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Physicians, health plans, and health systems are increasingly evaluated and rewarded based on Health Plan Effectiveness Data and Information Set (HEDIS) and HEDIS-like performance measures. Concurrently, employers and health plans continue to try to control expenditures by increasing out-of-pocket costs for patients. The authors use fixed-effect logit models to assess how rising copayment rates for physician office visits and prescription drugs affect performance on HEDIS measures. Findings suggest that the increase in copayment rates lowers performance scores, demonstrating the connection between financial aspects of plan design and quality performance, and highlighting the potential weakness of holding plans and providers responsible for performance when payers and benefit plan managers also influence performance. Yet the effects are not consistent across all domains and, in many cases, are relatively modest in magnitude. This may reflect the HEDIS definitions and suggests that more sensitive measures may capture the impact of benefit design changes on performance.

Keywords: *quality of care; prescription drugs; HEDIS; copayment rates*

The quality of care received by Americans with chronic illnesses has been a source of serious concern, with one report suggesting that 44% of the time, patients do not receive recommended treatments (McGlynn et al., 2003). Numerous initiatives, such as pay-for-performance and disease management, have attempted to improve this care (California Healthcare Foundation, 2005; Trude, Au, & Christianson, 2006; Weingarten et al., 2002).

Coincident with these efforts to improve care, employers and health plans have been raising patient copayments or shifting beneficiaries into high-deductible plans such as Health Savings Accounts in an effort to address rising health care expenditures (Barr, 2004; California Healthcare Foundation, 2005; Robinson, 2005). Considerable evidence suggests that higher copays reduce the use of valuable services, even for

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patients with serious chronic illness (Gibson, McLaughlin, & Smith, 2005; Gibson, Ozminkowski, & Goetzel, 2005; Goldman et al., 2004; Hillman et al., 1999; Huskamp et al., 2003; Landsman, Yu, Liu, Teutsch, & Berger, 2005; Soumerai, McLaughlin, Ross-Degnan, Casteris, & Bollini, 1994; Tamblyn et al., 2001). Although existing literature, using investigator-defined performance metrics, convincingly demonstrates that cost sharing can adversely affect clinical care, we do not know the impact of copays on the more widely used, standardized measures of quality, such as those measures contained in the Health Plan Effectiveness Data and Information Set (HEDIS).

The investigator-defined metrics may be more sensitive to copay changes than standard quality measures. Yet the relationship between cost sharing and HEDIS measures is important for several reasons. First, any factors that adversely affect HEDIS scores are likely to have deleterious effects on patient health. Second, even if we know that increases in copayment rates affect some measures of quality, it is important to know whether copays affect HEDIS measures of quality given the widespread visibility and reporting of HEDIS measures. Ninety percent of health plans use these measures to track performance (National Committee for Quality Assurance, 2008). However, the specific definitions of HEDIS measures may dampen the impact of copays on HEDIS measures, and, therefore, use of HEDIS measures may fail to convey strongly enough the impact of cost sharing on quality. Third, HEDIS measures are widely used by large employers to compare health plans. It is important to assess whether employers using HEDIS measures to assist in plan contracting or to steer employees to better performing plans may, inadvertently, adversely affect those measures by increasing patient cost sharing. Similarly, HEDIS measures resemble those measures used to create pay-for-performance incentives. It is important to assess whether copay changes may be working against pay-for-performance efforts to improve care.

Although patient cost sharing is not the only reason that patients do not appropriately manage their chronic diseases, it is among the most commonly used levers to control costs. Therefore, efforts should be made to assess the extent to which cost sharing contributes to the failure of patients to receive high quality care.

New Contribution

This is the first study to investigate the impact of cost sharing on the most widely used measures of performance contained in HEDIS. Furthermore, most existing studies focus on prescription drug copayments, but Hillman and colleagues (1999) have demonstrated that office visit copayments may matter as well.

