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Bundling in Medicare Patients Undergoing Bidirectional Endoscopy. How Often Does it Happen?

Hashem B. El-Serag, MD, MPH, Fang Xu, PhD, Prachi Biyani, MD, and Gregory S. Cooper, MD

Section of Gastroenterology and Hepatology, Departments of Medicine, Michael E. DeBakey Veterans Affairs Medical Center & Baylor College of Medicine, Houston, Texas, USA; Division of Gastroenterology, University Hospitals Case Medical Center and Comprehensive Cancer Center, Case Western Reserve University, Cleveland, Ohio, USA

Abstract

Background—In patients with appropriate indications, performance of both colonoscopy and esophagogastroduodenoscopy (EGD) at the same time (bundling) is convenient for patients, efficient for providers, and cost saving for the healthcare system. However, Medicare reimbursement for bundled procedures is at a rate that is less than the sum of the two procedures when charged separately; this may create a disincentive to bundle. The practice patterns of bundling are unknown at a US population-based level.

Methods—We examined 2007 to 2009 Medicare claims from the Carrier file in a national, random sample of fee-for-service beneficiaries aged 66 and older. We identified patients who had both a colonoscopy and EGD performed within 180 days of each other and calculated the proportions of patients with both procedures bundled on the same date, within 1 to 30 days, and within 31 to 180 days of each other. We compared patients in these 3 groups for demographics and clinical indications for the procedures (bleeding, lower or upper gastrointestinal [GI] symptoms, surveillance, and screening).

Results—We identified 12,982 Medicare-enrolled individuals who had a colonoscopy and an EGD performed within 180 days of each other. Approximately 35% of procedures were not bundled on the same day; and, of these, 2,359 (18%) were performed within 30 days of each other; and 2,219 (17%) were performed within 31 to 180 days of each other. There were marked geographic differences in the percentage of bundling, with the lowest in the Northeast and the highest in the West. Patients with bundled procedures were more likely to have GI bleeding and less likely to have screening or surveillance indications.

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Corresponding Author: Hashem B. El-Serag, MD, MPH, (MEDVAMC 152), 2002 Holcombe Blvd., Houston, TX 77030, Ph: 713-794-8640; fax: 713-748-7359, hashem.el-serag@va.gov.

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Conclusions—Although same-day bundling of endoscopic procedures offers a number of advantages, it is not practiced in more than one third of cases in a national sample of Medicare beneficiaries.

Background

In the management of patients with suspected digestive disorders (e.g., bleeding, iron-deficiency anemia), healthcare providers occasionally request both a colonoscopy and an esophagogastroduodenoscopy (EGD). Performance of both of these procedures in the same setting, a practice called bundling, is convenient for patients, efficient for providers, and cost saving for the healthcare system. However, the extent to which bundling of bidirectional endoscopy is performed in clinical practice is unknown. Medicare reimburses bundled procedures at a rate that is less than the sum of the 2 procedures charged separately. For example, for 2 codes with different base codes (e.g., colonoscopy and EGD), multiple-procedure guidelines apply, with 100% reimbursement for the highest procedure and 50% for the second. This reimbursement arrangement may create a disincentive for bundling. In addition, clinical necessities regarding the presentation and type of signs and symptoms may otherwise determine the performance of bundling.

Previous studies^{1–7} have largely focused on the diagnostic yield of same-day bidirectional endoscopy but have not considered the frequency of this practice as compared with procedures performed on different days. Moreover, patient, endoscopist, facility and geographic factors that predict the use of bundling have not been evaluated at a population level. Such knowledge may have a considerable impact on cost containment and quality of care. We, therefore, conducted the present study in a large Medicare-based cohort to examine the prevalence of bundled as compared to different-day bidirectional endoscopy.

Methods

The study cohort was obtained from a 5% random sample of Medicare beneficiaries of non-cancer patients in 2007, and overall 5% random sample that included both cancer and non-cancer patients in 2008–09, and who resided in a state or metropolitan region that is part of the Surveillance Epidemiology and End Results Program. The Surveillance Epidemiology and End Results Program currently captures approximately 26% of the US population <http://seer.cancer.gov/registries/list.html>. Our objective was to study this in the outpatient setting, where there are greater opportunities for bundling given the lower acuity. Procedures were identified from the Carrier or Physician Supplier file, which includes claims from physicians, as well as from other clinicians, and claims from free-standing ambulatory surgery centers. These files contain demographics, 1 primary and up to 3 secondary diagnoses coded according to the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9- CM), and up to 13 procedures coded according to Current Procedural Terminology, 4th Edition (CPT-4). The Summarized Denominator file was used to identify patients who were not enrolled in Medicare Part B or fee-for-service plans. The Summarized Denominator file also includes census-tract or ZIP code-level measures of income, educational level, and urban/rural status.

