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Overuse and Insurance Plan Type in a Privately Insured Population

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Abstract

OBJECTIVES—A substantial portion of healthcare spending is wasted on services that do not directly improve patient health and that cause harm in some cases. Features of health insurance coverage, including enrollment in high-deductible health plans (HDHPs) or health maintenance organizations (HMOs), may provide financial and nonfinancial mechanisms to potentially reduce overuse of low-value healthcare services.

STUDY DESIGN—Using 2009 to 2013 administrative data from 3 large commercial insurers, we examined patient characteristics and health insurance plan types associated with overuse of 6 healthcare services identified by the Choosing Wisely campaign.

METHODS—We explored associations between overuse and patient characteristics using multivariate logistic regression models, including patient age, gender, enrollment in an HMO, enrollment in an HDHP, an indicator of primary care fragmentation, and number of outpatient visits as explanatory variables.

RESULTS—Measurement of services highlighted as potential overuse by the Choosing Wisely recommendations revealed low to moderate prevalence, depending on the service. HMO coverage and enrollment in HDHPs were significantly associated with differences in prevalence of all 6 services, albeit differently in terms of the direction of the effects. Primary care fragmentation was significantly associated with higher rates of overuse.

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CONCLUSIONS—Neither HDHPs nor HMO plans, with their closed networks and referral requirements, consistently reduced overuse, although HMO plans were never associated with higher rates of overuse. As policy makers seek levers for reducing low-value healthcare utilization, health insurance plan features may prove a valuable target, although the effect may be complicated by other factors.

Driven by the urgency to achieve affordable healthcare for more Americans, many policy experts are focusing on defining, identifying, and reducing waste in healthcare. Some policy makers and researchers suggest that generous insurance coverage may prompt patients to demand more testing and interventions than they otherwise would, leading to overuse of services. To the extent this is occurring, health insurance plan type, which can include cost-sharing schemes or utilization management, may reduce waste by curbing demand-driven use of low-value services. To begin addressing this issue, the American Board of Internal Medicine Foundation launched the Choosing Wisely campaign in 2012, an initiative aimed at reducing unnecessary use of healthcare services. More than 80 specialty societies created lists of low-value services,¹ and the campaign was associated with modest decreases in some services.²

The potential impact of health insurance plan type and, more specifically, high-deductible health plans (HDHPs) on minimizing waste remains inconclusive. HDHPs have high levels of initial cost sharing until the deductible is met, potentially reducing inappropriate use by making consumers more sensitive to the prices of healthcare services. Shifts in the employer-sponsored insurance landscape indicate a gradual increase in the number of firms offering and number of employees enrolling in HDHPs in the past 5 years.^{3,4} It is thus increasingly important to understand the relationship between health insurance plan type and overuse of care.

Although evidence on the long-term effect of HDHPs on overuse is limited, some results of studies examining the short-term effects on utilization and spending suggest that HDHPs may reduce outpatient visits, out-of-pocket (OOP) spending, and emergency department use.^{5–7} Others have found that HDHPs do not affect utilization of laboratory tests or acute care visits and that decreases in utilization are temporary as the patient transitions to a new plan with higher levels of cost sharing.^{8,9} The evidence on high deductibles and cost sharing suggests that consumers have difficulty differentiating high- and low-value care; this often requires physician judgment.^{10–15} Studies also reveal variation in patient adherence to providers' medical advice and suggest that adherence can be influenced by several patient factors, including age, gender, and patient–provider relationship.^{16–19}

Health maintenance organizations (HMOs) are thought to reduce overuse by requiring patients to select a primary care provider (PCP), from whom a referral is required in order to see a specialist, who must be part of the plan's network.^{20,21} These plans may steer patients away from providers with high rates of low-value service use through limited networks. There may also be financial and nonfinancial mechanisms, such as preauthorization or utilization review, that discourage physicians from ordering low-value services.

Little is known about trends in overuse for adults with private insurance, although evidence is mounting on the prevalence of and variation in overuse in the Medicare population.^{22–27} Most studies describing overuse of low-value care among the privately insured have focused on pediatric populations or assessed overuse in a single insurer or state.^{28–30} With renewed interest and professional engagement in naming and addressing low-value services, policy makers and payers need evidence on which tools and levers reduce overuse.