We focus on all of the HEDIS measures related to prescription medications because copayment rates for prescription drugs have received considerable attention as plans adopt multi-tiered formularies. These measures relate to treatment of asthma, receipt of beta-blocker prescriptions post acute myocardial infarction (AMI,

or heart attack), and treatment for depression. Investigation of HEDIS measures related to clinical outcomes, such as Hemoglobin A1c levels, was not possible with our administrative data.

Conceptual Framework

Our conceptual framework draws on standard demand theory. As prices that patients must pay for services rise, consumption falls. However, unlike standard demand theory, which would posit that reductions in use associated with higher prices at the point of service would be concentrated in low-value services, we allow for the possibility that higher prices would deter use of high-value services such as those contained within HEDIS. Considerable empirical evidence supports this possibility (Gibson, McLaughlin, et al., 2005; Gibson, Ozminkowski, et al., 2005; Goldman et al., 2004; Hillman et al., 1999; Huskamp et al., 2003; Landsman et al., 2005; Soumerai et al., 1994; Tamblyn et al., 2001).

Data and Method

We conducted the analysis at the patient level using logistic regression. Individual-level analysis allowed us to more accurately control for patient demographics. Because health plan performance scores are based on an aggregation of individual-level compliance with HEDIS measures, our results indicate how health-plan-level performance may be affected by cost sharing. The magnitude of the effects at the health plan level would depend on the composition of plan enrollees. In the asthma models, about one third of these patients appear in both measurement years (22,397 of the 68,589 patients), so a random-effects logit model was estimated and robust standard errors were utilized.

Sample

Our analysis uses the 2000–2003 MarketScan Commercial Claims and Encounters database, representing the health care experience of at least 6 million enrollees with employer-sponsored health insurance each year. Medical and prescription drug claims were linked to patient enrollment information to create the analytic data set. Importantly, particularly for mental health measures, the data includes claims for services provided under carve-out plans.

Because fee-for-service (FFS) health plans without explicit physician networks or gatekeeper requirements are less apt to participate in quality management initiatives, we excluded enrollees in these types of FFS plans. Only 10% of individuals in the sample were enrolled in plans that were only available in 1 year of the sample. We retained these individuals in the sample, but the results were insensitive to their

exclusion. From this sample, we selected enrollees who met the 2004 HEDIS Technical Specifications (National Committee for Quality Assurance [NCQA], 2003) for the three performance standards that we examine. Thus, three patient subsets were created (see Table 1). The first subset consisted of patients with persistent asthma (N = 68,589), the second consisted of patients with a diagnosis of major depression who had also filled a prescription for an antidepressant (N = 11,638), and the third consisted of patients discharged alive from the hospital after a heart attack (N = 2,929). These are not necessarily mutually exclusive patient groups.

Dependent Variables (Performance Measures)

In each analysis, the dependent variable is a binary variable indicating compliance with the HEDIS standard (1 = *the patient met the performance measure* and 0 = *otherwise*). All definitions reflect HEDIS criteria, and all measures reflect HEDIS methods, with the exception of beta blockers post AMI, which is a hybrid measure. The hybrid measures are based on administrative claims and medical records review, although we base our measures only on administrative claims. Values based on administrative claims are somewhat lower than those based on hybrid methods (Pawlson, Scholle, & Powers, 2007). Because our study design is based on changes in rates over time, and our approach to measurement is the same across the study period, any time invariant measurement issues will be controlled for and will not bias our findings.

All performance measures were calculated in the measurement years, which were 2002 and 2003. For patients with asthma, the performance criterion is that patients with asthma in the prior year must fill at least one prescription for an appropriate asthma medication in the measurement year (inhaled corticosteroids, nedocromil, cromolyn sodium, leukotriene modifiers, or methylxanthines).

For patients suffering from depression, we examined both HEDIS's Effective Acute Phase Treatment and Effective Continuation Phase Treatment measures. Compliance with the performance standard for the acute phase required that patients diagnosed with depression and treated with antidepressants also remain on antidepressants for at least 12 weeks during a 114-day time period. Compliance with the performance standard for the continuation phase required that patients diagnosed with depression and treated with antidepressants also remain on antidepressants for at least 6 months in a 245-day time period.

