Original Article

Trends in Surveillance for Resected Colorectal Cancer, 2001-2009

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BACKGROUND: Little is known about recent trends in surveillance among the more than 1 million US colorectal cancer (CRC) survivors. Moreover, for stage I disease, which accounts for more than 30% of survivors, the guidelines are limited, and the use of surveillance has not been well studied. Guidelines were changed in 2005 to include recommendations for computed tomography (CT) surveillance in select patients, but the impact of these changes has not been explored. **METHODS:** A retrospective analysis of patients who were identified in the Survival, Epidemiology, and End Results–Medicare database and underwent resection of stage I to III CRC between 2001 and 2009 was performed. The receipt of guideline-determined sufficient surveillance, including office visits, colonoscopy, carcinoembryonic antigen (CEA) testing, and CT imaging, in the 3 years after resection was evaluated. **RESULTS:** The study included 23,990 colon cancer patients and 5665 rectal cancer patients. Rates of office visits and colonoscopy were high and stable over the study period. Rates of CEA surveillance increased over the study period but remained low, even for stage III disease. Rates of CT imaging increased gradually during the study period, but the 2005 guideline change had no effect. Stage II patients, including high-risk patients, received surveillance at significantly lower rates than stage III patients despite similar recommendations. Conversely, up to 30% of stage I patients received nonrecommended CEA testing and CT imaging. **CONCLUSIONS:** There continues to be substantial underuse of surveillance for CRC survivors and particularly for stage II patients, who constitute almost 40% of survivors. The 2005 guideline change had a negligible impact on CT surveillance. Conversely, although guidelines are limited, many stage I patients are receiving intensive surveillance. ***Cancer* 2015;121:3525-33**. © *2015 American Cancer Society.*

KEYWORDS: colon cancer, epidemiology, guideline adherence, rectal cancer, surveillance.

INTRODUCTION

Colorectal cancer (CRC) is the third most commonly diagnosed cancer in the United States, with almost 140,000 new cases in 2014.[1] Fortunately, survival is high; even with stage III disease, 5-year survival exceeds 50%. Because of improved screening and treatment, mortality continues to decline. Because of the large number of CRC patients and the high and improving long-term survival, there are now more than 1 million CRC survivors alive, with at least half of those eligible for surveillance care, in the United States.[1]

Surveillance after treatment leads to early detection of recurrences or second primary CRCs and improves survival for patients with stage II and III CRC.[2-6] Surveillance entails office visits, colonoscopy, and serial carcinoembryonic antigen (CEA) blood testing for up to 5 years after treatment. In 2005, recommendations by the American Society of Clinical Oncology (ASCO) and the National Comprehensive Cancer Network (NCCN) added annual surveillance computed tomography (CT) scanning for at least 3 years after treatment for all stage III and select stage II patients.[7-9] The most recent ASCO update to the CRC surveillance guidelines in 2013 reinforced these recommendations and further suggested that even more frequent CT imaging might be considered for patients deemed to be at high risk for recurrence.[10] Results from a recent trial suggest that stage I patients, who constitute more than 30% of the CRC survivor population, benefit from

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E. Carter Paulson, Andrew J. Epstein, Christine M. Veenstra, and Anil Vachani contributed to the study concept and design. All authors contributed to the acquisition, analysis, or interpretation of data. E. Carter Paulson contributed to the drafting of the article. All authors contributed to the critical revision of the article for important intellectual content. E. Carter Paulson and Andrew J. Epstein contributed to the statistical analysis.

DOI: 10.1002/cncr.29469, **Received:** February 16, 2015; **Revised:** April 22, 2015; **Accepted:** April 27, 2015, **Published online** June 16, 2015 in Wiley Online Library (wileyonlinelibrary.com)

aggressive surveillance.[11] Despite this, neither the ASCO guidelines nor the NCCN guidelines comprehensively address stage I surveillance.

Numerous population-based studies have examined patient and geographic factors associated with underuse of surveillance in the 1990s and early 2000s.[2,12-14] Little is known, however, about longitudinal trends in surveillance, especially after the 2005 guideline change recommending CT surveillance. In this study, we used data from a national cancer registry combined with Medicare claims to examine trends in CRC surveillance from 2001 through 2009 for patients with stage I, II, and III CRC. We were interested specifically in the association between the 2005 guideline change and the use of surveillance CT imaging. In addition, given the lack of formal recommendations, we evaluated trends in surveillance for patients with stage I CRC.

