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Coordination of Care Around Surgery for Colon Cancer: Insights from National Patterns of Physician Encounters with Medicare Beneficiaries

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Abstract

Background: To improve care coordination for complex cancers, it is critical to establish a more nuanced understanding of the types of providers involved. As the number of provider types increases, strategies to support cancer care coordination must adapt to a greater variety of information needs, communication styles, and treatment strategies.

Methods: We categorize providers into 11 types, using National Provider Identifier specialties. Using Medicare claims, we count the number of unique combinations of provider types billed during preoperative, operative, and post-discharge care around colon cancer surgery, and assess how this count varies across hospitals. The study included 70,567 beneficiaries in fee-for-service Medicare A and B for six months prior and 60 days after, an admission for colectomy for colon cancer between 2008–2011.

Results: We observed 1,554 pre-operative provider-type combinations, 975 operative combinations, and 1,571 post-discharge combinations. The 3 most common combinations in the preoperative phase were: general medicine only; other medical specialists only; and general medicine and other medical specialists. In the operative phase: primary surgery, anesthesiology, and pathology; general medicine, other medical specialists, radiology, primary surgery, anesthesiology, and pathology; and other medical specialists, radiology, primary surgery, anesthesiology, and pathology. In the post-discharge phase: general medicine; general medicine and other medical specialists, and general medicine and oncology. On average, each hospital had 15 pre-operative, 11 operative, and 15 post-operative combinations. High volume, larger, teaching, urban, and non-critical access hospitals had more combinations in all phases.

Conclusion(s): A large number of provider-type combinations are involved in colon cancer surgery care. Substantial variation exists across hospitals types, suggesting that certain hospitals need additional resources and more flexible infrastructure to coordinate care.

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Background

Care coordination during cancer treatment is associated with a range of benefits, including fewer emergency department visits and duplicative services, increased patient satisfaction, and better disease management.[1] Coordination failures are common and occur when complete, timely, and usable information is not available when needed.[2] A variety of policy initiatives have sought to improve care coordination, but significant shortcomings remain, leading to deficiencies in efficiency, effectiveness, and safety of care.[3,4]

Care coordination around surgery for cancer is particularly challenging because a variety of activities— including preoperative workup and staging, operative procedures and pathology findings, and adjuvant therapy or surveillance— are conducted by multiple physicians across specialties, institutions, and locations.[5–7] As the types of physicians sharing in care increase, the information that needs to be communicated and synthesized also increases,[8] leading to more opportunities for failures. Prior work has found that the burden of care coordination is high; a typical primary care physician must coordinate care with 229 physicians across 117 practices annually.[5,7] Our study expands on this work by measuring the number and variation of *unique combinations of provider types* involved in care episodes.

Efforts to implement care coordination improvements are currently limited by a lack of understanding of coordination needs, specifically an understanding of variation in the types of providers involved in care for a patient population.[9] Drawing an a framework developed by Zapka et al, we conceptualize that many provider types are involved in cancer care, both within and across treatment phases (Figure 1).[10] To the extent that provider-type combinations differ for patients receiving care from a single organization, information coordination challenges for that organization may increase. In cancer surgery, for example, if the types of providers involved in care are relatively uniform across patients, information sharing for care coordination may be more easily routinized (for example, by sending a standardized document from the preoperative workup to the surgeon). If instead, providers types are highly variable, information-sharing approaches must be flexible to accomodate differences in documentation, treatment strategies, and communication styles that stem from differences in provider-type expertise.[11–13] For example, the type of information that a surgeon sends to a family practice physician may be different from what an oncologist requires.

To better understand how information needs for care coordination vary in complex surgical care, we focus on colectomy for colon cancer. We use Medicare claims to measure how frequently different combinations of provider types are involved in three care phases: preoperative, operative, and post-discharge. We measure variation in these combinations at the hospital level (where the surgery occurred) to assess whether certain types of hospitals have greater information needs and may therefore face greater challenges to implementing care coordination improvements. Taken together, our results offer a critical step towards understanding how to improve care coordination for cancer care by capturing variation in the types of providers whose information needs must be coordinated.

Methods

Data and Study Population

We used national Medicare claims from the Medicare Provider Analysis and Review (MedPAR) file. We obtained hospital characteristics from the 2014 American Hospital Association Annual Survey.

