvis (or patient refusal of CT scan) for patients with stages II to III CRC undergoing definitive surgical resection is available. Current NCCN guidelines also recommend a CT scan of the chest.[17,18] However, this recommendation was not in place during the entire study period.

Preoperative CEA. Preoperative CEA determination for patients with stages II to III CRC undergoing definitive surgical resection is documented. CEA determination for CRC is included in American Society of Clinical Oncology (ASCO) evidence-based guidelines.[21,22]

Clear surgical margins. Documentation of clear surgical margins for patients with stages II to III CRC undergoing definitive surgical resection is available.

Referral to a medical oncologist. Documented referral to a medical oncologist (or documented reason why not) for patients with stages II to III CRC is available.

Fluorouracil-based chemotherapy. Adjuvant (postoperative) fluorouracil (FU) –based therapy or capecitabine after definitive resection of stage III CRC (or documented reason why not) is documented. Within current NCCN CRC guidelines, only use of FU-based chemotherapy for patients with stage III disease is specifically labeled as being based on NCCN category-1 evidence (ie, high level of evidence [eg, randomized controlled trials] and uniform NCCN consensus).[17,18]

Surveillance colonoscopy. Surveillance colonoscopy within 7 to 18 months after definitive surgery for patients with stages I, II, and III CRC with documentation of no preoperative obstructing lesion is documented. To be included in the calculation, a patient had to survive at least 1 year after surgery. The 2003 and subsequent NCCN guidelines[11,12] and current joint guidelines of the American Cancer Society and major gastroenterology societies[23] recommend that colonoscopies occur within 1 year after surgery. However, the 2005 ASCO guideline recommending surveillance colonoscopy within 3 years of surgery has not been updated.[24] For this study, 7 months was used as a minimum, because colonoscopies performed sooner than 7 months might not be intended primarily for surveillance, and 18 months was chosen because surveillance colonoscopies may not occur exactly within 1 year.

Specific quality indicators for the timeliness of care include the following: diagnosis to initiation of treatment, surgery to the initiation of adjuvant chemotherapy, and surgery to surveillance colonoscopy.

Diagnosis to initiation of treatment. Days from diagnosis to initiation of treatment—including definitive surgery, chemotherapy, and/or radiation therapy—were measured for patients with stages II to III CRC. For patients with rectal cancer, it is possible for a definitive diagnosis to be made after initiation of therapy. NCCN guidelines suggest that, for some stages II to III rectal cancers, neoadjuvant (ie, preoperative) radiation therapy is warranted. In occurrences for which a definitive pathologic diagnosis of invasive cancer (with staging information) is not made until the time of surgery, the interval from diagnosis to treatment may be represented as a negative number. This occurred for 14.3% of patients who contributed data to the quality indicator.

Surgery to the initiation of adjuvant chemotherapy. Days from definitive surgery to initiation of adjuvant (ie, postoperative) chemotherapy treatment for patients with stages II to III CRC were measured. Although adjuvant chemotherapy is not necessarily indicated for all patients with stage II disease,[11,12] we are assuming that patients with stage II disease who receive adjuvant chemotherapy should begin chemotherapy as soon as clinically appropriate. As a result, this measure utilized data for patients with stage II disease who have both a recorded surgery and chemotherapy start date.

Surgery to surveillance colonoscopy. Days from definitive surgery to surveillance colonoscopy in patients with stages I, II, and III CRC with documentation of no preoperative obstructing lesion were measured.

Data Analysis

We report the percentage of patients with CRC receiving care concordant with clinical practice guidelines and the mean (standard deviation [SD]) and median (interquartile range) number of days between care events for timeliness indicators. Because each chart abstraction represents at least 15 months of follow-up, 1-year (ie, 365-day), stage-specific mortality rates were calculated. Results were combined for patients with colon cancer and rectal cancer. SAS version 9.1.3 (SAS Institute, Cary, NC) was used for data management and analyses.

