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Medicare Accountable Care Organizations and use of potentially low value procedures

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Abstract

Objective: To evaluate the effect of Accountable Care Organizations (ACOs) on the use of vertebroplasty and arthroscopic partial meniscectomy, two procedures for which randomized controlled trials suggest similar outcomes to sham surgery and therefore may provide low value.

Medicare Shared Savings Program Accountable Care Organizations (ACOs) aim to improve quality and decrease healthcare spending. Reducing the use of potentially low value procedures can accomplish both of these goals.

Methods: We performed a retrospective cohort study of patients who underwent potentially low value orthopedic procedures (vertebroplasty and partial meniscectomy) and a control (hip fracture) from 2010 to 2015 using a 20% sample of national Medicare claims. We performed an interrupted time-series analysis using linear spline models to evaluate the count of each procedure per 1,000 patients, stratified by ACO participation.

Results: We identified 76,256 patients who underwent arthroscopic partial meniscectomy, 44,539 patients who underwent vertebroplasty, and 50,760 patients who underwent hip fracture admission. Arthroscopic partial meniscectomy rates decreased, vertebroplasty rates remained stable, and hip fracture rates increased for both groups during the study period, with similar trends among ACO and non-ACO patients. After January 1, 2013, ACO and non-ACO populations had similar trends for vertebroplasty (ACO Incidence rate ratio (IRR) 1.15 [1.08–1.23] vs non-ACO

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IRR 1.11 [1.05–1.16]), meniscectomy (ACO IRR 1.06 [1.01–1.12] vs non-ACO IRR 1.03 [0.99–1.07]), and hip fracture (ACO IRR 1.08 [1.01–1.14] vs non-ACO IRR 1.08 [1.03–1.13]).

Conclusions: ACOs were not associated with a reduction in the frequency of vertebroplasty and arthroscopic partial meniscectomy.

Keywords

Accountable care organizations; low value care; orthopedic surgery

Introduction

Medicare’s Shared Savings Program Accountable Care Organizations (ACOs) aim to improve population health and the value of healthcare.¹ Waste is a major driver of spending growth² and one opportunity for ACOs to decrease spending and to improve quality is to reduce potentially “low-value” healthcare. Such care does not benefit patients, exposes them to potential risks of treatment, and generates unnecessary costs.³ By providing incentives to improve value, ACOs have the potential to decrease low value care. Indeed, early findings suggest that Medicare ACOs achieved modest reductions in the use of some low value services, such as cancer screening in the elderly and unnecessary cardiovascular testing.⁴

Whether ACOs can reduce the use of low value surgical procedures is unclear. One on hand, the focus of ACOs and associated benchmarks around primary care providers may limit their ability to affect care provided by surgeons, who continue to be motivated by volume in the fee-for-service payment system. Indeed, fewer than 1 in 4 U.S. surgeons participate in an ACO.⁵ On the other hand, because primary care providers in ACOs are measured on beneficiary spending, they may raise their thresholds for referral for diseases in which surgical care has questionable benefit (e.g., chronic lower back pain).⁶

For these reasons, we evaluated the effects of Shared Savings Program ACO participation on arthroscopic partial meniscectomy and vertebroplasty. Both procedures have been demonstrated to afford no additional benefits relative to sham surgery in randomized controlled trials^{7–12} and thus may be of low value. We also assessed effects on the treatment of hip fracture, which is considered to be of high value.^{13,14}

Methods

Data source and study population

We used a 20% sample of Medicare data to examine rates of arthroscopic partial meniscectomy, vertebroplasty and hip fracture between January 1, 2010 and December 31, 2015. We included fee-for-service Medicare patients aged 66 years and older who were eligible for both Medicare Parts A and B for the study period and 12 months prior to treatment.