STUDY DESIGN

We examined cross-sectional data from a large commercially insured population to describe trends in overuse of low-value care between 2009 and 2013 and to capture the association among patient characteristics, health insurance plan type, and the use of 6 low-value services.

DATA AND METHODS

Data and Study Population

We obtained commercial insurance claims data from the Health Care Cost Institute (HCCI) for patients with employer-sponsored health insurance coverage from 2009 to 2013. This dataset includes commercial data from 3 large insurers: Aetna, Humana, and UnitedHealthcare. Across all years, the data reflect the healthcare claims of approximately 45 million adults aged 18 to 64 years. HCCI estimates that these claims data account for about 26% of adults younger than 65 years with employer-sponsored insurance in the United States.³¹

Selecting Choosing Wisely Services for Measurement

We developed claims-based algorithms for 6 services, representing 22 Choosing Wisely recommendations. We selected recommendations for analysis based on: 1) the feasibility of measuring the service and manner of use in claims data only, 2) the expected denominator size, and 3) our desire to study services that vary broadly in cost and represent diverse segments of healthcare. The Choosing Wisely services excluded from analysis were either difficult to measure in claims data or pertained to a very small percentage of the commercially insured population. We studied nonindicated use of the following: imaging early in the course of new back pain, vitamin D deficiency screening for low-risk patients, prescription opioids for migraine, cardiac testing in low-risk patients, short-interval bone densitometry (DEXA), and preoperative cardiac testing in low-risk patients ahead of low-risk (noncardiac) surgery.

Construction of Measure-Specific Cohorts at Risk

We used a combination of *International Classification of Diseases, Ninth Revision (ICD-9)* and Current Procedural Terminology codes to construct cohorts at risk for 6 Choosing Wisely services and to identify health service events highlighted by the Choosing Wisely recommendations. In the eAppendix (available at ajmc.com), we describe the measure and event definitions. We used HCCI pharmacy claims data, where applicable, for cohort inclusion/exclusion and to identify Choosing Wisely prescription service events. In all cases,

we conservatively excluded beneficiaries not targeted by the Choosing Wisely recommendation. We limited our analysis to nonindicated tests and procedures, excluding services with claims diagnoses that suggested appropriate medical indication. When possible, we drew from published validated claims-based measures and conducted sensitivity analyses to optimize the measure construct. Although we used 2009 to 2013 data for the analyses, some measures were limited to smaller time windows to permit sufficient look-back periods within the data to identify, for example, prevalent disease states.

Statistical Analysis

Multivariate logistic models with hospital referral region (HRR) fixed effects were fitted to analyze the factors associated with overuse at the patient level. To identify the association between overuse of low-value care and each insurance plan type, we created several binary indicator variables. Included in the model were an indicator for enrollment in an HMO plan (compared with all other plan types, of which the majority were point-of-service [POS] plans, exclusive provider organizations [EPOs], or preferred provider organization [PPO] models) and an indicator for an HDHP. We also included an indicator for patients with administrative services only (ASO) plans, which are arrangements where an employer contracts with an organization to deliver administrative services, like claims processing, for its self-funded health insurance program. The indicator for ASO plans may pick up the effects of either or both characteristics of these plans and the patients who are enrolled in them compared with fully insured plans that are not captured by the network type and HDHP indicator. We also included the patient's age, gender, and health status as explanatory variables. We hypothesized that patients with more contact with the health system overall, which we captured as the number of outpatient visits during the study year, would have more opportunities for overuse. Finally, we included the number of unique PCPs seen during the study period as an indicator of the fragmentation of primary care, which may also be a risk factor for low-value care receipt. We included year indicators in the model to allow for changes over time.

The study was approved by the institutional review board at the Harvard T.H. Chan School of Public Health.