MATERIALS AND METHODS

Cohort

We obtained data from the Survival, Epidemiology, and End Results (SEER)–Medicare files for patients who underwent surgical resection of stage I, II, or III invasive colon or rectal adenocarcinoma between 2001 and 2009.[15] Notably, for rectal cancer patients treated with neoadjuvant radiochemotherapy, we included only patients with documented pathologically staged disease. In addition, to identify surveillance for CRC only, we excluded patients for whom CRC was not the first primary cancer or who were diagnosed with any other cancer. To fully capture claims, patients were also excluded if they were enrolled in a health maintenance organization or were not enrolled in Medicare Parts A and B for at least 1 year before their diagnosis or for any time during the follow-up period. We excluded patients younger than 66 years or older than 99 years. Individuals younger than 65 years who are covered under Medicare are disabled or have end-stage renal disease. Because of their unusual characteristics, we did not include them in our analysis.

Surveillance

Subjects were considered to have had sufficient surveillance according to the existing literature and the ASCO and NCCN guidelines if they received the following services during the first 3 surveillance years: 1) 2 office visits per year; 2) 1 CT scan of the chest, abdomen, and pelvis per year; and (c) 1 total colonoscopy. In addition, subjects were required to have at least 2 blood tests for CEA per year for the first 2 surveillance years. We recognize that the use of CT was not included in surveillance recommendations until 2005, and the imaging guidelines apply only to stage III patients and select stage II patients. Nevertheless, to compare the use of surveillance in a uniform manner across all years and stages, we used this common definition of sufficient surveillance for all stage I, II, and III patients. Sufficient nonimaging surveillance, defined by the same criteria minus the CT scans, was also explored.

In the published guidelines, yearly CT surveillance is recommended for all stage III patients and stage II patients with high-risk features.[8,9] Risk factors that we could identify from the SEER data were the grade of disease (well, moderately, and poorly differentiated or undifferentiated) and the number of lymph nodes evaluated. We defined a high-risk stage II cohort as patients with poorly differentiated or undifferentiated tumors or with fewer than 12 lymph nodes identified in the surgical specimen. We analyzed rates of CT use in this group separately.

To avoid capturing tests performed for diagnosis rather than surveillance, eligibility for surveillance started 6 months after the operation. The surveillance periods were defined as year 1 (postoperative months 7-18), year 2 (postoperative months 19-30), and year 3 (postoperative months 31-42). We searched claims in the Medicare National Claims History, outpatient, and Medicare Provider Analysis and Review files to identify relevant *Current Procedural Terminology* and *International Classification of Diseases, Ninth Revision* codes for surveillance tests (Table 1). We counted office visits as surveillance only if the provider specialty code associated with the visit indicated a primary care, oncologic, or surgical specialty because these are the specialties typically involved in CRC surveillance. Codes for the same service on the same day identified in more than 1 file were counted only once to avoid duplications.

Claims data were available from January 1, 2000 through December 31, 2010. Patients were included in each surveillance period–specific analysis only if they had follow-up for the entire time period being studied. For example, for 1-year surveillance, we included patients who had at least 18 months of follow-up from surgery to December 31, 2010. Thus, only patients who had surgery before July 2007 were included in analyses of 3-year surveillance. In addition, recognizing that patients at the end of life may have had different patterns of care, we included for analysis only patients who survived for 3.5 years after surgery or, for those diagnosed after August 2008, were alive at the end of the survival follow-up (February 28, 2012).

Finally, in an effort to identify testing used only for surveillance, we excluded patients with evidence of

TABLE 1. ICD-9 and CPT Codes for Identifying Surveillance Items

Category	CPT/HCPCS Codes	Description
Office visits	99201-99215, 99214-99245	Office visits
Colonoscopy	44388	Colonoscopy through stoma; diagnostic, with or without collection of specimen
	44389	Colonoscopy through stoma, with biopsy, single or multiple
	44392	Colonoscopy through stoma, with removal of tumor(s), polyp(s), or other lesions by hot biopsy forceps or bipolar cautery
	44393	Colonoscopy through stoma; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique
	44394	Colonoscopy through stoma; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
	45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure)
	45380	Colonoscopy, flexible, proximal to splenic flexure; with biopsy, single or multiple
	45383	Colonoscopy, flexible, proximal to splenic flexure; with ablation of tumor(s), polyp(s), or other lesion(s) not amenable to removal by hot biopsy forceps, bipolar cautery or snare technique
	45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery
	45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
	45391	Colonoscopy, flexible proximal to splenic flexure with endoscopic ultrasound examination
	G0105	Colorectal cancer screening; colonoscopy on individual at high risk
	G0120	Colorectal cancer screening; alternative to G0105, screening colonoscopy, barium enema
	G0121	Colorectal cancer screening; colonoscopy on individual not meeting criteria for high risk
CEA	82378	CEA
CT imaging	71250	CT thorax, without contrast
	71260	CT thorax, with contrast
	71270	CT thorax, without contrast followed by contrast
	71275	CT thorax—angiography
	74150	CT abdomen, without contrast
	74160	CT abdomen, with contrast
	74170	CT abdomen, without contrast followed by contrast
	74176	CT abdomen and pelvis, without contrast
	74177	CT abdomen and pelvis, with contrast
	74178	CT abdomen and pelvis, without contrast followed by contrast
	72192	CT pelvis, without contrast
	72193	CT pelvis, with contrast
	72194	CT pelvis, without contrast followed by contrast