For patients discharged from the hospital alive following an AMI, two performance measures are used. The first requires that these patients receive a prescription for a beta blocker within 7 days of discharge, have beta blockers on hand prior to admission, or fill an outpatient prescription for a beta blocker during the admission. The second performance measure for AMI patients is based on persistence of beta-blocker treatment after an AMI. To be considered compliant with this measure, patients discharged alive after a heart attack must have or obtain beta blockers for at

Table 1
Sample Definition

Disease	Sample
Asthma	Patients aged 5 to 56 years in the measurement years (2002 and 2003) who were continuously enrolled in the measurement year and the year prior to the measurement year were selected. In the year prior to the measurement year, patients with any of the following events were identified: • at least one Emergency Department visit or inpatient visit with asthma (DX 493.xx) as the principal diagnosis, • at least four outpatient asthma visits, with asthma as one of the diagnoses and at least two asthma-medication dispensing events. An asthma-medication dispensing event is the number of 30-day equivalents of medication that were dispensed to the patient, or • at least four asthma-medication dispensing events. If the patient only meets this criterion through leukotrine modifiers, then the patient must also have a diagnosis of asthma.
Heart attack (AMI)	Patients aged 35 to 64 years who were continuously enrolled in the measurement year and in the subsequent year were selected. Patients discharged alive from an inpatient admission with any of these heart attack (AMI) codes were identified: Diagnosis code 410.x1 or DRG = 121,122, or 516. The first AMI admission for each patient within the time frame was selected. Patients were also excluded if they had any contraindication (via a diagnosis or prescription fill) for beta blockers within the study time frame.
Major depression	Patients aged 18 to 64 with a diagnosis of major depression (ICD-9-CM diagnosis codes: 296.2x, 296.3x, 298.0x, 300.4x, 309.1x, 311.xx) and continuously enrolled in the measurement year and the prior year who met at least one of the following criteria were selected: 1. one principal diagnosis of major depression in any setting, 2. at least two secondary diagnoses of major depression on two different service dates in the outpatient setting, or 3. at least one secondary diagnosis of major depression in the inpatient setting. Patients had to meet one of the above diagnostic criteria during an "intake period" time window (running the previous May 1 to the current year April 30) for each measurement year and also had to fill a prescription for an antidepressant prescription near the first diagnosis date.

Note: Sample definitions based on 2004 HEDIS Technical Specifications.

least 135 days during a 6-month time period. We assume that beta blockers on hand before the AMI admission will be used after the admission, so any days supplied remaining at the time of admission are added to the postdischarge days supply to measure availability of beta blockers.

These measures, which were based on unaudited administrative data as opposed to the audited administrative and clinical data used by the official HEDIS statistics, were within the range of acceptable rates published by the National Committee for Quality Assurance in 2005 for commercially insured individuals (National Committee for Quality Assurance, 2005). In the case of beta blockers, within 7 days of discharge, a certified HEDIS auditor confirmed that the administrative rates that we calculated (for the hybrid measure) were well within the acceptable range. The depression and asthma measures were at about the 90th percentile of performance, suggesting that performance within these large employers measured in the MarketScan database exceeded that for the population at large.

Explanatory Variables

Patient cost sharing. We measured both the copayment amount for prescription drugs and the copayment for an office visit because obtaining an appropriate prescription may entail a physician office visit. Average physician-office-visit copayments were derived from the copayment amounts on the medical claims information for each health plan in each measurement year.

Copayments for prescription drugs vary based on formulary placement (including branded or generic status) and on other incentives (e.g., ordering prescriptions by mail). Furthermore, in some cases copayments are structured as a percentage of the cost (coinsurance) as opposed to a fixed fee per prescription.