We used International Classification of Diseases, Ninth Revision, Clinical Modification procedure codes to identify patients who had arthroscopic partial meniscectomy, vertebroplasty, or hip fracture (see Supplemental digital content, table). We assigned all

patients to a primary care physician based on the plurality of their primary care services using established methodology similar to the Medicare Shared Savings Program final rule.^{15,16} We used the provider-level research identifiable file from the Centers for Medicare and Medicaid Services to determine the ACO participation of each primary care physician in years 2012 through 2015 (N.B. the first Shared Savings Program ACOs began on April 1, 2012). Patients enrolled in Medicare Advantage plans were excluded because they are ineligible for participation in Shared Savings Program ACOs.¹⁷

Outcome

We examined the rate of arthroscopic meniscectomy, vertebroplasty and hip fracture per 1,000 patients. This rate was calculated using the count of procedures performed in each population (ACO or non-ACO) as the numerator and the total number of people in each group as the denominator. The rate of treatment was calculated for each procedure, study year, and ACO alignment (or eventual alignment) of each patient's primary care physician.

Statistical analysis

We assessed differences in patient characteristics between ACO and non-ACO patients using Pearson's chi-squared test. To assess the impact of ACO alignment on the use of potentially low-value surgery, we performed an interrupted time-series analysis using linear spline models, stratified by ACO participation. We fit negative binomial models including year of surgery and adjusted for patient age, sex, race, socioeconomic class, and comorbidity. Socioeconomic class was included as a categorical variable at the zip-code level.¹⁸ Comorbidity score was determined for each patient from claims in the year prior to surgery using the Klabunde modification of the Charlson comorbidity index.¹⁹

From each model, the estimated incidence rate ratio represents the adjusted time trend in the rate of use of each procedure. Because most Medicare Shared Savings Program ACO contracts were initiated by January 1st, 2013, we fit linear splines with "knots" at this time point. This approach allows for a change in the rate of these procedures, or a "post-ACO trend" that differs from the background trend.

All analyses were performed using SAS version 9.4 (Cary, NC). All tests were two-tailed with the probability of type 1 error set at 0.05. The study protocol was deemed to be exempt from review by the University of Michigan institutional review board.

Results

Between 2010 and 2015, 76,256 patients underwent arthroscopic partial meniscectomy, 44,539 patients underwent vertebroplasty, and 50,760 patients were admitted with a hip fracture. Of these, 21,026 (28.2%) meniscectomy patients, 12,521 (28.1%) vertebroplasty patients, and 13,930 (27.4%) hip fracture patients were aligned with a primary care physician that ultimately participated in a Shared Savings Program ACO. For all three procedures, ACO patients were more likely to live in zip codes with the highest socioeconomic class. ACO and non-ACO groups were otherwise similar, with small differences in demographic characteristics that are unlikely to be clinically meaningful (Table 1).

Arthroscopic partial meniscectomy

Table 2 depicts adjusted rates of each procedure, stratified by ACO status. Arthroscopic partial meniscectomy rates decreased in both ACO and non-ACO groups (Figure 1). The use of partial meniscectomy among ACO patients decreased from 2.1 per 1000 in 2010 to 1.6 per 1000 in 2015 (Incidence rate ratio [IRR] per year 0.95, 95% confidence interval [95%CI] 0.94–0.96, $P<0.001$). Among non-ACO patients, this rate decreased from 2.3 per 1000 in 2010 to 1.6 per 1000 in 2015 (IRR per year 0.93, 95%CI 0.92–0.94, $P<0.001$). In the post-ACO period (after January 1, 2013), rates of partial meniscectomy declined somewhat less relative to pre-period (IRR per year 1.06, 95%CI 1.01–1.12, $P=0.02$) (Table 3). Non-ACO patients also experienced a smaller relative decline in the post-period (IRR per year 1.03, 95%CI 0.99–1.07, $P=0.17$).