Abbreviations: CEA, carcinoembryonic antigen; CPT, *Current Procedural Terminology*; CT, computed tomography; HCPCS, Healthcare Common Procedure Coding System; ICD-9, *International Classification of Diseases, Ninth Revision*.

recurrent disease during the 3.5-year surveillance period. Laboratory testing and imaging studies are likely used more frequently during the workup and treatment of recurrence and would have inflated the surveillance rate if they had been included in the analysis. Recurrence was defined as the presence of codes for chemotherapy beginning 1 year after surgical treatment. Adjuvant therapy should be complete within 1 year of surgery, so chemotherapy outside this window was used as a marker for recurrence.

Analysis

Patients' receipt of each type of surveillance service was measured as a binary indicator variable (yes/no) and modeled with logistic regression as a function of the year of diagnosis (measured as a set of binary indicators) and a set of patient characteristics. The patient characteristics included the cancer site (colon or rectal), sex, age, race/ethnicity, marital status, and Charlson comorbidity score (calculated on the basis of claims occurring during the 1 year before the index resection).[16,17] We calculated adjusted annual proportions of surveillance receipt by diagnosis year from the logistic regression results separately for individual surveillance procedures for postoperative surveillance years 1, 2, and 3.

We also compared the adjusted annual proportions of patients receiving sufficient surveillance (according to the aforementioned definitions) before and after the 2005 change in surveillance CT guidelines. For selected outcomes, we calculated average annual rates of change as slope coefficients from linear models of the adjusted surveillance proportions regressed on a linear trend based on

TABLE 2. Patient Demographics by Stage of Disease

	Overall	Stage I	Stage II	Stage III	*P*
Cancer site, % (No.)					<.001
Rectal	19 (5665)	25 (2847)	14 (1579)	18 (1239)	
Colon	81 (23,990)	75 (8584)	86 (9904)	82 (5502)	
Sex, % (No.)					<.001
Female	58 (17,333)	57 (6474)	61 (6965)	58 (3894)	
Male	42 (12,322)	43 (4957)	39 (4518)	42 (2847)	
Marital status, % (No.)					<.001
Not married	48 (14,157)	45 (5189)	50 (5797)	47 (3171)	
Married	52 (15,498)	55 (6242)	50 (5686)	53 (3570)	
Charlson comorbidity index score, % (No.)					<.001
0	59.5 (17,639)	59.4 (6788)	58.6 (6729)	61.2 (4122)	
1	23 (6845)	23.2 (2653)	23.5 (2693)	22.2 (1499)	
2	8.3 (2451)	8.8 (1007)	8.0 (922)	7.7 (522)	
3+	9.2 (2720)	8.6 (983)	9.9 (1139)	8.9 (598)	
Age, % (No.)					<.001
66–70 y	21 (6197)	22.6 (2583)	19 (2127)	22 (1487)	
71–75 y	24 (7023)	25.2 (2875)	22 (2538)	24 (1610)	
76–80 y	24 (7229)	24.9 (2852)	24 (2785)	24 (1592)	
81–85 y	19 (5708)	17.6 (2014)	21 (2413)	19 (1281)	
86+ y	12 (3498)	9.7 (1107)	14 (1620)	11 (771)	
Race/ethnicity, % (No.)					<.001
White	83.6 (24,791)	84.2 (9619)	84.4 (9690)	81.4 (5482)	
Black	6.3 (1867)	6.0 (686)	6.3 (720)	6.8 (461)	
Hispanic	4.4 (1294)	4.1 (469)	4.3 (493)	4.9 (332)	
Asian	4.0 (1174)	3.8 (438)	3.5 (405)	4.9 (331)	
Unknown	1.7 (529)	1.9 (219)	1.5 (175)	2.0 (135)	
Sample size, n	29,655	11,431	11,483	6741	

the year of diagnosis. Specific annual surveillance proportions were compared between years with Wald tests.

Notably, we analyzed colon cancer and rectal cancer separately and together. The trends and rates of surveillance were almost identical for colon and rectal cancers, so only results based on the combined data are presented here. The study was approved by the the Hospital of the University of Pennsylvania IRB.

RESULTS

We identified 23,990 colon cancer patients and 5665 rectal cancer patients with stage I, II, or III disease who underwent surgical resection between 2001 and 2009 and survived, without evidence of recurrence, at least 3.5 years or to the end of follow-up (Fig. 1). The mean age of patients in the cohort was 76.6 years; 38.5% had stage I disease, 38.7% had stage II disease, and 22.7% had stage III disease. The characteristics of the cohort by disease stage are shown in Table 2.