Our measure of prescription drug copayments was based on claims data because it was available for all subjects. For each employer–health plan–year combination, we computed the consumer out-of-pocket expense for a 30-day supply for brand-name drugs and generic drugs (including all medications used by patients in the sample). This adjusts for variation in days supplied that may arise if prescriptions are ordered through mail order programs. All copayment amounts were adjusted for inflation using the consumer price index and benchmarked to 2003. Copayments were then assigned to patients based on their enrollment information.

The Pearson correlation coefficients between the claims-derived copayment measures and copayments listed in health plan benefit guides (which were available for approximately half of the enrollees) were high (.91–.99) and always statistically significant ($p < .01$).

Because generic and brand-name prescription drug copayments were highly correlated (Pearson correlation coefficient greater than .70), the two copayment measures were combined into a price index based on the weighted average of the brand and generic prices. The weights were based on the relative number of prescriptions for generic and brand-name drugs across all patients in the clinical area. For anti-asthmatics, 60% of use was for brand-name products. For antidepressants and beta blockers, the brand share was 69.6% and 39.0%, respectively. Because of the differences in these weights, the copay index will vary for each clinical area. This variation is appropriate.

Our use of an index to measure prescription drug copays is similar to related literature (Goldman et al., 2004). By using an employer–plan–year specific index, we avoid any selection bias that might arise if we based the copay for each patient on the actual medications they chose. We believe that class-specific indices are appropriate because they allow us to use an index that appropriately corresponds to the class of medications being studied. Importantly, we do not use the exact drug chosen as the basis of the price index because those choices are endogenous. For example, if patients were able to perfectly substitute away from higher price drugs to lower price drugs, an index based on the actual drug purchased would erroneously suggest that prices were falling. Our index is a measure of the employer action to change prices for the class of drugs in question. If patients respond by switching to less expensive drugs in the class, that endogenous response will appropriately be captured in our effect size.

Other Covariates

We include measures of patient age in years, gender (1 if female), spouse or dependent status (vs. the reference of employee), hourly or salaried employee status (vs. unknown), and income. The household income is imputed using the median household income in the patient's ZIP code of residence from the 2000 U.S. Census. We also included the following measures of health plan type in the measurement year: health maintenance organization (HMO), point-of-service (POS), and capitated POS (vs. a reference of PPO, or preferred provider organization).

Because comorbid conditions and disease severity may affect adherence, each of the models included a series of binary variables capturing the presence or severity of particular comorbid conditions and also the Charlson Comorbidity Index, a comorbidity index derived from the medical claims (D'Hoore, Bouckaert, & Tilquin, 1996; appendix available from authors). These measures were calculated for the year prior to the measurement period to lessen their endogeneity with the performance measure. An indicator variable was created to signify whether the patient was seen by a specialist in the 12 months preceding the measurement period because treatment by a specialist may indicate a higher level of severity of illness and may also affect treatment patterns. This measure is also lagged to lessen endogeneity of provider type with the performance measure. Specialist type varies by disease: pulmonologist for asthma, mental health specialist (psychiatrist or psychologist) for depression, and cardiologist for AMI. Employer and year fixed effects were included in all models to account for secular trends and unobserved employer differences.

Results

The copay and demographic changes vary by disease because the composition of the sample varies by disease, and for drugs, the mix of products across copay categories

(brand name, generic, etc.) varies by disease. There was a rapid increase in consumer cost sharing, with office copays rising between about 14% and 31% during the period and the prescription drug index rising between about 12% and 16% (see Table 2). The main demographic measures were relatively constant, although there were shifts in the share of hourly workers and in plan type (see Table 2).

The impact of copayments on health plan performance measures varies by disease and performance measure (see Table 3). For example, the results for asthma suggest that a $10 increase in the office copayment rate (about a doubling) would generate a reduction of 1.1 percentage points in the performance measure ($p < .01$) from a base of about 76% compliance with the standard (see Figure 1). We do not find a statistically significant effect of prescription drug copays on the asthma performance measure, although the point estimate suggests a small (.2 percentage points) inverse relationship.