RESULTS

Of 9,599 individual patients identified by the case-finding algorithm, 571 (5.9%) did not have a CRC diagnosis, and 4,640 (48.3%) had a diagnosis outside of the 2.5-year study-diagnosis period. This would

Table 1. Characteristics of Patients in the Sample of Nonmetastatic Colorectal Cancer

Characteristic	Patients (N = 2,492)		
	No.	No. Evaluated	%
Ethnicity			
African American	326		13.1
White	1,793		72.0
Other	16		0.6
Unknown	357		14.3
Age at diagnosis, years*			
Mean		68.3	
SD		10.4	
Median		68.5	
Range		24.6-94.3	
Sex			
Male	2,439		97.9
Female	53		2.1
Cancer stage			
I	763		30.6
II	921		37.0
III	808		32.4
Calendar year of diagnosis†			
2003	248		10.0
2004	1,118		44.9
2005	978		39.3
2006	148		5.9
1-Year mortality by stage at diagnosis			
I	37	763	4.9
II	54	921	5.9
III	95	808	11.8

Abbreviation: SD, standard deviation.
*Data were based on 2,480 patients with age information.
†Diagnoses were made between October 1, 2003, and March 31, 2006.

be expected, because the search algorithm allowed for codes 3 months before or after the official study period, with the goal of capturing patients diagnosed throughout the time period of interest. Of the remaining 4,388 patients, 212 (4.8%) did not have a documented stage in the VA EHR, 709 (16.2%) did not have a record of definitive CRC surgery, and 517 (13.0%) did not have a documented diagnosis of CRC. This would be expected, because some patients with CRC may not have had an indication for surgery because of synchronous metastatic disease or endoscopic removal of certain early-stage (ie, T0) cancers. In addition, some CRC codes may have been included in administrative data during the diagnostic process for patients who did not have the disease. Of the remaining 2,896 patients, 119 with stage 0 (ie, noninvasive) disease and 285 with stage IV (ie, metastatic) disease were not included in the final data set; 2,492 patients with stages I to III disease remained who met all inclusion criteria.

Most patients were men (97.9%) and had a mean age of 68.3 years (SD, 10.4) at the time of diagnosis. Patients were treated at 128 of the 153 VA medical centers. Stage-specific 1-year mortality rates included the following: stage I, 4.9%; stage II, 5.9%; and stage III, 11.8%. Table 1 describes patient characteristics.

Tables 2 and 3 detail quality-indicator results. More than 80% of patients had preoperative CEA determination (by stages II to III, 82.8%; by documented clear surgical margins and stages II to III, 81.2%). Among 329 patients without clear margins, 207 had documentation that margins were not clear, the abstractor was not able to determine status of margins for 118 patients, and the question answer was missing in four patients. The majority of patients also had appropriate referral to a medical oncologist (in stages II to III, 77.5%), adjuvant FU-based chemotherapy (in stage III, 73.5%), and preoperative CT scan of the abdomen and pelvis (in stages II to III, 72.1%). However, less than half of patients with stages I, II, or III disease without a preoperative obstructing lesion (43.5%) had a follow-up colonoscopy within 7 to 18 months of surgery.

The mean number of days between major treatment events included the following: 26.6 days (SD, 38.2; median, 20 days) between diagnosis and initiation of treatment, including surgery, radiotherapy, or chemotherapy (in stages II to III); 64.9 days (SD, 54.9; median, 50 days) between definitive surgery and start of adjuvant chemotherapy (in stages II to III disease who received adjuvant chemotherapy); and 444.1 days (SD, 182.1; median, 393 days) between definitive surgery and follow-up colonoscopy (in patients with stages I, II, and III disease

Table 2. Guideline Concordance Quality of Nonmetastatic Colorectal Cancer Care in the Veterans Health Administration

Quality Indicator	Cancer Study Population	Qualified Study Sample (No. of patients)	Yes Results (%)
Preoperative CT scan of abdomen and pelvis prior to definitive surgical resection	Stages II and III colorectal cancer	1,729	72.1
Preoperative CEA determination prior to definitive surgical resection	Stages II and III colorectal cancer	1,729	82.8
Documented radial margins were free of tumor at the time definitive surgical resection	Stages II and III colorectal cancer	1,725*	81.2†
Referral to a medical oncologist	Stages II and III colorectal cancer	1,729	77.5
Adjuvant FU or capecitabine administered after definitive surgical resection	Stage III colorectal cancer	808	73.5
Surveillance colonoscopy within 7 to 18 months after definitive surgical resection for patients with documentation of no preoperative obstructing lesion	Stages I, II, and III colorectal cancer with no preoperative obstructing lesion documented	1,259	43.5

Abbreviations: CT, computed tomography; CEA, carcinoembryonic antigen; FU, fluorouracil.
*Margins question was missing with four patients.
†Of the 1.725 patients for whom the abstraction question pertaining to clear margins was answered, 1400 (81.2%) had documentation of clear margins, 207 (12.0%) had medical record indication that margins were not clear, and for 118 (6.8%) abstractors could not ascertain the margin status from the medical record.