Vertebroplasty

Vertebroplasty use remained stable in both ACO and non-ACO groups from 2010 to 2015 (Figure 1). Among ACO patients, the use of vertebroplasty was 1.3 cases per 1000 in 2010 and 1.4 cases per 1000 in 2015 (IRR per year 1.02, 95%CI 1.0–1.03, $P=0.07$). Similarly, among non-ACO patients, the rate of vertebroplasty changed from 1.4 per 1000 in 2010 to 1.3 per 1000 in 2015 (IRR per year 0.99, 95%CI 0.98–1.01, $P=0.34$). The use of vertebroplasty increased for both ACO (IRR per year 1.15, 95%CI 1.08–1.23, $P<0.001$) and non-ACO (IRR per year 1.11, 95%CI 1.05–1.16, $P<0.001$) groups in the post-ACO period (Table 3).

Hip fracture

The adjusted rate of hip fracture increased among both ACO and non-ACO patients (Figure 1). In the ACO group, the rate of hip fracture increased from 1.1 per 1000 in 2010 to 1.7 per 1000 in 2015 (IRR per year 1.08, 95%CI 1.06–1.09, $P<0.001$). Similarly, in the non-ACO group, the rate increased from 1.3 per 1000 in 2010 to 1.7 per 1000 in 2015 (IRR per year 1.05, 95%CI 1.04–1.06, $P<0.001$). As depicted in Table 3, both groups had similarly increasing rates of hip fracture in the post-ACO time period (ACO IRR per year 1.08, 95%CI 1.01–1.14, $P=0.02$ and non-ACO IRR per year 1.08, 95%CI 1.03–1.13, $P=0.003$).

Discussion

Medicare Shared Savings Program ACO participation was not associated with a reduction in the use of two potentially low-value procedures. The rates of both arthroscopic partial meniscectomy and vertebroplasty were similar for ACO and non-ACO patients, with almost identical trends overall and in the post-ACO time period. Hip fracture admissions, included as a control, were also similar among ACO and non-ACO patients. These results suggest that Shared Savings Program ACOs, despite their mission to reduce spending, are not associated with a reduction in the rate of arthroscopic partial meniscectomy or vertebroplasty. Both procedures have similar outcomes to those of sham procedure controls in randomized clinical trials and, therefore, represent an avenue by which ACOs could reduce spending while improving quality.^{8–12}

In 2009, two double-blind, randomized, sham-surgery controlled trials demonstrated no significant benefit of vertebroplasty on pain control or functional outcomes in patients with vertebral compression fractures.^{10,11} Since the publication of these findings, the utilization of vertebroplasty has decreased.²⁰ Similarly, arthroscopic partial meniscectomy was found to be no better than sham surgery for relieving symptoms of a degenerative meniscal tear in two high-profile randomized clinical trials published in 2013.^{8,9} While these findings have been controversial, multiple clinical practice guidelines have now recommended against the use of arthroscopic partial meniscectomy in patients with a degenerative meniscal tear, especially in those with pre-existing arthritis.^{21,22} Both vertebroplasty²⁰ and arthroscopic partial meniscectomy²³ are expensive procedures and pose considerable risks of complications and side effects to patients.^{22,24}

ACOs accept responsibility for the health and healthcare spending for a population and share in any savings that they generate. Reducing low-value care, or costly care without commensurate impact on quality, offers an ideal method for achieving these goals. Early Medicare ACOs (Pioneer ACOs) demonstrated moderate reductions in low-value care and suggested that this may be a good strategy to control spending.⁴ This study considered several low value services across the continuum of medical care. We focused on low value surgical procedures as these have a high risk of negative side effects for patients and are usually associated with considerable costs to the payer. However, despite these considerations, Medicare Shared Savings Program ACOs did not have a meaningful impact on the use of two potentially low value procedures.