The strongest copay effects are found for depression. Consistent with the asthma findings, only office visit copayments matter for acute-stage treatment, whereby a $10 increase in copayments would yield a reduction of 3.6 percentage points in the performance measure ($p = .01$), from a base of about 69% compliance. The effects of prescription drug copayments are in the hypothesized direction and are about the same magnitude (3.5 percentage points) but are not statistically significant.

The continuation-treatment performance measure for depression is sensitive to both office copayments and prescription drug copayments. A $10 increase in office copayments is estimated to reduce performance on this measure by 3.2 percentage points ($p = .042$), and a $10 increase in prescription drug copayments is estimated to reduce performance by 7.1 percentage points ($p = .027$), relative to a base of about 54%. This implies that a $10 increase in copays would reduce performance to about 47%.

In contrast to these results, we do not find a statistically significant relationship between office visit or prescription drug copayments and heart-disease performance measures, which capture the use of beta blockers post AMI. Apart from the copay results, we find that compliance rises with age and income. The results for the other covariates do not present a consistent pattern and often are not statistically significant.

Discussion

Policy makers, health care providers, and purchasers have devoted considerable attention to improving the quality of care. Health plan performance measures have been developed to assess plan performance, and large investments have been made in initiatives such as report cards, disease management, and pay-for-performance programs, all intended to improve quality. At the same time, managers concerned with the costs of care have been raising consumer copayments.

Table 2
Descriptive Statistics by Condition—Measurement Years 2002 and 2003

	Patients With Asthma		Patients With Depression		Patients Discharged Alive After AMI	
Measurement Year	2002	2003	2002	2003	2002	2003
N	39,748	51,238	5,473	6,165	1,169	1,760
Prescription drug copayment	$9.72	$10.98	$12.23	$13.85	$11.44	$13.25
	(3.73)	(4.95)	(4.04)	(5.79)	(5.33)	(5.25)
Office visit copayment	$10.31	$13.48	$11.83	$13.52	$9.06	$11.43
	(6.48)	(7.38)	(5.36)	(4.60)	(7.82)	(9.13)
Age (years)	35.45	35.32	40.5	39.62	51.96	52.03
	(17.84)	(18.00)	(11.11)	(11.26)	(6.27)	(6.66)
Female (%)	54.9%	55.8%	65.2%	64.5%	20.7%	22.5%
Relationship to employee (%)						
Employee	45.1%	45.4%	60.0%	61.6%	68.8%	67.9%
Spouse	23.4%	22.8%	31.4%	29.4%	31.2%	32.1%
Dependent	31.5%	31.8%	8.6%	9.0%		
Employee status (%)						
Salaried	24.7%	23.1%	24.7%	24.0%	23.7%	17.3%
Hourly	21.2%	18.7%	23.6%	25.8%	25.0%	38.7%
Unknown	54.1%	58.3%	52.1%	50.2%	51.3%	44.0%
Income in 000s (census)	$52.08	$51.06	$50.77	$50.39	$46.73	$44.36
	(19.02)	(19.02)	(18.11)	(18.13)	(16.78)	(15.98)
Plan type (%)						
HMO	27.8%	28.0%	32.1%	31.5%	18.1%	17.4%
PPO	39.7%	39.0%	38.3%	45.8%	48.1%	59.7%
POS	15.3%	25.7%	12.8%	13.6%	20.1%	17.5%
Capitated point of service	17.2%	7.3%	16.8%	9.1%	13.7%	5.4%

(continued)

Table 2 (continued)

	Patients With Asthma		Patients With Depression		Patients Discharged Alive After AMI	
Measurement Year	2002	2003	2002	2003	2002	2003
Performance measures (%)						
Receipt of right asthma medication	75.9%	77.0%				
Acute-phase treatment of depression			69.0%	67.1%		
Continuation-phase treatment of depression			53.9%	51.9%		
Beta blocker within 7 days					77.1%	75.9%
Beta-blocker persistence					59.5%	58.2%