Table 3. Timeliness of Nonmetastatic Colorectal Cancer Care in the Veterans Health Administration

Quality Indicator	Cancer Study Population	Qualified Study Sample (No. of patients)	Days			
			Mean	SD	Median	IQR
Days from diagnosis to initiation of initiation of treatment (i.e. surgery, chemotherapy, and/or radiation therapy)	Stages II and III colorectal cancer	1,729	26.6	38.2	20.0	37
Days from definitive surgical resection to start of adjuvant chemotherapy	Stages II and III colorectal cancer	767	64.9	54.9	50.0	35
Days from definitive surgical resection to surveillance colonoscopy for colonoscopies performed at least 7 months after surgical resection	Stages I, II, and III colorectal cancer with no preoperative obstructing lesion documented	644	444.1	182.1	393.0	166

Abbreviation: IQR, interquartile range.

who had a follow-up colonoscopy). The standard deviation is larger than the mean for diagnosis to initiation of treatment because treatment could have been initiated before the official diagnosis date in occurrences for which the definitive pathology report with final staging information followed neoadjuvant therapy. This neoadjuvant therapy would generally have been based on an initial diagnosis made by using a combination of information from a pathology report of biopsy results and radiographic findings.[12]

DISCUSSION

With the exception of receiving follow-up colonoscopy within 7 to 18 months of definitive surgery, more than 72% of VA patients received care that was guideline concordant for each diagnostic and therapeutic measure.

Although direct comparisons with non-VA providers are not available, the level of guideline concordance appears to at least be similar to that of the private sector. The National Initiative for Cancer Care Quality (NICCQ) evaluated 25 CRC quality measures by using medical record abstraction and patient survey results in five geographic regions among patients with stages II to III CRC diagnosed in 1998. They found that, overall, patients received guideline-concordant care 78% of the time. Some NICCQ measures can be obtained from medical records and, therefore, may be mapped to quality indicators that we evaluated. For example, among patients with CRC with non-T4 lesions who underwent resection, NICCQ found that 85% had documentation of clear surgical margins.[25] Similarly, we found that 81% of patients undergoing surgery in VA had this documentation. In addition, population-based reviews of patients entered onto the California Cancer Registry and Surveillance, Epidemiology, and End Results (SEER) –Medicare data set in the mid- to late-1990s found rates of referral to a medical oncologist (75%)[26] and receipt of appropriate adjuvant chemotherapy (67%)[27] similar to or somewhat less than our results from VA between 2003 and 2006 (medical oncology referral for stages II to III, 78%; adjuvant FU-based chemotherapy for stage III, 74%). A review of care provided by four clinics affiliated with the University of South Florida Moffitt Cancer Center in 2004 found that 57% of patients received preoperative/prechemotherapy CEA testing,[28] whereas we found that 83% of patients received this recommended evaluation in VA.

The area of the greatest opportunity for improvement in VA is performance and documentation of timely colonoscopy surveillance. Only 44% of patients without a preoperative obstructing lesion received a surveillance colonoscopy documented in the medical record within 7 to 18 months after surgery. When restricted to the more stringent, 12-month postoperative colonoscopy recommendation recently put forth by a multisociety task force,[29] only 23% of VA patients with CRC with nonobstructing lesions had documentation of appropriate postoperative colonoscopy surveillance. The NICCQ analysis found 50% guideline-concordance for CRC surveillance.[25] The Moffitt analysis found that 43% of patients had a colon evaluation within 12 months of surgery.[28] An important consideration, however, is that during the study period NCCN guidelines recommended a 1-year follow-up,[11,12] whereas other societies recommended a 3-year follow-up.[24,30] This lack of agreement may have contributed to lower levels of guideline concordance both within and outside VA.