ACOs may not have been able to reduce arthroscopic partial meniscectomy and vertebroplasty because of unclear lines of accountability. Patients are attributed to Medicare Shared Savings Program ACOs based on the physician who delivers the plurality of their primary care services.²⁵ Further, ACOs are charged with maintaining health care quality, defined by a number of measures in 4 domains that are mostly relevant to primary care providers.^{26,27} While this emphasis on primary care makes sense for improving preventative care and care coordination, it may limit the impact of ACOs on controlling total health care spending which is often driven by expensive tests and procedures associated with specialty and surgical care. Indeed, specialists have little motivation to reduce spending or recommend against treatment in the fee-for-service system. Evidence surrounding the effect of ACOs on specialty care is mixed. ACO participation has been shown to reduce readmissions following major surgery, though almost all of the effect appeared due to synergy with the Hospital Readmissions and Reduction Policy.²⁸ Conversely, ACO participation did not reduce disparities in surgical care for racial and ethnic minorities²⁹ or improve outcomes after major cancer surgery.³⁰

This study must be considered in the context of several limitations. We used Medicare claims and therefore were unable to evaluate the specific indications for each procedure. However, such indications should not be systematically different in large ACO and non-ACO populations. Second, the designation of vertebroplasty and arthroscopic partial meniscectomy as potentially low-value procedures, despite considerable supporting evidence, is controversial. Some physicians may feel that these procedures offer some benefit and therefore have little reason to constrain their use. The results of this analysis,

therefore, may not be generalizable to other “low-value” services. Finally, we considered only Medicare Shared Savings Program ACOs in this study. The vast majority of the participants in this program are in a one-sided risk model and have the potential to earn modest shared savings without any downside risk.³¹ These small potential bonuses may not be sufficient to overcome the financial incentives to increase volume in a fee-for-service framework. Newer payment models such as Next Generation ACOs and partial capitation (i.e. stronger incentives to constrain spending) may be better able to motivate a reduction in the use of potentially low value procedures.

Despite these limitations, our findings have important implications for clinical leaders and policymakers. ACOs are built on a framework that suggests that high quality care should reduce health care costs in the long run. However, delivering high quality health care often increases spending.³² Constraining the use of low value surgical care is an important mechanism to improve quality while reducing spending. It is essential, therefore, that we better understand what balance of organizational structure, incentives, and quality measures will result in reductions in low-value surgical treatments.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix

	Codes used to identify procedure
Vertebroplasty	CPT: 22510, 22511, 22512, 22520, 22521, 22522, S2360, S2361, 0200T, 0201T, 22513, 22514, 22515, 22523, 22524, 22525, S2362, S2363, 72291, 72292
Arthroscopic partial meniscectomy	CPT: 29880, 29881
Hip fracture	Methodology used by the Centers for Medicare & Medicaid Services' Comprehensive Care for Joint Replacement Model ¹ (https://innovation.cms.gov/Files/worksheets/cjr-icd10hipfracturecodes.xlsx , Accessed 2/28/2018)