Office Visits

Most patients met the recommendations for office visits (Fig. 2A). Over the study period, there were no significant changes over time in the rates of office visits among stage I ($P = .72$), stage II ($P = .59$), or stage III patients ($P = .49$). Overall, stage III patients received recommended office visits 78.5% of the time versus 69% and 67% for stage II and stage I patients, respectively ($P < .001$).

Colonoscopy

Similarly high and stable rates of adherence were seen for surveillance colonoscopy, but there was little difference between stages (Fig. 2B). Among stage I patients, 76% in 2001 and 77% in 2007 underwent colonoscopy within the 3-year surveillance period. The rates were essentially the same for stage II and III patients (73.2% and 73.1% overall, respectively).

CEA

Adherence to CEA testing was lower in comparison with office visits and colonoscopy for all stages, although rates increased over the study period (Fig. 2C). In 2001, 44% of stage III patients met recommended CEA surveillance, whereas 54% did in 2008; this indicated an average increase of 1.7 percentage points per year ($P < .001$). Among stage II patients, 26% of patients diagnosed in 2001 and 38% of patients diagnosed in 2008 received sufficient CEA screening; this meant an average increase of 1.5 percentage points per year ($P < .001$). Although the rates were lower, a similar trend was seen in stage I patients. Use of CEA testing was significantly higher in stage III patients versus stage II patients ($P < .001$). Stage

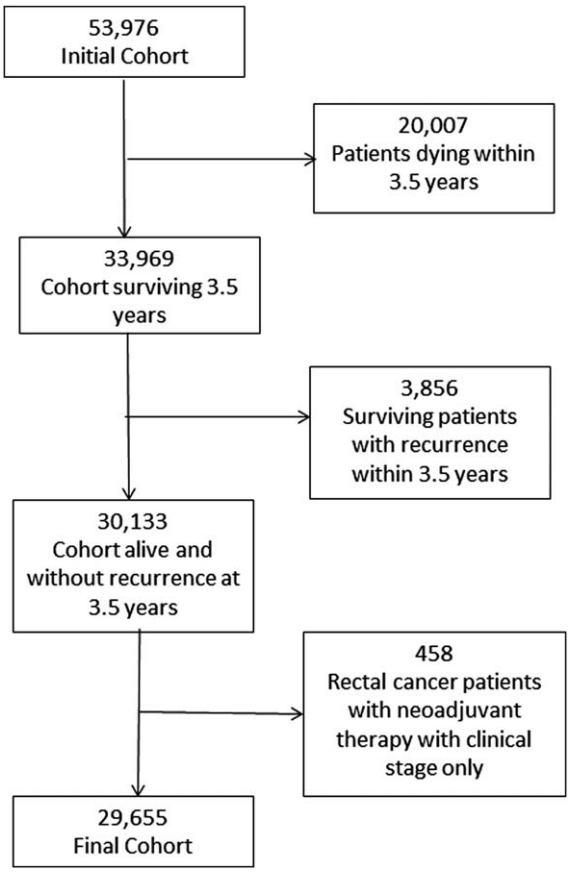

Figure 1. Flowchart demonstrating cohort creation.

I patients had the lowest rates of CEA testing, although almost 20% underwent at least 2 CEA tests per year for the first 2 years of surveillance.

CT

CT use varied by stage of disease (Fig. 3). Over the study period, 52% of stage III patients underwent CT in surveillance year 1, whereas 37% of stage II patients and 26% of stage I patients did ($P < .001$). Only 18% of stage III patients, 9% of stage II patients, and 5% of stage I patients underwent at least 1 CT scan per year for 3 years ($P < .001$).

We also compared rates of CT surveillance between stage III patients and high-risk stage II patients before and after the 2005 inclusion of CT in the national surveillance guidelines (Fig. 4). From 2005 to 2009, 58% of stage III patients underwent a CT scan in surveillance year 1, whereas 46% of high-risk stage II patients did ($P = .005$). During the same time period, 22% of stage III patients received sufficient CT imaging for all 3 years, whereas 11% of high-risk stage II patients did ($P < .001$).

There was a significant increase in the use of CT between 2001 and 2009, most notably in stage III patients (Fig. 3). CT surveillance in year 1 increased on average by 1.2, 1.6, and 1.9 percentage points per year for stage I, II, and III patients, respectively ($P < .001$ for each). Similar trends were seen for years 2 and 3. The proportion of patients undergoing at least 1 CT scan per year for all 3 years also increased during the study period. In 2001, 13% of stage III patients underwent at least 1 CT scan per year for 3 years, whereas 27% did in 2007; this translated into an average increase of 2.4 percentage points per year ($P < .001$).