RESULTS

Age and gender differences were consistent with the clinical circumstances of the featured tests and treatments (Table 1). Patients in our sample were enrolled in health insurance products that varied by managed care structure and cost sharing: 8.5% to 15.3% of patients in each measure sample were enrolled in an HMO and 14.1% to 17.2% were enrolled in an HDHP.

Rates of overuse ranged from a low of 6.8% for short-interval DEXA testing to a high of 28.1% for preoperative cardiac testing (Table 1). Two of 6 measures revealed a downward trend in overuse in 2009, 2010, 2011, and 2012: prescription opioids for migraine and preoperative cardiac testing. We observed monotonically increasing overuse of vitamin D deficiency screening from 2009 through 2013. In multivariate analyses controlling for region and individual characteristics for each of the 6 measures, health insurance plan type was

associated with overuse (Table 2). HMO enrollment was associated with significantly less overuse of imaging for low back pain (odds ratio [OR], 0.880; 95% CI, 0.870–0.890), vitamin D deficiency screening (OR, 0.606; 95% CI, 0.604–0.607), cardiac testing (OR, 0.962; 95% CI, 0.959–0.965), and preoperative cardiac testing (OR, 0.937; 95% CI, 0.923–0.951). The association between having an HDHP and overuse differed by measure (Figure); those enrolled in HDHPs had slightly but significantly lower odds of overuse of imaging for low back pain (OR, 0.987; 95% CI, 0.979–0.995), prescription opioids for migraine (OR, 0.960; 95% CI, 0.943–0.980), and short-interval DEXA (OR, 0.946; 95% CI, 0.930–0.963). In contrast, enrollment in HDHPs was significantly associated with greater odds of overuse of vitamin D deficiency screening (OR, 1.036; 95% CI, 1.034–1.038) and preoperative cardiac testing (OR, 1.012; 95% CI, 1.001–1.023). Relative to those who were fully insured, having an ASO plan was associated with slightly but significantly greater odds of imaging for low back pain (OR, 1.010; 95% CI, 1.003–1.021), cardiac testing (OR, 1.020, 95% CI, 1.017–1.022), short-interval DEXA (OR, 1.301; 95% CI, 1.278–1.324), and preoperative cardiac testing (OR, 1.015; 95% CI, 1.005–1.025).

Compared with those with 3 or more PCPs, patients cared for by 1 or 2 PCPs had significantly lower odds of overuse for 4 of 6 measures: vitamin D deficiency screening, prescription opioids for migraine, cardiac testing, and short-interval DEXA.

DISCUSSION

Our findings suggest that overuse is widespread among commercially insured patients and, despite the availability of utilization management and higher cost sharing, comparable with rates found in previous studies of the Medicare population.^{22,24} For nearly every service we studied, patient characteristics and health insurance plan type were significant predictors of overuse. Fragmentation of primary care, in particular, was associated with significantly more overuse for most measures. This finding is consistent with previous work suggesting that care continuity may play a role in reducing overuse and is perhaps attributable to patient–provider trust and communication.³² Current efforts to redesign primary care delivery, many of which prioritize care continuity, may play a role in reducing overuse.

All of the health insurance plan types studied (HMO, HDHP, or ASO) were associated with significant differences in overuse compared with EPOs, PPOs, or POS plans. However, the direction of the association differed across the set of 6 services studied. Focusing specifically on the role of HMO and HDHP enrollment in informing interventions to reduce waste, we found that these factors were important explanatory variables (based on statistical significance), but their association with overuse was inconsistent and warrants further investigation. Further insights on the causal effects of health insurance plan type could be derived from analyzing an exogenous source of variation in cost sharing or plan structure, such as when an employer switches plan offerings. From the standpoint of intervention, payers might do more to target cost sharing and other policies explicitly to address overuse, rather than put downward pressure on all nonpreventive healthcare utilization as in an HDHP. Although relying on higher cost sharing may achieve reductions in spending, it carries risks, and co-payment amounts and deductible sizes should be set carefully.³³ Findings of several studies have shown that high deductibles may encourage individuals,

particularly of lower income or with multiple chronic conditions, to forego essential medical care.^{34–37} As a result, health insurance plan type should be considered alongside other policies and interventions to address overuse of low-value services.³⁸