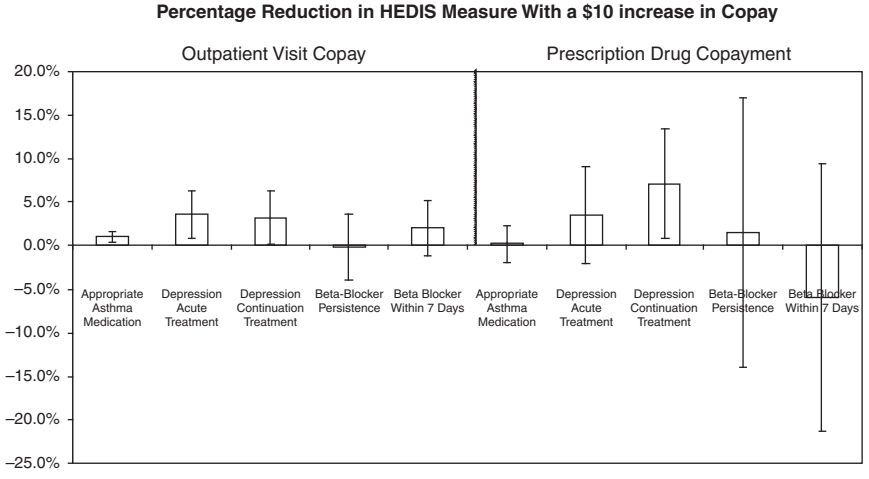
Note: Standard deviations are shown in parentheses below the related figure. HMO = health maintenance organization; PPO = preferred provider organization; POS = point-of-service.

Table 3
Model Estimates

	Appropriate Asthma Medication (N = 68,589)	Depression Acute Treatment (N = 11,638)	Depression Continuation Treatment (N = 11,638)	Beta-Blocker Persistence (N = 2,929)	Beta Blockers Within 7 Days (N = 2,929)
Office visit copayment	–0.008***	–0.017***	–0.013**	0.001	–0.012
	(0.002)	(0.007)	(0.006)	(0.008)	(0.009)
Drug Copayment Index	–0.002	–0.016	–0.029**	–0.006	0.032
	(0.008)	(0.013)	(0.013)	(0.033)	(0.038)
Age (years)	0.012***	0.017***	0.026***	0.023***	0.013*
	(0.002)	(0.002)	(0.002)	(0.006)	(0.007)
Female	0.024	0.047	0.067	–0.143	–0.197*
	(0.025)	(0.044)	(0.041)	(0.095)	(0.108)
Spouse	–0.057*	0.130***	0.156***	–0.168**	–0.219**
	(0.032)	(0.048)	(0.044)	(0.085)	(0.097)
Dependent	0.117**	–0.239***	–0.217**	—	—
	(0.058)	(0.088)	(0.087)		
Salaried	0.002	–0.042	–0.026	–0.093	0.340
	(.110)	(0.245)	(0.240)	(.498)	(.563)
Hourly	–0.322***	–0.369	–0.415*	–0.122	0.344
	(0.116)	(0.248)	(0.244)	(0.510)	(.563)
Income in 000s (census)	0.008***	0.008***	0.008***	0.009***	0.008**
	(0.001)	(0.001)	(0.001)	(0.003)	(0.004)
HMO	–0.196***	0.101	–0.045	0.136	0.585***
	(0.039)	(0.078)	(0.075)	(0.166)	(0.206)
POS	–0.181***	0.052	–0.079	0.156	0.168
	(0.049)	(0.090)	(0.086)	(0.186)	(0.216)
Capitated POS	–0.265***	0.121	0.006	0.082	0.116
	(0.059)	(0.099)	(0.094)	(0.225)	(0.256)
Measurement year 2003	–0.011	0.002	0.019	–0.026	–0.010
	(0.024)	(0.046)	(0.044)	(0.105)	(0.125)

Note: Covariates included in the model but omitted from the table include the constant, region fixed effects, employer fixed effects, health status variables, and the visit to a specialist indicator. Each cell contains the coefficient estimate and below is the standard error estimate (in parentheses). HMO = health maintenance organization; PPO = preferred provider organization; POS = point-of-service.
*p < .10. **p < .05. ***p < .01.