We also analyzed the difference in CT use by diagnosis year versus the baseline year of 2004, the year before the inclusion of CT surveillance in the guidelines (Fig. 3). The sizes of the differences between 2001 and 2004 and between 2004 and 2007 were similar. For example, in stage III patients, receipt of 3-year sufficient CT surveillance increased by 7.5 percentage points from 2001 to 2004 ($P < .001$). From 2004 to 2007, the increase was 7.2 percentage points ($P = .025$). Similar trends were seen in the rate of CT use for individual surveillance years.

Overall Surveillance

The rate of sufficient nonimaging surveillance (office visits plus colonoscopy and CEA) was low but increased modestly between 2001 and 2007 (Fig. 5A). In all years, stage III patients received sufficient nonimaging surveillance significantly more frequently than stage II or I patients. Between 2001 and 2007, sufficient nonimaging surveillance increased annually by 1.2 percentage points for stage III disease ($P = .001$), 1.0 percentage points for stage II disease ($P < .001$), and 0.8 percentage points for stage I disease ($P < .001$).

To assess adherence to the 2005 guideline changes, we analyzed rates of sufficient surveillance with the inclusion of CT for patients diagnosed in 2005 or later (Fig. 5B). Sufficient surveillance declined significantly across all stages when CT was included, and this indicated poor adherence to the imaging recommendations. From 2005 to 2007, after CT was included, roughly 15% to 20% of stage III patients and 5% to 10% of stage II patients received sufficient surveillance.

DISCUSSION

Using the SEER-Medicare linked database, we examined CRC surveillance trends in the United States. Rates of office visits were high and remained steady over time. The rates of office visits reported here are slightly lower than those in other published studies,[2,12-14] likely because we included only office visits associated with codes for primary care, oncologic, or surgical specialties. Encouragingly, rates of surveillance colonoscopy were also high and steady.

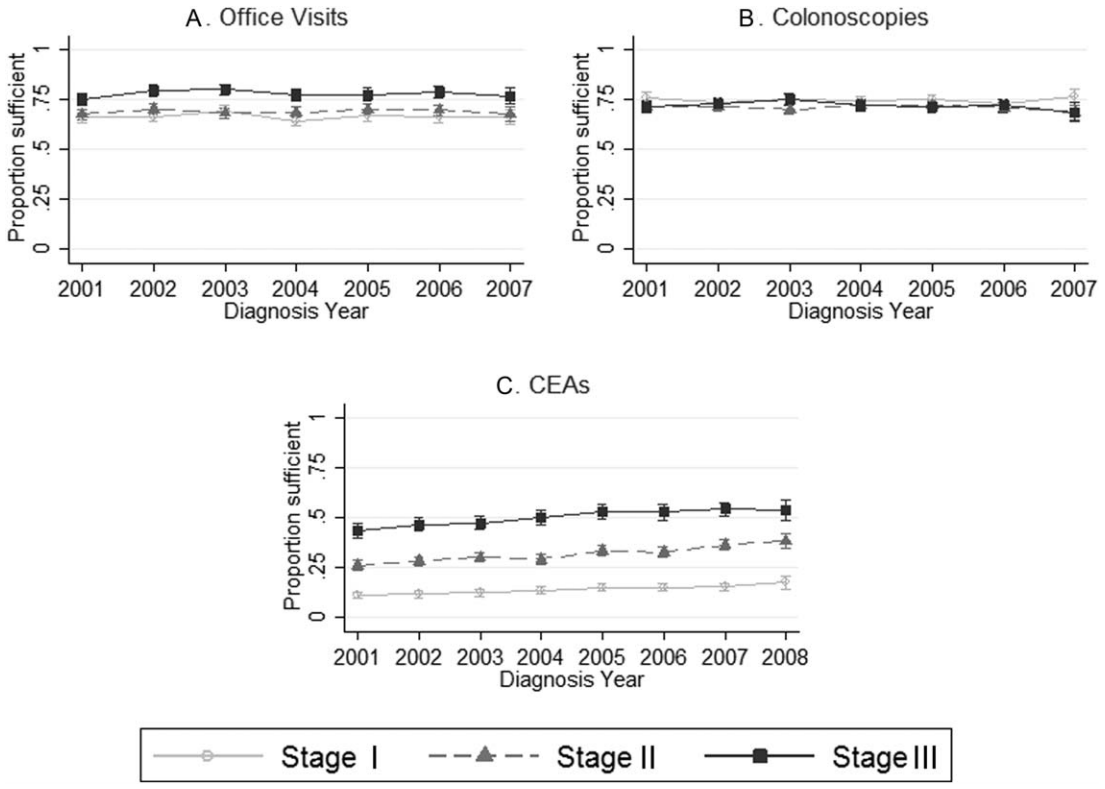

Figure 2. Adjusted sufficient nonimaging surveillance (office visits, colonoscopy, and CEA) by diagnosis year and stage. CEA indicates carcinoembryonic antigen.

Rates of CEA testing were relatively low but rising. The use of CT increased substantially over the study time period but remained well below guideline recommendations.