Interpretation of our findings on ASO plans may reflect a complicated mix of both plan and population differences. A 2011 report to Congress indicated that there are small differences in coverage generosity when comparing self-insured and fully insured employer plans, which may affect the use of low-value care. Among HMO plans, for example, OOP payments are higher for self-insured plans relative to fully insured plans. Further, the report found that employers with low-risk employees are more likely to self-insure, resulting in different risk profiles between otherwise identical ASO and fully insured plans.³⁹

Limitations

Our analysis had a number of limitations. We relied on administrative data with limited information on plan benefits and design to identify and describe the use of low-value services. Although we used conservative definitions and exclusion criteria to minimize misclassification risk, claims may not provide enough information or clinical detail to precisely identify low-value care. We were unable to include other measures of benefit design, such as co-payment amounts or OOP maximums. We proxied for these characteristics using insurance plan type. Second, although we aimed to include Choosing Wisely recommendations on lists from multiple specialty societies and services ordered by both specialists and PCPs, the range of services measured was narrow. Lack of variation in demographics or other patient-level factors may have impacted our results. Previous studies have found heterogeneity in nonelderly adults with private insurance; however, we do not think this focus will eliminate variation in our sample.⁴⁰ Our model did not control for supply-side factors other than by controlling for region using HRR indicators. Finally, our analysis of factors associated with overuse was cross-sectional in nature and cannot be used to make definitive causal inferences. Low pseudo-R² values are common in cross-sectional analyses with limited explanatory variables.

CONCLUSIONS

As clinicians and other experts expand our understanding of low-value health services, payers and policy makers are looking for tactics to influence the use of these services while maintaining access to effective care. For privately insured patients, such as the subjects of our analysis, health insurance plan type might be expected to affect the value of care received. Our work shows that HDHPs do not consistently reduce overuse, nor do HMO plans that typically have closed networks and referral requirements (although HMO plans were never associated with higher degrees of overuse). Contrary to the popular belief that patients need more cost sharing to internalize the value of healthcare services, our study plans with lower cost sharing were not consistently associated with higher use of low-value services. More targeted demand-side mechanisms (eg, value-based cost sharing) or stringent supply-side mechanisms (eg, preauthorization or risk bearing by providers) may be warranted to address the use of low-value care.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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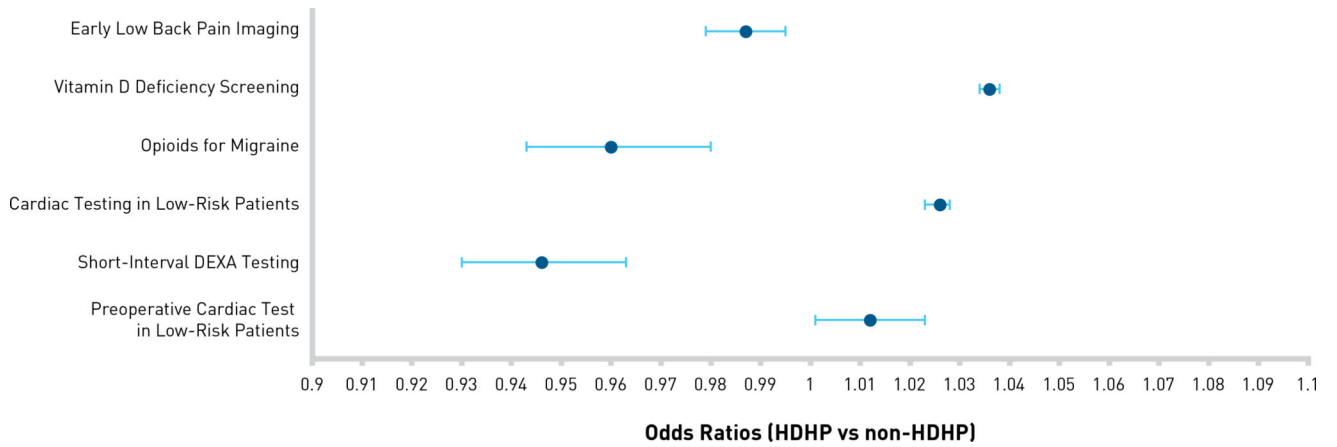
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TAKEAWAY POINTS