Our study included all colon cancer patients (ICD-9 153.X and 154.0) who underwent colectomy (ICD-9 17.3X, 45.7X, and 48.X) in U.S. hospitals between January 2008 and December 2011. We included beneficiaries 66 years and older with continuous enrollment in fee-for-service Medicare Parts A and B six months prior and 60 days after a colectomy. We then determined the hospital where the colectomy was performed and the provider types involved in care.

We focused on colectomy for cancer because colon cancer is the second-most common solid organ malignancy and involves multimodal therapy.[14] Colectomy is common, conducted in nearly all acute-care hospitals, by general and specialist surgeons, electively or as an emergency, and is responsible for the largest share of complications in major general surgery.[15] Management of colon cancer surgery requires integration of information from multiple phases. In the preoperative phase, diagnostic tests are conducted and forwarded to the operating physician. The operative phase reveals intraoperative findings and pathologic staging, and potentially postoperative medical and surgical complications, which may require ongoing treatment or evaluation after discharge. In the post-discharge phase, the operating physician forwards their report to the follow-up provider, including recommendations for ongoing management, adjuvant therapy, and surveillance.

Outcome

We evaluated care patterns in three stages: preoperative (30 days before the operation), operative (index hospitalization), and post-discharge (60 days after discharge). We identified provider specialties using their NPI's primary taxonomy code, with two exceptions. For providers whose primary code was "Specialist" or "Internal Medicine," we used the secondary code. We grouped providers into 11 types: primary surgery (i.e., general surgeons, colon and rectal surgeons, surgical oncologists, critical care surgeons, vascular surgeons, and trauma surgeons), other surgery (i.e., all other surgeons), general medicine (i.e. general medicine and primary care), emergency medicine, gastro-intestinal specialties, oncology, other medical specialties, pathology, laboratory/radiology facilities, anesthesiologists, and ancillary providers, dropping other provider types (i.e. chiropractors, dental providers, transportation services, etc.) from the analysis (definitions available upon request).

Analytic Approach

We calculated how frequently each provider type appeared in each phase. Next, we determined the most frequent *combinations* of providers types in each phase. Finally, to assess whether the bulk of patients saw the same few combinations, we calculated the number of combinations that accounted for 80%, 60%, 40% and 20% of patients both at the national and hospital level.

To understand how coordination needs vary across hospital types, we assessed the association between hospital characteristics and the number of provider-type combinations. We selected characteristics that influence access to different provider types— teaching status (membership in the Council of Teaching Hospitals and Health Systems and accreditation by the Accreditation Council for Graduate Medical Education), size (beds), urbanicity (Core Based Statistical Area type), and critical access status.

We conducted three sensitivity analyses. With the exception of “other medical specialty”, each provider type in our study is expected to be involved in colectomy care (either directly providing care, or indirectly coordinating care). We re-ran analyses without “other medical specialities” to ensure that our results were not meaningfully influenced by their inclusion. Second, to see how care coordination needs may differ between elective versus emergency cases, we re-ran our analyses, dropping patients whose colectomies were not elective. Finally, our “primary surgery” group includes surgeons who specialize in surgery for colon cancer, and “other primary” surgeons who may perform colectomy routinely, but do not specialize in colon cancer care. To see how provider-type combinations differ between subgroups of operating providers, we re-ran our analyses for the subset of patients who had claims from colorectal or oncology surgeons and not “other primary” surgeons during the index hospitalization, and for the subset of patients who had claims from “other primary” surgeons and not colorectal or oncology surgeons during the index hospitalization.

Results

Our sample included 70,567 Medicare beneficiaries who underwent colectomy in 3,537 U.S. hospitals. Of these, 3,164 hospitals (89%) were successfully matched to the AHA Annual Survey.

Provider Types

The five most common provider types in each phase, agnostic to combinations, follows. In the preoperative phase: radiology (67% of patients), general medicine (65%), other medical specialties (62%), primary surgery (56%), and pathology (40%). In the operative phase: anesthesiology (95%), primary surgery (92%), pathology (89%), radiology (70%), and other medical specialties (64%). In the post-discharge phase: general medicine (73%), other medical specialties (59%), radiology (56%), oncology, and laboratory/radiology facilities (40%).