Rates of sufficient surveillance and sufficient nonimaging surveillance increased gradually but remained low for stage II and III disease, especially when CT imaging was included in the definition. The surveillance guidelines are most explicit for stage III CRC, and this patient population, not surprisingly, received surveillance testing at much higher rates than the stage I and stage II populations. Even among stage III patients, however, only 20% of patients diagnosed after 2005 received sufficient surveillance at 3 years.

To our knowledge, no other study has examined the rate of CT surveillance around the 2005 guideline change. Our results show a gradual increase in the rates of CT imaging across all disease stages between 2001 and 2009, with no abrupt increase noted after 2005. In fact, there was a greater increase in CT use during 2001-2004 than 2004-2007, and this suggests that the increase was potentially driven by easier access to CT scans rather than a response to changing guidelines.

We also looked at the use of surveillance in stage I and stage II patients, who constitute the majority of the survivor population but for whom surveillance guidelines are less specific. The guidelines for CEA, colonoscopy, and office visit surveillance for stage II patients are the same as those for stage III patients.[8,9] In 2007, however, stage II patients were almost half as likely as stage III patients to receive sufficient nonimaging surveillance.

The NCCN guidelines recommend annual CT surveillance for stage II patients with a high risk of recurrence, which includes poorly differentiated histology, <12 lymph nodes examined, lymphovascular invasion, perineural invasion, perforation, and close margins.[8,9] To evaluate this, we examined surveillance in stage II patients and used differentiation and nodal examination as a proxy for recurrence risk; we recognize that in practice other factors listed previously also play a role. The rate of imaging surveillance for patients with high-risk stage II disease was well below that for patients with stage III disease. Because stage II patients make up almost 40% of the CRC survivor population, further studies elucidating the patterns of surveillance based on specific patient and tumor characteristics in this population would be warranted. If even high-risk stage II patients are receiving surveillance at such low rates, perhaps

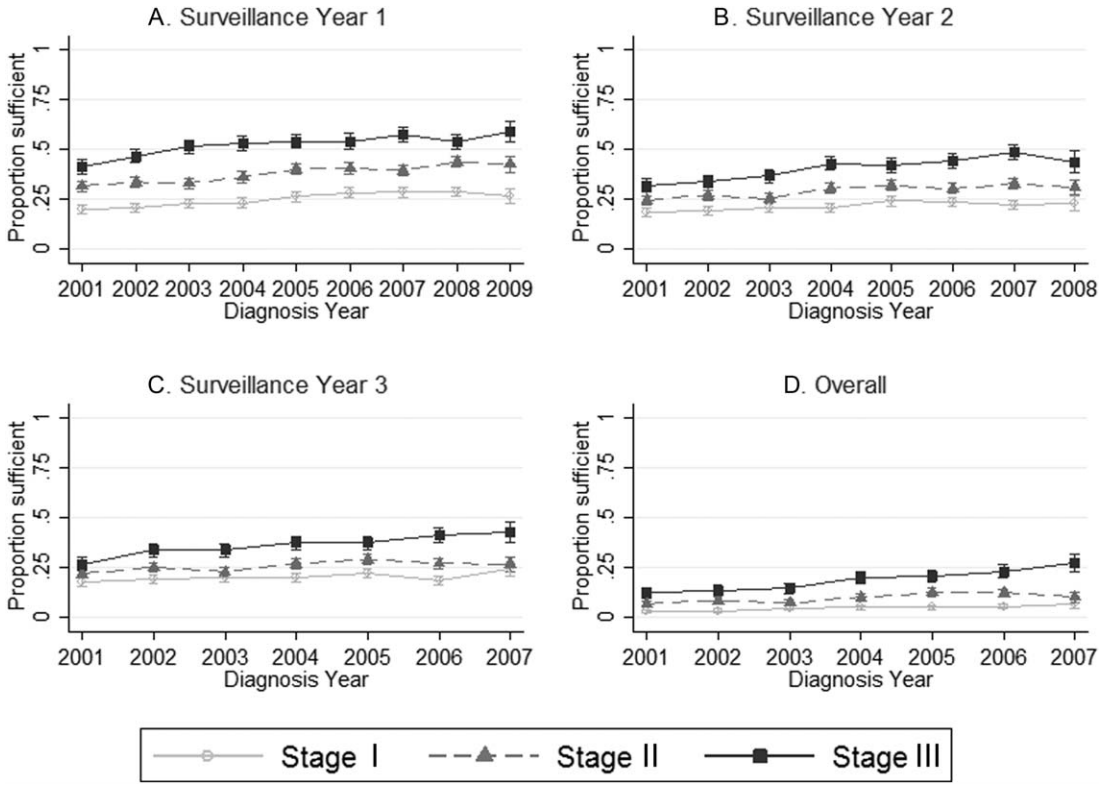

Figure 3. Adjusted sufficient computed tomography by stage, diagnosis year, and surveillance year.

clarification of the guidelines with specific recommendations for subgroups of stage II patients is needed.