- › We found low to moderate overuse of 6 low-value health services among patients with commercial insurance.
- › Health insurance plan type, including enrollment in a health maintenance organization or high-deductible health plan, was significantly associated with differences in prevalence of all 6 services.
- › Primary care fragmentation was significantly associated with higher rates of overuse.
- › Health insurance plan features should be considered alongside more targeted mechanisms, like preauthorization and value-based cost sharing, to influence overuse of these low-value services.

**FIGURE.****Association Between HDHPs and Overuse of 6 Low-Value Services^a**

DEXA indicates bone densitometry; HDHP, high-deductible health plan.

^aOveruse was defined as receipt of low-value care: low back imaging early in an episode of pain, vitamin D deficiency screening in low-risk patients, prescription opioid use in patients with migraine, cardiac testing in asymptomatic patients, short-interval DEXA testing, and preoperative cardiac testing for low-risk surgery.

Source: Authors' calculations based on data from the Health Care Cost Institute, 2009–2013.

TABLE 1

Patient Characteristics and Prevalence of 6 Low-Value Services

Patient Characteristics	Early Low Back Pain Imaging (n = 3,125,607)		Vitamin D Deficiency Screening (n = 94,344,334)		Opioids for Migraine (n = 649,343)		Cardiac Testing in Low-Risk Patients (n = 71,573,063)		Short-Interval DEXA Testing (n = 1,665,968)		Preoperative Cardiac Test in Low-Risk Patients (n = 1,757,046)	
	n	%	n	%	n	%	n	%	n	%	n	%
Overuse rate	676,792	21.7	9,525,170	10.1	138,694	21.1	8,192,458	11.4	114,021	6.8	493,661	28.1
Female	1,737,846	55.6	53,232,182	56.4	526,771	81.1	40,562,797	56.7	1,584,028	95.1	947,138	53.9
Age, years												
18–24	260,147	8.3	11,566,218	12.3	69,034	10.6	9,219,422	12.9	8,052	0.5	102,480	5.8
25–34	553,325	17.7	19,102,821	20.2	147,429	22.7	14,399,797	20.1	20,303	1.2	204,212	11.6
35–44	772,613	24.7	21,884,938	23.2	183,648	28.3	17,563,163	24.5	77,453	4.7	379,211	21.6
45–54	865,841	27.7	23,441,952	24.9	166,157	25.6	18,267,775	25.5	565,615	34.0	570,763	32.5
55–64	673,681	21.6	18,348,405	19.4	83,075	12.8	12,122,906	17.0	994,545	59.4	500,380	28.5
HDHP enrollment	486,571	15.6	15,226,388	16.1	91,597	14.1	12,260,005	17.1	286,200	17.2	273,578	15.6
HMO enrollment	264,316	8.5	10,544,841	11.2	99,206	15.3	7,086,517	9.9	152,338	9.1	170,191	9.7
Year												
2009	N/A	N/A	20,094,679	21.3	140,586	21.7	14,493,015	20.3	N/A	N/A	379,149	21.6
2010	939,731	30.1	19,598,123	20.8	130,168	20.1	14,007,596	19.6	N/A	N/A	361,027	20.6
2011	826,481	26.4	19,651,687	20.8	125,772	19.4	14,195,358	19.8	633,121	38.0	347,686	19.8
2012	775,092	24.8	19,713,387	20.9	124,651	19.2	14,401,110	20.1	532,819	32.0	343,593	19.6
2013	584,303	18.7	15,286,458	16.2	128,166	19.7	14,475,984	20.2	500,028	30.0	325,591	18.5