The top 20% most commonly billed provider-type *combinations* are reported in Figure 2. In the preoperative phase, 4% of patients had claims from general medicine only; 3% other medical specialties only; 2% general medicine, other medical specialties, primary surgeons, and radiology; and 2% both general medicine and other medical specialties. In the operative phase, 8% of patients had claims from primary surgery, pathology, and anesthesiology; 7% primary surgery, pathology, anesthesiology, other medical specialties, radiology, and general medicine; 4% primary surgery, pathology, anesthesiology, other medical specialties, and radiology; 4% primary surgery, pathology, anesthesiology, and general medicine; and 4% primary surgery, pathology, anesthesiology, radiology, and general medicine. In the post-discharge phase, 5% of patients had claims from general medicine only, 4% general

medicine/primary care and other medical specialties, 3% general medicine/primary care and oncology, 2% oncology only, and 2% other medical specialties only.

Number of Provider-Type combinations

At the national level, 1,554 provider-type combinations appeared in the preoperative phase, 975 in the operative phase, and 1,571 in the post-discharge phase (Table 1). When limited to the most common combinations responsible for 80% of patients, 227 combinations appeared in the preoperative phase, 72 in the operative phase, and 182 in the post-discharge phase (Table 1).

At the hospital level, the average number of provider-type combinations was 15 (SD: 14.88) in the preoperative phase, 11 (SD: 9.94) in the operative phase, and 15 (SD: 14.41) in the post-discharge phase (Table 1). When limited to the most common combinations for 80% of patients, the average number of combinations were: 12 (SD: 10.85) in the preoperative phase, 8 (SD: 6.09) in the operative phase, and 12 (SD: 10.44) in the post-discharge phase (Table 1).

The number of provider-type combinations varied with hospital characteristics for all three phases ($p<0.001$ for all characteristics). Hospitals in the highest tertile of volume had more combinations than the second and first tertile (preoperative: 30, 15, and 6 respectively; operative: 21, 13, and 5; and post-discharge, 29, 15, and 6; Table 2). Large hospitals had more combinations than medium and small (preoperative: 36, 18, and 5 respectively; operative: 24, 15, and 4; and post-discharge: 34, 19, and 5; Table 2). Major and minor teaching hospitals had more combinations than non-teaching (preoperative: 33, 21, and 10 respectively; operative: 21, 16, 8; and post-discharge: 31, 21, 10; Table 2). Hospitals in metropolitan and micropolitan areas had more combinations than rural areas (preoperative: 20, 10, and 4 respectively; operative: 15, 8, 4; and post-discharge: 20, 11, 4; Table 2). Critical access hospitals had fewer combinations than non-critical access (preoperative: 3 and 17 respectively, operative: 3 and 13, post-discharge 3 and 17; Table 2).

Sensitivity Analysis

When we dropped “other medical specialists” from the analysis (Online Table 1), the number of combinations representing 100% of patients at the national level dropped from 1,554 to 916 in the preoperative phase, 975 to 622 in the operative phase, and 1,571 to 939 in the post-discharge phase. At the hospital level, the average number of combinations decreased from 15 to 14 in the preoperative phase, 11 to 10 in the operative phase, and 15 to 13 in the post-discharge phase. When limited to elective surgeries (Online Table 2), the number of combinations representing 100% of patients at the national level dropped from 1,554 to 1,329 in the preoperative phase, 975 to 711 in the operative phase, and 1,571 to 1,374 in the post-discharge phase. At the hospital level, the average number of combinations increased from 15 to 21 in the preoperative phase, 11 to 13 in the operative phase, and remained at 15 in the post-discharge phase. When limited to surgeries conducted by colorectal and/or oncology surgeons compared to “other primary” surgeons (Online Table 3), we found that the number of combinations representing 100% of patients at the national level was 1,168 for colorectal and oncology surgeons compared to 1,537 for “other primary”

surgeons in the preoperative phase, 317 compared to 564 in the operative phase, and 1,139 compared to 1,603 in the post-discharge phase. At the hospital level, the average number of combinations was 20 for colorectal and oncology surgeons compared to 21 for “other primary” surgeons in the preoperative phase, 11 compared to to 14 in the operative phase, and 20 compared to 21 in the post-discharge phase.