The study sample was obtained from all beneficiaries aged 66 years and older in the Carrier files with any of several codes for EGD (43234, 43235, 43239, and 43255) and colonoscopy (44388, 44389, 45378, 45380, 45382, G0105, G0121, 44392–44394, and 45383–45385) performed within 180 days of each other, beginning on January 1, 2007, and ending June 30, 2009. Patients were followed for up to 6 months after the index endoscopic procedure (the earliest of the 2 procedures) for performance of a second procedure. We excluded patients with either a colonoscopy alone or upper endoscopy alone (n=4,046). Because of the high likelihood of incomplete claims data, patients who were enrolled in Medicare managed-care plans and patients who were not enrolled in Medicare Part B during the period of interest were excluded. Using the Unique Physician Identification Number (UPIN) associated with the initial procedure claim and those missing a UPIN part are substituted from the Health Care Financing Administration specialty information, we categorized physician specialty as gastroenterology, general surgeon, colorectal surgeon, internal medicine, family practice and other/unknown. Approval from Institutional Review Board at Case Western University was obtained.

For each procedure of interest, using associated diagnosis and procedure codes, we identified possible indications for colonoscopy, as well as indications for EGD. These included GI bleeding or anemia (ICD-9-CM 280, 285.1, 285.9, 569.3, 578, 792.1), lower GI symptoms (558.9, 560.9, 564.0, 564.5, 783.0, 783.2, 787.0, 787.3, 787.6, 787.9), upper GI symptoms (530.8, 560.9, 783.0, 783.2, 786.5, 787.0, 787.2, 787.3, 789.0, 789.3), or colon surveillance (555, 556, V10.05, V10.06, V12.72); the remaining colonoscopy procedures were categorized as screening. The Carrier, Outpatient and MEDPAR files were searched for a diagnosis code of interest according to ICD-9-CM during the 365 days prior to the index procedure date. To maximize the true-positive rate of a listed diagnosis, we included only diagnoses that appeared more than once in any of the 3 files. Claims from the 365-day to 30-day period prior to the index procedure were also used to derive a previously validated, weighted comorbidity score.⁸

We compared the characteristics of 3 groups of patients (bundled same-day procedures, procedures conducted within 2–30 days, and procedures conducted within 30- to 180-day intervals) including demographics, procedure indications and census-based measures of socioeconomic status. The a priori decision to examine periods 2–30 days and 30–180 days was made based on our assumption that a second endoscopic procedure performed after 30 days made be related to new indications that were not discovered at the time of presentation, where as those occurring 2–30 days are much more likely to have been present at presentation. The Pearson Chi square tests were used for categorical variables and *t*-tests for continuous variables.

We tested several patient (demographic and clinical) characteristics as well as provider characteristics in unadjusted bivariate analyses, and selected those with $p < 0.1$ for further testing in a multivariate model. Age was treated as a categorical variable. A multinomial logistic-regression model was then used to determine independent predictors of undergoing both procedures within a 2- to 30-day interval or a 30- to 180-day interval. Two sets of models were constructed, one nested within individual endoscopists and another that included the endoscopists as independent observations. Variables with $p < 0.1$ were retained

in the final model. We used Proc Glimmix of SAS treating UPIN as a random effect. All statistical analyses were performed using the Statistical Analysis System software, Version 9 (SAS, Inc., Cary, NC).

Results

In the sample, we identified 12,982 Medicare beneficiaries with claims for colonoscopy and EGD within 180 days of each other. This group included 8,404 patients with bundled procedures (64.7%), 2,359 with procedures within 30 days of each other (18.2%), and 2,219 with procedures performed within a 30-day to 180-day interval (17.1%). During the study period, 7.5% patients had >1 colonoscopies and 9.9% patients had >1 EGD. Of patients who had an EGD and colonoscopy within 30 days, 1,491 (63.2%) had colonoscopy on a subsequent date of service within 30 days; 868 (36.8%) had an EGD on a subsequent date of service within 30 days. Among the procedures performed on separate dates, the median and mean $\pm$ SD number of days between procedures was 28 (25th – 75th percentile 7 – 70) and 49 ± 50 days, respectively.

Characteristics of the 3 groups are shown in Table 1. Compared with others, patients with bundled procedures were slightly younger, more likely to be white, residing in an urban area with a higher median educational level, and more likely to have low comorbidity scores.