Health status^a

Patient Characteristics	Early Low Back Pain Imaging (n = 3,125,607)		Vitamin D Deficiency Screening (n = 94,344,334)		Opioids for Migraine (n = 649,343)		Cardiac Testing in Low-Risk Patients (n = 71,573,063)		Short-Interval DEXA Testing (n = 1,665,968)		Preoperative Cardiac Test in Low-Risk Patients (n = 1,757,046)	
	n	%	n	%	n	%	n	%	n	%	n	%
0 comorbidities	1,486,266	47.6	52,152,215	55.3	274,446	42.3	42,435,860	59.3	513,133	30.8	593,119	33.8
1 comorbidities	839,321	26.9	23,837,959	25.3	187,962	29.0	18,880,461	26.4	494,533	29.7	476,696	27.1
2 comorbidities	441,091	14.1	11,002,784	11.6	98,423	15.2	7,094,805	9.9	325,615	19.6	321,360	18.3
3 comorbidities	358,929	11.5	7,351,376	7.8	88,512	13.6	3,161,937	4.4	332,687	20.0	365,871	20.8
Number of PCPs ^b												
1	1,716,531	70.6	39,497,347	52.9	337,234	61.5	29,312,137	51.1	887,185	69.5	903,406	67.1
2	534,261	22.0	19,797,104	26.5	131,991	24.1	15,394,053	26.8	281,510	22.1	309,205	23.0
3	180,349	7.4	16,363,573	20.6	78,894	14.4	12,658,145	22.1	107,166	8.4	133,089	9.9
Number of annual visits ^c (mean ± SD)	3.18 ± 2.59		2.29 ± 1.64		3.47 ± 3.31		2.28 ± 1.60		3.11 ± 2.56		3.41 ± 2.83	

DEXA indicates bone densitometry; HDHP, high-deductible care plan; HMO, health maintenance organization; N/A, not applicable; PCP, primary care provider.

^aHealth status reflects comorbidity count using the Elixhauser algorithm.

^bNumber of PCPs refers to the number of unique PCPs from whom a patient received care during the study period.

^cNumber of annual visits reflects number of outpatient visits to a clinician.

Source: Authors' calculations based on data from the Health Care Cost Institute, 2009–2013.