Discussion

We examined combinations of provider types involved in colectomy for colon cancer. We found that, although some provider types are commonly involved in each phase of care, many provider-type *combinations* are present within each phase. While the former is unsurprising, the latter suggests substantial variation in information needs exist as physicians are expected to coordinate across many different provider-types combinations. For example, in 8% of cases, follow-up providers have to obtain information from surgeons, pathologists, and anesthesiologists. In another 4% of cases, providers have to obtain information from those three provider types as well as medical specialists and radiologists. In all cases, providers must know who to obtain information from and how to integrate the information into their care plan.[16] Our sensitivity analyses suggest that high variation persists even between subgroups of patients (elective versus all cases) and subgroups of operating providers (colorectal and oncology surgeons versus all “other primary” surgeons).

Variation in the number of provider-type combinations can lead to significant information coordination challenges. As variation in the number of provider-type combinations increases, so does the range of information that a provider must gather and integrate for a given patient panel, increasing the complexity involved in information-sharing procedures.[17] This finding has important implications. First, clinicians who regularly provide care for patients undergoing multi-phasal treatments should be aware of the information needs for their own phase of care, as well as subsequent phases so that information can preemptively follow the patient. Relatedly, providers that routinely share patients may wish to strategize about what information is regularly needed, when, and from whom.

We also found that, in the preoperative and post-discharge phases, common provider types did not appear in the same combinations. For example, in the post-discharge phase, general medicine providers, other medical specialists, radiologists, and oncologists each appeared in more than half of patient cases, but they did not appear *together* in the top 20% of combinations. This suggests that patients may be seeing different provider types for the same treatment needs. For example, a patient may receive post-discharge care from a general medicine provider instead of an oncologist. This variation may be driven by underlying factor(s), such as differences in clinical complexity or structural features of the local healthcare system. It follows that strategies to improve coordination should be customized to reflect the treatment and communication styles within sub-groups of providers, as considerable variation may exist in providers’ documentation styles,[11] especially in outpatient settings where preoperative and post-discharge care occurs.[12] From a policy perspective, this finding suggests that information-sharing systems should be designed to promote the exchange of diverse data types to account for a wide range of information needs. For example, many hospitals send a standardized Continuity of Care Document

(CCD) to providers following a discharge. Data contained in the CCD may be adequate for some cases, but not all. Including more types of information in the CCD may accommodate the information needs of a wider variety of follow-up providers.

Compared to the national level, the numbers of combinations at the hospital level were two orders of magnitude smaller. It follows that state and federal policies promoting care coordination should be flexible to allow hospitals to design strategies unique to their patterns of provider-type involvement. For example, Medicare Accountable Care Organizations give providers freedom to choose with whom to share responsibility of care. This approach encourages hospitals to invest in partner-specific information-sharing strategies that can be tailored to accommodate specific coordination needs.[18] Hospitals-level policies can also take into account common provider-type combinations. For example, hospitals with many combinations may find that the industry-standard Health Level Seven International (HL7) CCD template is too rigid for colon cancer surgery patients. These hospitals may wish to adopt CCD templates that contain a wider variety of information.

We also found that the number of combinations varies significantly with hospital characteristics. Hospitals that are more likely to be referral centers (high volume, large, teaching, urban hospitals) have more combinations than low volume, small, non-teaching, rural hospitals. This is not surprising given that these hospitals may also have greater access to, and reason to build relationships with, a wider variety of provider types. These results suggest that hospital types with fewer provider-type combinations are also those that operate under resource constraints (e.g. small, rural, critical access hospitals). For these hospitals, adjusting information-sharing approaches to fit coordination needs of their specific provider-type combinations may be especially challenging. Policy efforts may attenuate these challenges by soliciting feedback from the common provider types identified in this study when developing CCD templates for colectomy.

Finally, this study highlights the need to help *patients* understand the roles of the providers involved in their care in order to improve self-management, empowerment, and communication.[19,20] Patients are often required to shoulder the burden of their own care management; this burden becomes more cumbersome as the number of providers involved in their care increases.

Limitations

Results should be interpreted with limitations in mind. First, our study does not associate provider-type combinations with quality of care or care coordination. Thus, our analysis does not suggest which patterns are associated with *superior* quality, though this is an important question for future research.