Stage I patients make up more than one-third of the CRC survivor population, but recommendations for their surveillance care are limited. The 2013 ASCO update specifically notes that the guidelines do not apply to stage I patients. As expected, far fewer stage I patients underwent surveillance testing than stage II or III patients did. Our results show, however, that up to 30% of stage I patients underwent CT scanning and CEA testing in surveillance year 1. To prevent potential overuse or underuse of care and to better guide providers caring for stage I patients in the survivorship period, additional research is needed to determine the benefits (if any) and costs of intensive surveillance in these low-risk patients.

Our study is limited by reliance on administrative claims data. We cannot know for certain the actual indication for the surveillance tests identified. If some of the items captured were diagnostic and were not for surveillance, the already low rates of surveillance that we have demonstrated would be upper bound estimates, and the true rates would be even lower. In addition, patients who were morbidly ill from their cancer or other causes may have received more or less surveillance testing because their care was driven by their overriding medical condition. As such, we limited our analyses to those patients who survived at least 3.5 years or to the end of our study period to capture surveillance tests more accurately. In addition, our analysis is limited to only those patients at least 66 years of age who were covered by Medicare. Surveillance patterns for CRC in those younger than 66 years or in those with private insurance may look very different than those in elderly Medicare patients. Despite this, the median age of CRC diagnosis in the general population is 69 years, and well over 50% of patients diagnosed with the disease are >65 years old, so these observations are applicable to a majority of the CRC patient population.[18] In addition, Medicare covers 93% of the population older than 65 years, and almost 50% are covered only by Medicare.[19] Thus, although patterns for the privately insured may differ, our study sample represents a substantial subset of the CRC patient population.

In conclusion, despite an absence of formal guidelines for surveillance care among patients with resected stage I CRC, many of these patients have undergone intensive surveillance, including annual CT imaging. Currently, the impact of intensive surveillance on stage I CRC is unclear. Intensive surveillance could be beneficial in

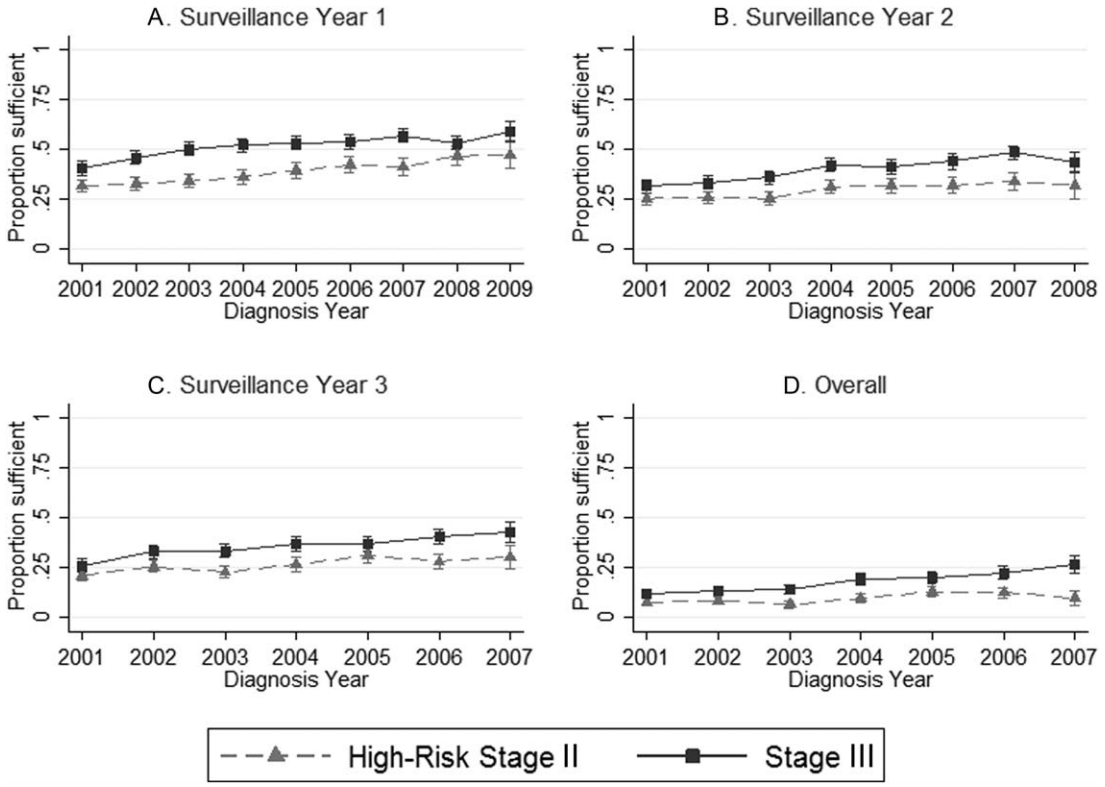

Figure 4. Adjusted sufficient computed tomography for high-risk stage II patients versus all stage III patients by diagnosis year and surveillance year.