TABLE 2

Patient-Level Logistic Modeling Results for Each of 6 Low-Value Services

	Early Low Back Pain Imaging (n = 3,125,607)		Vitamin D Deficiency Screening (n = 94,344,334)		Opioids for Migraine (n = 649,343)		Cardiac Testing in Low-Risk Patients (n = 71,573,063)		Short-Interval DEXA Testing (n = 1,665,968)		Preoperative Cardiac Test in Low-Risk Patients (n = 1,757,046)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Pseudo R ²	0.01		0.08		0.13		0.08		0.03		0.13	
Measures												
HDHP (HDHP vs not)	0.987 ^a	(0.979–0.995)	1.036 ^b	(1.034–1.038)	0.960 ^b	(0.943–0.980)	1.026 ^b	(1.023–1.028)	0.946 ^b	(0.930–0.963)	1.012 ^c	(1.001–1.023)
HMO (HMO vs not)	0.880 ^b	(0.870–0.890)	0.606 ^b	(0.604–0.607)	1.007	(0.985–1.028)	0.962 ^b	(0.959–0.965)	1.009	(0.983–1.035)	0.937 ^b	(0.923–0.951)
Funding (ASO vs not)	1.010 ^a	(1.003–1.021)	0.999	(0.997–1.001)	0.956	(0.942–0.971)	1.020 ^b	(1.017–1.022)	1.301 ^b	(1.278–1.324)	1.015 ^a	(1.005–1.025)
Gender (male vs female)	1.114 ^b	(1.108–1.121)	0.470 ^b	(0.469–0.470)	0.895 ^b	(0.879–0.911)	1.364 ^b	(1.362–1.367)	N/A	N/A	1.413 ^b	(1.403–1.424)
Age, years (18–24 vs 55–64)	0.801 ^b	(0.791–0.811)	0.284 ^b	(0.283–0.285)	0.681 ^b	(0.660–0.702)	0.205 ^b	(0.204–0.206)	0.563 ^a	(0.504–0.629)	0.093 ^b	(0.090–0.095)
Age, years (25–34 vs 55–64)	0.811 ^b	(0.804–0.819)	0.480 ^b	(0.479–0.481)	1.077 ^b	(1.052–1.102)	0.326 ^b	(0.325–0.326)	0.501 ^b	(0.466–0.538)	0.186 ^b	(0.183–0.189)
Age, years (35–44 vs 55–64)	0.853 ^b	(0.846–0.860)	0.692 ^b	(0.691–0.694)	1.129 ^b	(1.102–1.151)	0.543 ^b	(0.542–0.544)	0.592 ^b	(0.573–0.613)	0.369 ^b	(0.365–0.373)
Age, years (45–54 vs 55–64)	0.900 ^b	(0.893–0.907)	0.895 ^b	(0.893–0.896)	1.126 ^b	(1.102–1.151)	0.823 ^b	(0.822–0.825)	0.686 ^a	(0.677–0.696)	0.731 ^b	(0.725–0.738)
Year (2009 vs 2013)	N/A	N/A	0.356 ^b	(0.355–0.357)	1.252 ^b	(1.226–1.278)	N/A	N/A	N/A	N/A	1.500 ^b	(1.482–1.518)
Year (2010 vs 2013)	1.027 ^c	(1.019–1.036)	0.640 ^b	(0.639–0.642)	1.246 ^b	(1.219–1.272)	N/A	N/A	N/A	N/A	1.525 ^b	(1.506–1.543)
Year (2011 vs 2013)	1.040 ^b	(1.031–1.049)	0.772 ^b	(0.770–0.774)	1.206 ^b	(1.180–1.232)	N/A	N/A	1.147 ^b	(1.130–1.164)	1.495 ^b	(1.477–1.514)
Year (2012 vs 2013)	0.999	(0.994–1.004)	0.867 ^b	(0.865–0.869)	0.993	(0.979–1.006)	N/A	N/A	0.896 ^b	(0.882–0.911)	1.412 ^b	(1.395–1.430)
Health status ^d	1.019 ^b	(1.017–1.021)	1.304 ^b	(1.303–1.305)	1.338 ^b	(1.331–1.344)	1.576 ^b	(1.574–1.577)	0.970 ^b	(0.966–0.974)	1.104 ^b	(1.102–1.107)
Primary care fragmentation measure ^e	0.998	(0.986–1.010)	0.865 ^b	(0.864–0.867)	0.713 ^b	(0.699–0.727)	0.934 ^b	(0.932–0.936)	0.412 ^b	(0.403–0.421)	1.000	(0.999–1.014)

	Early Low Back Pain Imaging (n = 3,125,607)	Vitamin D Deficiency Screening (n = 94,344,334)	Opioids for Migraine (n = 649,343)	Cardiac Testing in Low-Risk Patients (n = 71,573,063)	Short-Interval DEXA Testing (n = 1,665,968)	Preoperative Cardiac Test in Low-Risk Patients (n = 1,757,046)
Pseudo R ²	0.01	0.08	0.13	0.08	0.03	0.13
Measures	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI	OR 95% CI
Primary care fragmentation measure 2 ^f	0.959 (0.986–1.011)	0.942 ^b (0.940–0.944)	0.786 ^b (0.769–0.802)	0.970 ^b (0.967–0.972)	0.625 ^b (0.611–0.638)	1.009 ^a (1.003–1.016)
Number of outpatient visits	0.991 ^b (0.990–0.993)	1.043 ^b (1.043–1.043)	1.181 ^b (1.178–1.184)	1.060 ^b (1.059–1.060)	0.970 ^b (0.969–0.975)	1.025 ^b (1.023–1.026)

ASO indicates administrative services only; DEXA, bone densitometry; HDHP, high-deductible health plan; HMO, health maintenance organization; PCP, primary care provider.

^a $P < .01$.

^b $P < .001$.

^c $P < .05$.

^d Health status is measured by a comorbidity count using the Elixhauser algorithm.

^e Primary care fragmentation measure 1 compares having 1 PCP vs 3 PCPs.

^f Primary care fragmentation measure 2 compares having 2 PCPs vs 3 PCPs.

Source: Authors' calculations based on data from the Health Care Cost Institute, 2009–2013.