A review of SEER-Medicare data from patients diagnosed from 2000 to 2001 found that 73.6% of CRC survivors had a least one colonoscopy within 3 years of diagnosis.[31] A similar analysis of 749 patients with stages I to III disease in our data set with at least 3 years of follow-up from the time of diagnosis found that 60.9% had a least one documented colonoscopy within 3 years of diagnosis.

Although the precise reason for lower levels of documented surveillance is not known, there are quality improvement opportunities for clinicians and health systems.[32] Related efforts might focus on improving the transition of care between specialties and primary care (including use of care templates to guide physicians in the surveillance process), better tracking and documentation of colonoscopies performed outside VA, and increasing patient knowledge and participation in surveillance. Regarding improvement of follow-up of positive fecal occult blood tests in VA, evidence points to the importance of such quality improvement infrastructure (eg, measuring colonoscopy supply and demand, creating system for patient tracking) and process changes (eg, clarifying roles of different clinical services, revising colonoscopy preparation education and protocols).[33] These changes represent ongoing efforts of VA facilities to improve the provision of colonoscopies. Evidence concerning system failures related to the provision of breast cancer care outside VA additionally indicates the importance of addressing system processes, such as the interaction between treating specialties.[34]

Although specific standards of timeliness of care are not available, the 2008 joint quality measures of ASCO and NCCN suggest that patients should receive adjuvant chemotherapy within 4 months of colon cancer diagnosis and 8 months of rectal cancer diagnosis.[20] Delay in initiation of adjuvant chemotherapy has been associated with both increased cancer-specific and all-cause mortality among patients with stage III colon cancer.[19] For this study, the mean number of days between surgery and adjuvant chemotherapy was 64 (SD, 54.9; median, 50 days). Among patients with adjuvant chemotherapy start dates available, 93.0% began the process within 120 days of surgery.

Limited comparison data indicate that VA has timeliness of care consistent with other healthcare systems. A Canadian study of 3,510 patients with CRC diagnosed from 1993 to 2000 found a median number of 19 days between diagnosis and surgery.[35] This compares with 20 days for VA. On the basis of information in the SEER-Medicare database, approximately 4,382 patients with stage III colon cancer older than 65 years who were diagnosed from 1992 to 1999 and received adjuvant chemotherapy; 26%, 55%, 10%, and 9% received chemotherapy within 1, 1 to 2, 2 to 3, and greater than 3 months of surgery, respectively.[19] This compares with 11%, 52%, 22%, and 13% of 767 patients with stages II to III CRC receiving chemotherapy who got the treatment within 1, 1 to 2, 2 to 3, and greater than 3 months of surgery, respectively, in this study.

This analysis has some important limitations. It was based on a review of the VA EHR. Although information from across VA could be accessed, information on care delivered outside VA (eg, colonoscopies provided by non-VA providers, including those paid for by VA) that was not captured in the EHR or was only noted in a paper medical record would not have been available to the abstractor. Remote EHR access also may have limited the ability of abstractors to see scanned documents. In addition, patients with care patterns different from the case-finding algorithm would not have been included. Finally, the criterion requiring that patients had definitive surgery meant that the numbers of patients with stage IV disease in the data set was insufficient to assess the quality of care provided to patients with stage IV disease. Despite these limitations, quality of care in and outside VA appears similar.

Because of the potential limitation of remote abstraction, VA OQP offered each Veterans Integrated Service Network (VISN) the opportunity to review cases of patients for whom there was not documentation of receiving guideline-concordant care on the basis of a given quality indicator and all patients contributing data to timeliness measures. This article presents the prereview results, because VISNs were not mandated to review the data. As a result, the pre-VISN review provides a more consistent assessment of the quality of VA CRC care. Conclusions of the manuscript were not changed by the minor changes in the data after VISN review.

CRC represents an important condition and may serve as a proxy for the overall quality of cancer care. Via indirect comparison, the VA compares favorably with non-VA health systems in the delivery of CRC diagnostic and therapeutic measures. There may be opportunities for improvement in CRC surveillance.

In the past decade and a half, VA has become a leader in providing quality health care.[36-38] By measuring the quality of CRC and developing tools that can be used to respond to quality gaps, VA has become a national leader in the cancer care quality improvement process.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

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