We also observed strong and significant geographic variation associated with bundling, with the lowest proportions of bundled bidirectional procedures observed in the Northeastern and highest in the Western regions of the United States. Bundling was more common for procedures performed for indications of GI bleeding or symptoms other than surveillance or screening (Table 1). This association between indications and bundling status persisted in a subgroup analysis of patients with comorbidity 2 or greater (n=2961); patients with GI bleeding were significantly more likely, while those with screening/surveillance were significantly less likely to have bundled procedures than those without these indications. The association between GI symptoms and bundling status was less clear. Lastly, only approximately 0.8% of colonoscopy procedures in this study had an incomplete colonoscopy, which was indicated by the modifier code of '52' and '53' from the Carrier file.

In a multinomial analysis that accounted for clustering of procedures among individual endoscopists, we determined several independent predictors of unbundled procedures (Table 2). In that analysis, the sample size was smaller because of 18% of missing UPIN. Unbundled procedures were more likely in black patients and residents of urban areas and for bleeding and GI symptoms (more than surveillance). There was also striking geographic variation, with the highest likelihood of unbundled procedures in the Northeast and lowest in the West. Bundling was also slightly more likely for procedures performed by family practitioners or general surgeons.

An additional multinomial analysis was performed that did not include clustering of procedures among individual endoscopists. The results were generally consistent with those

of the previous model, including geographic and specialty variation in the odds of bundling (data not shown).

Discussion

In this large, population-based analysis of Medicare beneficiaries, we found that about one third of bidirectional endoscopic procedures were not performed on the same dates (i.e., not bundled), with the remainder performed on the same date. Although in some instances the referral patterns and clinical indications may have precluded bundling, the persistence of the findings in analyses that adjusted for indications and the considerable geographic variation in practice suggest a component of physician discretion.

To our knowledge, only 1 study has evaluated the use of bundled procedures in a large database. It used data from the Clinical Outcomes Research Initiative endoscopic database⁹ and examined the frequency of same-day bidirectional endoscopy. This practice, encompassing 11.2% of all upper and lower endoscopies, was most frequently performed for the evaluation of anemia, positive fecal occult blood testing or abdominal pain. However, the authors did not estimate the frequency of different-day procedures in the same population.

The missed opportunities related to nonbundled EGD and colonoscopy are likely to be associated with considerable increase in cost related to physician (gastroenterology, anesthesia, pathology) and facility fees. In addition, indirect cost in terms of workdays lost (on average for a sedated procedure, one-half to 1 full day) is also substantial; but, despite that, we found that almost 30% of procedures were performed within 4 days of each other. Although we found a somewhat lower prevalence of same-day endoscopy in patients with higher comorbidity scores, the risk of endoscopy and sedation-related complications is likely to be higher with separate procedures. However, accurate estimates are not available.

Although our study has the advantage of being population-based and capturing a broad range of practice settings, we recognize that it has several limitations. First, the study was conducted in a cohort of older Medicare beneficiaries receiving care in fee-for-service arrangements. Thus, the generalizability of findings to other patient groups is unknown. Second, the data were collected for billing purposes rather than research; and, thus, clinical details, including procedural findings, are lacking. We used UPIN Furthermore, the completeness and validity of self-reported physician-specialty can be suspect (10). However, the completeness of Medicare claims for measuring procedure use is relatively high (11). Third, we were unable to ascertain the procedural referral practices. For example, in an open-access endoscopy system a patient may have been referred for only 1 procedure; and, based on the outcome, a second procedure may have been requested at a later time. Fourth, because of the large sample sizes, differences that were statistically significant may not have been clinically relevant. Finally, because we did not have access to medical records, clinical indications and/or patient preferences that led to different-day procedures could not be captured.

On the basis of the findings of this study, it is worth considering that insurers reimburse physicians fully for bundled procedures. A formal cost- effectiveness analysis to evaluate the balance between costs incurred by reimbursing the physician for the 2 procedures at full charge and the potential savings related to avoiding procedures on separate days. Other considerations include facility costs, use of anesthesia professionals, type of endoscopic service performed (e.g. screening / diagnostic vs. procedural (biopsy, control bleeding, polypectomy)).

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Abbreviations

CPT	Current Procedural Terminology
EGD	esophagogastroduodenoscopy
GI	gastrointestinal
ICD-9-CM	International Classification of Diseases, 9 th Revision, Clinical Modification

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Table 1

Demographic and Clinical Characteristics of Patients with Bundled Procedures and Different Day Procedures.