Second, our study is based on claims, not clinical, data. While using claims data to study provider networks has been validated,[21,22] it excludes providers not paid by Medicare, including ancillary services providers such as social work, financial counseling, and pastoral care. Therefore, our study may underestimate coordination complexity, especially when viewed from a holistic perspective. The exclusion of commercial claims may explain why expected provider types were missing from some combinations (e.g. 5% of patients were

missing an anesthesiologist during the operative phase). Errors may also stem from NPI misclassification as a provider's assigned specialty may not reflect actual practice. This may be especially true in rural or small hospitals where surgeons routinely conduct procedures outside their specialties.

Third, our goal was to describe complexity in informational aspects of care coordination. To this end, we included provider types that contribute to information complexity, not necessary managerial complexity. For example, radiologists contribute pertinent information, but play a limited role in management.

Finally, the generalizability of our study is limited to care provided to Medicare patients by U.S. providers for one diagnosis. However, we believe colon cancer is useful for understanding coordination needs around cancer surgery because it is common and requires multidisciplinary management across multiple phases of care. Relatedly, we use a 60-day window to define the post-discharge phase, limiting the generalizability of results to perioperative care and not long-term surveillance. However, this window encompasses much of the *intiation* of postoperative care (since adjuvant chemotherapy is typically initiated 8 weeks after an uncomplicated operation).

While not a limitation, we did not examine the number of individual providers, which is a common measure of care continuity.[17,23] As multi-provider settings are becoming more common, providers are regularly sharing care for patients, resulting in an increase in the number of providers seen without necessarily increasing coordination needs. Further, from an information standpoint, multi-disciplinary teams may have higher and more complex information needs than teams with a large number of same-specialty providers.[16] While this decision makes it more difficult to compare our results to prior work, we think our resulting measures reflect an important new way of studying coordination needs.

Conclusion

In this study, we examined the number of provider-type combinations involved in surgery for colon cancer to determine the extent to which information coordination needs vary across phases of care. We found that a large number of provider-type combinations are involved in all phases of care at the national level. At the hospital level, we found fewer combinations and substantial variation across hospitals types. These findings suggest that while some hospitals may benefit from a more routinized approach to information sharing and care coordination, others (specifically, large, urban, and teaching hospitals) likely require flexible approaches that accommodate the needs of a wider variety of provider types. At the national level, policymakers should emphasize flexible approaches to incentivizing care coordination in order to allow providers to customize strategies to meet their patients' needs.

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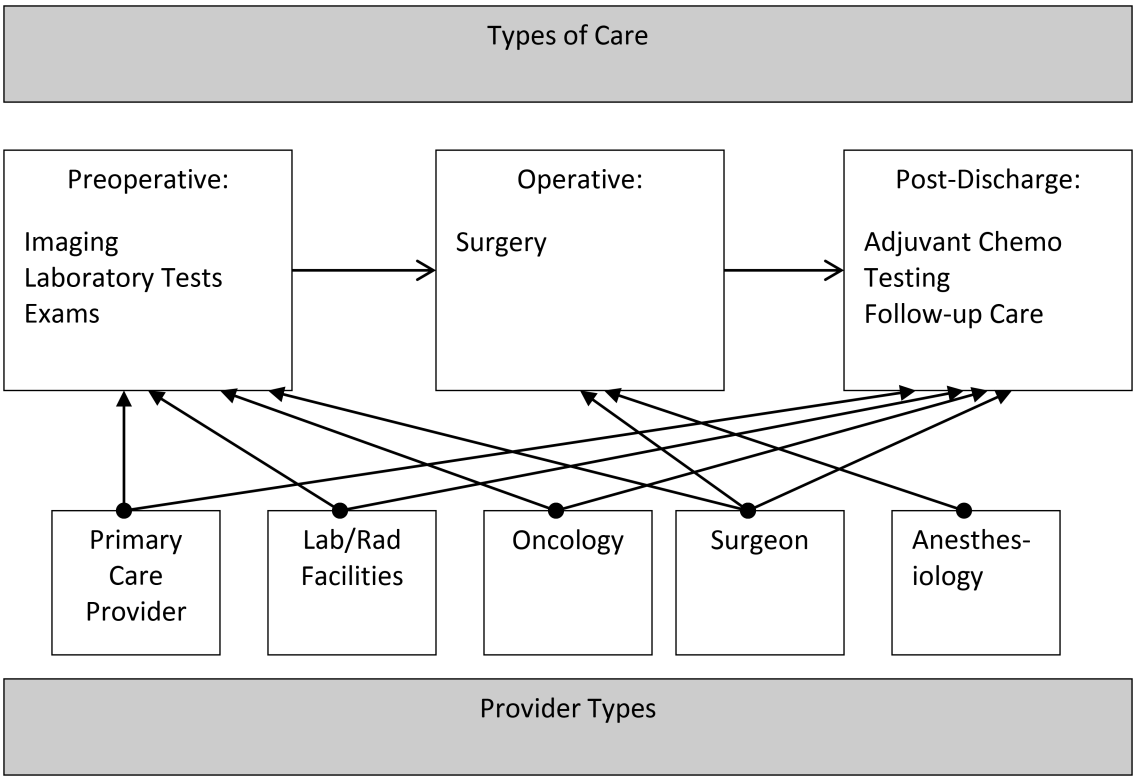