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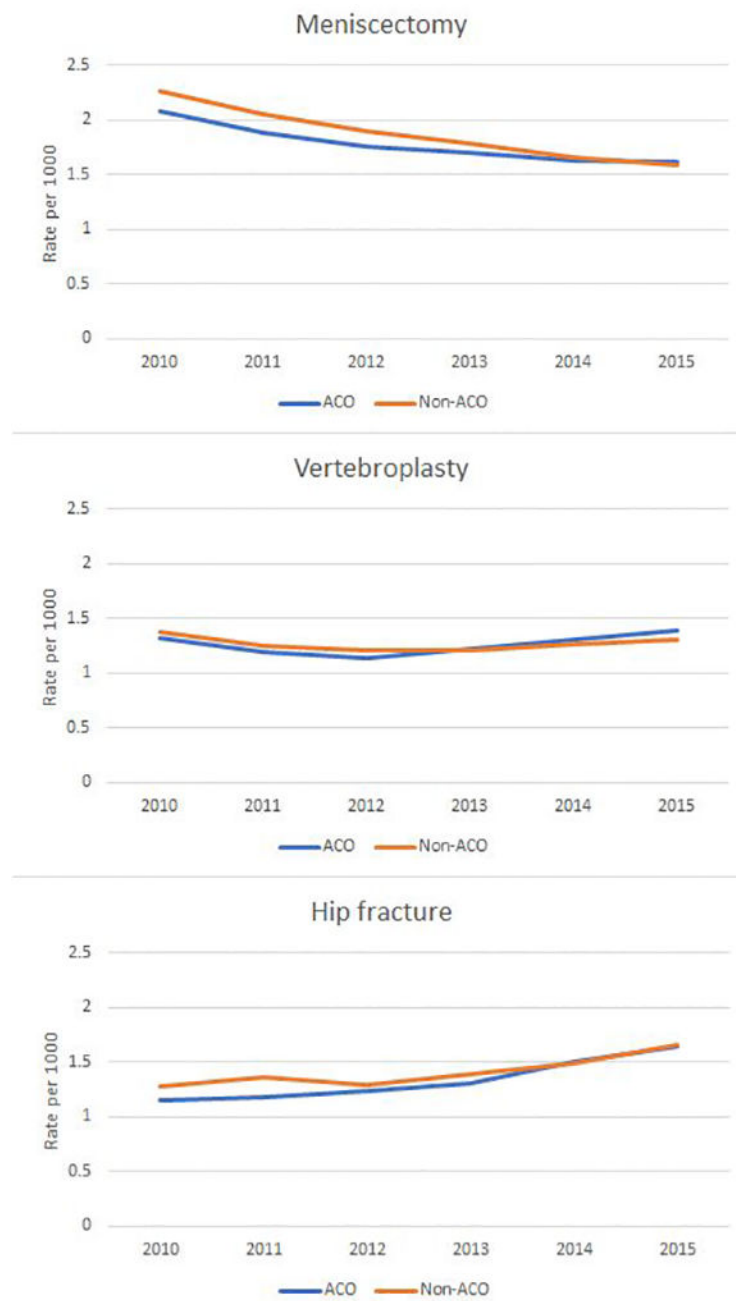


Figure. Rates of procedures per 1000 people by year, adjusted for age, sex, race, comorbidity score, and socioeconomic class. Calculated using negative binomial regression model for procedure counts with an offset for the total population.

Table 1.

Patient characteristics by procedure and ACO status. ACO = Accountable Care Organization. Socioeconomic class was calculated at the 5-digit zip-code level.¹⁸ Comorbidity score was calculated using claims from the year prior to surgery.¹⁹