Characteristic	Bundled (n=8,404; 64.7%)	Within 30 days (n=2,359; 18.2%)	Within 30 to 180 days (n=2,219; 17.1%)	p Value
Age group				< 0.001
< 70	1,999 (23.8)	526 (22.3)	531 (23.9)	
70 – 74	2,269 (27.0)	640 (27.1)	607 (27.4)	
75 – 79	1,958 (23.3)	543 (23.0)	573 (25.8)	
80 – 84	1,362 (16.2)	401 (17.0)	354 (16.0)	
85 +	816 (9.7)	249 (10.6)	154 (6.9)	
Gender				0.07
Male	3,150 (37.5)	913 (38.7)	786 (35.4)	
Female	5,254 (62.5)	1,446 (61.3)	1,433 (64.6)	
Race				< 0.001
White	6,720 (80.0)	1,738 (73.7)	1,735 (78.2)	
Black	581 (6.9)	221 (9.4)	172 (7.8)	
Asian	477 (5.7)	195 (8.3)	152 (6.8)	
Hispanic	322 (3.8)	109 (4.6)	83 (3.7)	
Other or unknown	304 (3.6)	96 (4.0)	77 (3.5)	
Residence				< 0.001
Metropolitan	6,994 (83.2)	2,069 (87.7)	1,951 (87.9)	
Urban	1,264 (15.0)	249 (10.6)	239 (10.8)	
Rural	146 (1.8)	41 (1.7)	29 (1.3)	
Median income (\$) (25th, 75th centile)	44,161 (35,137, 59,259)	43,906 (34,724, 59,014)	44,805 (35,347, 59,118)	0.50
Education (% High School Graduates)	83.0	81.8	82.3	< 0.001
Region				
Midwest	914 (10.8)	241 (10.2)	227 (10.2)	< 0.001
Northeast	1,656 (19.7)	723 (30.7)	634 (28.6)	
South	1,695 (20.2)	444 (18.8)	385 (17.3)	
West	4,139 (48.3)	951 (40.3)	973 (43.9)	
Charlson comorbidity Index				< 0.001
0	4,391 (52.3)	1,129 (47.9)	1,068 (48.1)	
1	2,171 (25.8)	632 (26.8)	630 (28.4)	
2	978 (11.6)	290 (12.3)	267 (12.0)	
3 +	864 (10.3)	308 (13.0)	254 (11.5)	
Indications				
GI Bleeding	3,266 (38.9)	800 (33.9)	449 (20.2)	< 0.001
Symptoms	3,063 (36.5)	675 (28.6)	794 (35.8)	< 0.001
Surveillance or screening	4,205 (50.0)	1,248 (52.9)	1,493 (67.3)	< 0.001

Characteristic	Bundled	Within 30 days	Within 30 to 180 days	p Value
	(n=8,404; 64.7%)	(n=2,359; 18.2%)	(n=2,219; 17.1%)	
Physician specialty				< 0.001
Colorectal surgeon	62 (0.7)	**	33 (1.5)	
Family practice	484 (5.8)	**	89 (4.0)	
Gastroenterologist	5,068 (60.3)	1,520 (64.4)	1,297 (58.5)	
General surgeon	756 (9.0)	117 (5.0)	141 (6.4)	
Internal medicine	346 (4.1)	108 (4.6)	102 (4.6)	
Others *	1,688 (20.1)	511 (21.7)	557 (5.1)	

* Others: All specialties not included in the above categories

** Due to the small sample size in the cells, the actual numbers are suppressed for confidentiality reason as per CMS and NCI policy.

Table 2

Multivariable Analysis Predicting Use of Unbundled (Different Dates) Colonoscopy and EGD (n = 10,630).