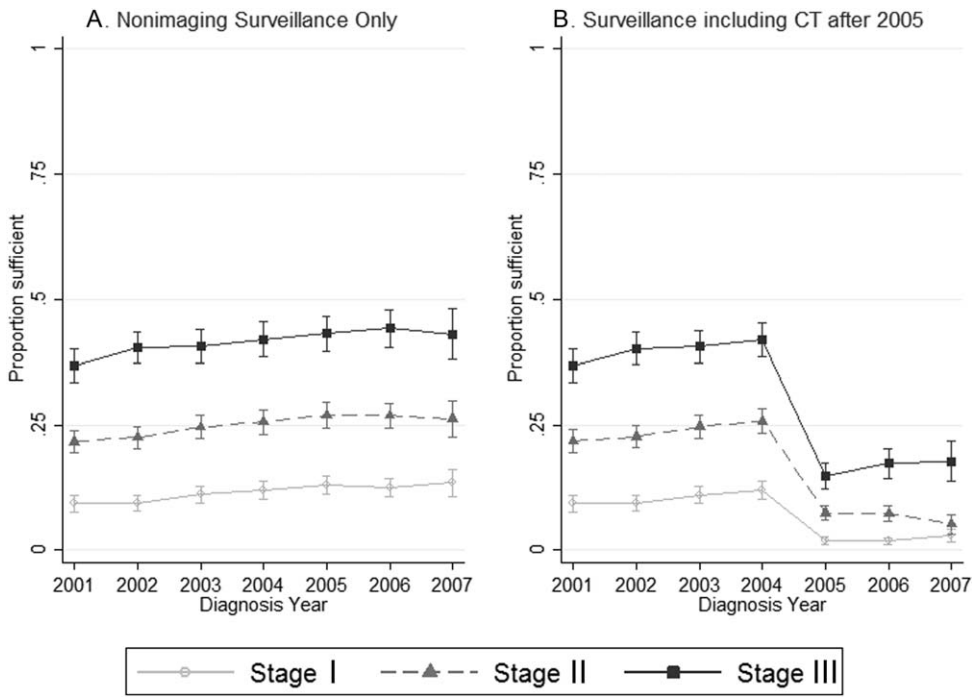

Figure 5. Three-year adjusted sufficient surveillance by diagnosis year and stage. CT indicates computed tomography.

improving overall survival through the detection of early disease recurrence or second primary CRC. Conversely, it could be harmful by leading to invasive tests that would otherwise not be performed and potentially increasing morbidity and health care costs. Additional research is needed to determine optimal surveillance care for patients with stage I CRC, especially because they make up more than a third of the CRC survivor population.

Rates of recommended surveillance care were significantly lower among stage II CRC patients (even high-risk stage II patients) versus stage III patients. This gap between guideline-recommended care and actual care is concerning because very few stage II patients receive sufficient surveillance with its attendant benefits. Perhaps more explicit guidelines are needed for the population of stage II CRC patients for whom intensive surveillance, including CT imaging, is thought to be beneficial. Finally, even among stage III CRC patients, for whom guidelines are the clearest, the rates of sufficient surveillance were notably low despite a modest increase in use over the study period.

In an effort to address low rates of surveillance, the Commission on Cancer recently advocated the development of survivorship care plans created by the treating cancer specialists.[10] The commission recommends that cancer providers deliver explicit plans, including surveillance goals, to patients and, if necessary, patients' primary providers in an effort to guide patients' survivorship care, even when they are not, or cannot, be followed by their specialty cancer providers. Perhaps adoption of such a practice as a quality measure in cancer care will lead to an increase in the low rate of guideline-adherent surveillance.

Although formal guidelines and specific care plans may help providers deliver adequate surveillance, there are likely other challenges in the provision of guideline-concordant care. Systems factors such as ease of obtaining surveillance testing, patient factors such as age, race, and socioeconomic status, and geographic limitations likely all contribute to the low rates of surveillance among CRC survivors. Personalization of surveillance care by disease stage and recurrence risk, in addition to further identification of specific, modifiable barriers to guideline-concordant surveillance, is also needed to improve adherence to recommended surveillance in this large and growing population of cancer survivors

FUNDING SUPPORT

This study was supported by the National Cancer Institute (Cancer Center Support Grant P30 CA016520) and the Abramson Cancer Center Population Science Pilot Project.

CONFLICT OF INTEREST DISCLOSURES

Anil Vachani reports grants from Integrated Diagnostics, Transgenomic, Janssen Research & Development, and Allegro Diagnostics.

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