Figure 1.
Conceptual Model: Potential Provider Type Involvement in Cancer Care Within and Across Treatment Phases

Figure 2.

Top 20% Provider-Type Combinations Treating Colon Cancer Patients Undergoing Colectomy in US Hospitals

Note: *Totals in each phase may not sum to 20% due to rounding

Table 1.

Unique Combinations of Provider Types Treating Colon Cancer Patients Undergoing Colectomy

X% of Patients	Preoperative		Operative		Post-discharge		All Phases	
National								
100%	1,554		975		1,571		1,099	
80%	227		72		182		76	
60%	85		23		58		27	
40%	33		9		22		13	
20%	10		4		8		5	
Hospital	**Mean (Range)**	**SD**	**Mean(Range)**	**SD**	**Mean (Range)**	**SD**	**Mean (Range)**	**SD**
100%	15 (1–102)	14.88	11 (1–74)	9.94	15 (1–115)	14.41	22 (1–65)	12.62
80%	12 (1–73)	10.85	8 (1–44)	6.09	12 (1–77)	10.44	15 (1–48)	7.57
60%	8(1–44)	6.93	5 (1–23)	3.34	8(1–43)	6.56	9 (1–31)	4.09
40%	5 (1–21)	3.55	3 (1–13)	1.72	5 (1–20)	3.33	5 (1–14)	2.07
20%	2 (1–9)	1.30	1 (1–5)	0.66	2 (1–9)	1.20	2 (1–6)	0.85

Note: National-level analysis based on all patients in our sample irrespective of the hospital where the colectomy was performed; hospital-level analysis is based on 3,164 hospitals. Patterns across all phases were determined by creating pattern type combinations at the patient level, agnostic to phase, and then summing at the national/ hospital level as appropriate.

Table 2.

US Hospital Characteristics Associated with Variation in Number of Provider-Type Combinations (n=3164)

Number of Combinations per Hospital						
	Preoperative		**Operative**		**Post-discharge**	
All Hospitals						
Mean (SD)	15	(14.88)	10	(8.37)	13	(12.45)
Min	1		1		1	
Max	102		61		92	
Average Number of Combinations per Hospital, By Hospital Characteristics						
	Preoperative		**Operative**		**Post-discharge**	
	Mean (SD)	**p-value***	**Mean (SD)**	**p-value***	**Mean (SD)**	**p-value***
Annual Colectomy Patient Volume		<0.001		<0.001		<0.001
High (44–212 patients)	30	(15.6)	21	(9.9)	29	(14.9)
Medium (23–43 patients)	15	(7.3)	13	(7.2)	15	(7.3)
Low (1–22 patients)	6	(4.8)	5	(4.7)	6	(4.8)
Size		<0.001		<0.001		<0.001
Large (400+ beds)	36	(20.5)	24	(12.1)	34	(19.3)
Medium (100–399 beds)	18	(12.0)	15	(8.4)	19	(12.3)
Small (6–99 beds)	5	(5.2)	4	(3.9)	5	(4.9)
Teaching		<0.001		<0.001		<0.001
Major (COTH)	33	(22.0)	21	(12.1)	31	(20.4)
Minor (ACGME)	21	(16.0)	16	(10.6)	21	(15.5)
Non-Teaching	10	(10.2)	8	(7.7)	10	(10.3)
Urbanicity		<0.001		<0.001		<0.001
Metropolitan	20	(16.7)	15	(10.7)	20	(16.1)
Micropolitan	10	(8.8)	8	(6.4)	11	(8.8)
Rural	4	(4.9)	4	(3.2)	4	(4.1)
Critical Access		<0.001		<0.001		<0.001
Critical Access	3	(2.6)	3	(2.0)	3	(2.7)
Not Critical Access	17	(15.2)	13	(10.0)	17	(14.7)