Characteristic	Within 30-day interval (1–30 days)			Within 180 days (31–180 days)		
	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)
Age group						
< 70 (Ref)	1		1	1		1
70 – 74	1.17 (0.98, 1.40)	0.08	1.13 ^c (0.94, 1.35)	1.03 (0.88, 1.21)	0.18	1.01 (0.86, 1.18)
75 – 79	1.07 (0.88, 1.28)	0.51	1.05 (0.87, 1.26)	1.21 (1.03, 1.41)	0.02	1.22 (1.04, 1.43)
80 – 84	1.18 (0.97, 1.45)	0.10	1.15 (0.94, 1.41)	1.00 (0.84, 1.20)	1.00	1.07 (0.89, 1.29)
85 +	1.36 (1.08, 1.73)	0.01	1.37 (1.07, 1.74)	0.74 (0.59, 0.93)	0.01	0.86 (0.68, 1.09)
Male gender	1.12 (0.98, 1.27)	0.09	1.12 (0.98, 1.28)	0.92 (0.82, 1.03)	0.15	0.89 (0.79, 1.01)
Race						
White (Ref)	1		1	1		1
Black	1.61 (1.27, 2.05)	<0.001	1.36 (1.06, 1.74)	1.10 (0.88, 1.38)	0.37	1.03 (0.81, 1.30)
Hispanic	1.49 (1.11, 2.00)	0.01	1.61 (1.18, 2.19)	1.23 (0.96, 1.57)	0.09	1.20 (0.92, 1.58)
Asian	1.37 (0.98, 1.91)	0.06	1.34 (0.95, 1.90)	1.03 (0.77, 1.40)	0.83	0.94 (0.68, 1.30)
Other	1.33 (0.94, 1.86)	0.10	1.40 (0.99, 1.98)	1.02 (0.76, 1.38)	0.91	0.96 (0.70, 1.32)
Residence						
Metropolitan (Ref)	1		1	1		1
Urban	0.62 (0.49, 0.78)	<0.001	0.76 (0.59, 0.98)	0.69 (0.58, 0.83)	<0.001	0.75 (0.61, 0.93)
Rural	0.96 (0.58, 1.58)	0.86	1.10 (0.87, 1.41)	0.77 (0.49, 1.22)	0.27	0.82 (0.51, 1.34)
Median income	0.99 (0.95, 1.02)	0.46	0.97 ^d (0.92, 1.02)	1.01 (0.98, 1.04)	0.70	1.01 (0.97, 1.06)
Education	0.50 (0.29, 0.87)	0.01	0.70 (0.28, 1.72)	0.51 (0.32, 0.80)	0.003	0.29 (0.13, 0.63)
Region						
Midwest (Ref)	1		1	1		1
Northeast	1.74 (1.29, 2.34)	<0.001	1.44 (1.06, 1.95)	1.55 (1.24, 1.94)	<0.001	1.26 (0.99, 1.59)
South	1.01 (0.74, 1.38)	0.96	0.99 (0.72, 1.36)	0.93 (0.74, 1.18)	0.57	0.84 (0.65, 1.08)
West	0.73 (0.55, 0.97)	0.03	0.56 (0.42, 0.76)	0.96 (0.78, 1.19)	0.72	0.78 (0.62, 0.97)
Comorbidity						

Characteristic	Within 30-day interval (1–30 days)			Within 180 days (31–180 days)		
	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	p-value
0 (Ref)						
1	1.10 (0.77, 1.55)	0.24	1.04 (0.89, 1.21)	1.22 (1.07, 1.39)	1.28 (1.11, 1.46)	< 0.001
2	1.11 (0.91, 1.36)	0.30	1.05 (0.85, 1.29)	1.07 (0.90, 1.29)	1.16 (0.97, 1.40)	0.11
3 +	1.53 (1.25, 1.87)	0.01	1.39 (1.13, 1.71)	1.29 (1.07, 1.55)	1.48 (1.22, 1.79)	< 0.001
Indications						
GI Bleeding	0.89 (0.77, 1.02)	0.08	0.38 (0.29, 0.18)	0.38 (0.33, 0.43)	0.32 (0.26, 0.40)	< 0.001
GI Symptoms	0.64 (0.56, 0.74)	< 0.001	0.42 (0.35, 0.50)	0.98 (0.87, 1.10)	0.62 (0.54, 0.72)	< 0.001
Surveillance or screening	1.02 (0.89, 1.16)	0.82	0.57 (0.46, 0.70)	2.22 (1.97, 2.50)	1.11 (0.93, 1.33)	0.24
Physician specialty						
Colorectal surgeon	0.40 (0.15, 1.07)	0.07	0.45 (0.17, 1.20)	2.43 (1.41, 4.20)	2.50 (1.43, 4.37)	0.001
Family practice	0.53 (0.37, 0.78)	0.001	0.58 (0.40, 0.84)	0.70 (0.53, 0.92)	0.75 (0.56, 1.00)	0.05
Gastroenterologist (Ref)	1		1	1	1	
General surgeon	0.39 (0.28, 0.54)	< 0.001	0.41 (0.29, 0.58)	0.77 (0.61, 0.98)	0.85 (0.66, 1.08)	0.19
Internal medicine	0.99 (0.64, 1.53)	0.96	1.00 (0.65, 1.55)	1.20 (0.87, 1.65)	1.11 (0.80, 1.54)	0.53
Others	1.11 (0.86, 1.44)	0.42	1.24 (0.96, 1.59)	1.42 (1.18, 1.69)	1.36 (1.13, 1.63)	< 0.001

* Others: any other specialty not covered by the previous categories