	Meniscectomy (n=76,256)			Vertebroplasty (n=44,539)			Hip fracture (n=50,760)		
	Non-ACO, n (%)	ACO, n (%)	p-value	Non-ACO, n (%)	ACO, n (%)	p-value	Non-ACO, n (%)	ACO, n (%)	p-value
No. patients	54,770 (71.8)	21,486 (28.2)		32,018 (71.9)	12,521 (28.1)		36,830 (72.6)	13,930 (27.4)	
Age:			0.084			0.06			0.863
66–69	21,153 (38.6)	8,416 (39.2)		2,785 (8.7)	1,091 (8.7)		1,610 (4.4)	585 (4.2)	
70–74	17,990 (32.9)	7,144 (33.3)		4,929 (15.4)	1,825 (14.6)		3,426 (9.3)	1,300 (9.3)	
75–79	9,912 (18.1)	3,745 (17.4)		6,438 (20.1)	2,460 (19.6)		5,597 (15.2)	2,137 (15.3)	
80–84	4,174 (7.6)	1,620 (7.5)		7,795 (24.3)	3,056 (24.4)		8,593 (23.3)	3,213 (23.1)	
85+	1,541 (2.8)	561 (2.6)		10,071 (31.5)	4,089 (32.7)		17,604 (47.8)	6,695 (48.1)	
Race/ethnicity:			0.004			<0.001			<0.001
White	51,512 (94.1)	20,297 (94.5)		30,981 (96.8)	12,135 (96.9)		35,256 (95.7)	13,393 (96.1)	
Black	1,720 (3.1)	692 (3.2)		388 (1.2)	182 (1.5)		851 (2.3)	340 (2.4)	
Asian	267 (0.5)	83 (0.4)		182 (0.6)	44 (0.4)		159 (0.4)	43 (0.3)	
Hispanic	170 (0.3)	60 (0.3)		111 (0.3)	58 (0.5)		182 (0.5)	61 (0.4)	
Other/unknown	1,101 (2.0)	354 (1.6)		356 (1.1)	102 (0.8)		382 (1.0)	93 (0.7)	
Gender:			0.042			0.955			0.068
Male	22,723 (41.5)	8,741 (40.7)		8,910 (27.8)	3,481 (27.8)		10,453 (28.4)	3,840 (27.6)	
Female	32,047 (58.5)	12,745 (59.3)		23,108 (72.2)	9,040 (72.2)		26,377 (71.6)	10,090 (72.4)	
Socioeconomic class:			<0.001			<0.001			<0.001
Low	17,867 (32.6)	5,742 (26.7)		10,526 (32.9)	3,347 (26.7)		11,994 (32.6)	3,661 (26.3)	
Medium	19,289 (35.2)	7,779 (36.2)		11,275 (35.2)	4,489 (35.9)		12,952 (35.2)	4,944 (35.5)	
High	17,614 (32.2)	7,965 (37.1)		10,217 (31.9)	4,685 (37.4)		11,884 (32.3)	5,325 (38.2)	
Comorbidity:			0.373			0.061			0.73
0	31,587 (57.7)	12,458 (58.0)		9,558 (29.9)	3,675 (29.4)		12,071 (32.8)	4,554 (32.7)	
1	12,052 (22.0)	4,626 (21.5)		7,099 (22.2)	2,701 (21.6)		8,416 (22.9)	3,186 (22.9)	
2	6,481 (11.8)	2,603 (12.1)		5,348 (16.7)	2,065 (16.5)		6,126 (16.6)	2,270 (16.3)	
3+	4,650 (8.5)	1,799 (8.4)		10,013 (31.3)	4,080 (32.6)		10,217 (27.7)	3,920 (28.1)	

Table 2.

Adjusted rate of procedure per 1000 people. Calculated using a negative binomial regression model adjusted for age, sex, race, socioeconomic class, and comorbidity score.

ACO = Accountable Care Organization

	Meniscectomy		Vertebroplasty		Hip fracture	
Year	non-ACO	ACO	non-ACO	ACO	non-ACO	ACO
2010	2.26	2.09	1.37	1.33	1.28	1.15
2011	2.05	1.89	1.25	1.20	1.36	1.18
2012	1.90	1.76	1.21	1.14	1.29	1.24
2013	1.79	1.70	1.20	1.22	1.39	1.30
2014	1.66	1.64	1.27	1.30	1.48	1.50
2015	1.59	1.62	1.31	1.39	1.66	1.65

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Table 3.

Incidence rate ratios for post-ACO trend by procedure. Negative binomial models with linear splines and knots were used, controlling for age, sex, race, socioeconomic class, and comorbidity score.

IRR = incidence rate ratio; 95%CI = 95% confidence interval; ACO = Accountable Care Organization

	Non-ACO			ACO		
	IRR	95% CI	P-value	IRR	95% CI	P-value
Meniscectomy						
Post-ACO trend	1.03	0.99–1.07	0.17	1.06	1.01–1.12	0.02
Vertebroplasty						
Post-ACO trend	1.11	1.05–1.16	<0.001	1.15	1.08–1.23	<0.001
Hip fracture						
Post-ACO trend	1.08	1.03–1.13	0.003	1.08	1.01–1.14	0.02

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