*Significance based on ANOVA test of equal group means

Online Table 1.

Sensitivity Analysis Excluding Other Medical Specialties: Number of Unique Combinations of Provider Types Treating Colon Cancer Patients Undergoing Colectomy

X% of Patients	Preoperative		Operative		Post-discharge	
National						
100%	916		622		939	
80%	122		42		102	
60%	46		13		31	
40%	18		6		12	
20%	6		2		4	
Hospital	Mean (Range)	SD	Mean (Range)	SD	Mean (Range)	SD
100%	14 (1–88)	13.16	10 (1–61)	8.37	13 (1–92)	12.45
80%	10 (1–60)	9.20	7 (1–31)	4.81	10 (1–58)	8.54
60%	12 (1–35)	5.48	4 (1–20)	2.59	7 (1–32)	4.93
40%	6 (1–18)	2.71	2 (1–11)	1.36	4 (1–15)	2.39
20%	3 (1–7)	0.99	1 (1–4)	0.53	2 (1–6)	0.87

Online Table 2.

Sensitivity Analysis Examining Number of Unique Combinations of Provider Types for Elective Cases versus All Cases

X% of Patients	Preoperative		Operative		Post-discharge	
	Elective Cases	Main Analysis	Elective Cases	Main Analysis	Elective Cases	Main Analysis
National	Total	Total	Total	Total	Total	Total
100%	1,329	1,554	711	975	1,374	1,571
80%	211	227	47	72	181	182
60%	82	85	15	23	57	58
40%	34	33	6	9	21	22
20%	12	10	2	4	7	8
Hospital	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)
100%	21 (1–89)	15 (1–102)	13 (1–44)	11 (1–74)	15 (1–115)	15 (1–115)
80%	16 (1–57)	12 (1–73)	9 (1–29)	8 (1–44)	16 (1–77)	12 (1–77)
60%	11 (1–35)	8 (1–44)	5(1–16)	5(1–23)	11 (1–38)	8(1–43)
40%	6(1–18)	5 (1–21)	3 (1–9)	3 (1–13)	6 (1–19)	5 (1–20)
20%	3 (1–8)	2 (1–9)	1 (1–4)	1 (1–5)	3 (1–8)	2 (1–9)

Online Table 3.

Sensitivity Analysis Examining Number of Unique Combinations of Provider Types by Operating Surgeon Specialty

X% of Patients	Preoperative		Operative		Post-discharge	
	Colorectal and Oncology Surgeons	Other Primary Surgeon	Colorectal and Oncology Surgeons	Other Primary Surgeon	Colorectal and Oncology Surgeons	Other Primary Surgeon
National						
100%	1168	1537	317	564	1139	1603
80%	256	189	27	49	190	145
60%	89	64	8	15	46	40
40%	32	24	4	7	14	14
20%	10	6	1	2	3	4
Hospital	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)	Mean (Range)
100%	20 (1–73)	21 (1–88)	11 (1–36)	14 (1–59)	20 (1–106)	21 (1–86)
80%	15 (1–51)	16 (1–56)	7 (1–24)	9 (1–33)	14 (1–51)	15 (1–61)
60%	10 (1–29)	9 (1–32)	4 (1–13)	6 (1–17)	8 (1–24)	9 (1–36)
40%	5 (1–16)	5 (1–16)	2 (1–8)	3 (1–9)	4 (1–11)	5 (1–14)
20%	2 (1–7)	2 (1–8)	1 (1–4)	1 (1–4)	2 (1–5)	2 (1–7)