Figure 1
Effect Size



Note: Each bar represents the estimated reduction in compliance with the HEDIS measure in response to a $10 increase in copays (a positive bar indicates that performance deteriorated in response to an increase in copays). The lines represent a 95% confidence interval. Estimates are adjusted for age, gender, employee, spouse or dependent, salary or hourly, income, plan type, year, comorbidity index, and an employer fixed effect.

The findings from this work confirm that increases in copayment rates can lead to lower performance scores. This is consistent with existing literature and illustrates the connection between financial aspects of plan design and quality performance. It highlights the potential weakness of holding plans and providers responsible for performance when payers and benefit plan managers, who often set copayment rates, can influence performance as well.

Yet the magnitude of the effects is not consistent across all domains, and in many cases, it is relatively modest. A reasonable reading of our findings could be that the impact of copay increases on quality is small. We believe that this is a flawed interpretation because it assumes the HEDIS measures are comprehensive measures of quality. We prefer to interpret our results as an indication that some HEDIS measures may not be as sensitive to changes in copayments that we know, from other literature, can lead to deleterious effects.

One reason that HEDIS measures may be less sensitive to copayments than other measures designed to capture quality of care is that HEDIS measures tend to focus on treatment patterns in close proximity to an event (which is often needed to qualify patients for the sample population), as opposed to focusing on long-term treatment. It

is reasonable to speculate that this may result in less sensitivity to price than other quality indicators, which has been shown in the literature to respond to price changes. Our finding that continuation-phase treatment for depression, which is the measure most closely related to continued adherence to medications and the only measure for which prescription drug copayment affects use, is consistent with this view. For the other measures, office visit copayment is more salient, likely reflecting the need for an office visit to obtain a prescription. For AMI patients, office visit copayments are not related to performance, but in this case, all patients have been discharged from the hospital, so it is unlikely that they would need a physician office visit to obtain a prescription. Other factors, such as the seriousness of an AMI and the requirement of only one anti-asthmatic prescription fill for the asthma performance measure, may also help explain our findings.

Expansion of HEDIS measures to better capture persistence may be useful, and NCQA has begun to move in that direction by replacing the acute beta-blocker measure with an analogous one more closely related to persistence. There are, however, barriers to moving too strongly in this direction, including the nature of point-in-time measurement and HEDIS sample definitions. The practical aspects of HEDIS measurement may, thus, not be particularly conducive to longer term measures of performance. Nevertheless, modest changes in this spirit, which the NCQA has already demonstrated are feasible, could be valuable. In part, they could be used in investigations, such as this one, that examine whether factors outside of a health plan's control (e.g., copayments) may affect quality.

The results of other research and our analysis of continuation-phase treatment for depression suggest that long-term treatment is more sensitive to copayments, because each service obtained over time requires a copayment. However, the "persistence" aspect of quality is not well captured by many HEDIS measures. For this reason, we believe that the effects of copays on the quality of care might be underestimated if one were to rely on HEDIS measures as the only quality indicators. The implication for managers and policy makers is that standard quality measures must be developed (and perhaps integrated into HEDIS) that are sensitive to initiatives intended to control costs.

There are several potential confounding factors that may affect our analysis and the speculation that the definition of some HEDIS measures makes them less sensitive to copay changes. First, it is possible that some individuals disenrolled in health plans that raised their copayment rates. If these individuals were systematically more or less likely to comply with HEDIS performance standards, this systematic disenrollment could generate selection bias. Because most office visit or drug copayment rates for workers in these large firms do not vary a great deal at the employer level for a given class of employee (e.g., salaried active), this would typically entail switching employers, which we consider an unlikely response to relatively modest copay increases.

A second concern is that copay changes might be systematically related to other initiatives that may affect performance (such as formulary changes or quality initiatives).

Because we use a market-basket approach to measuring drug prices based on the actual medications used, our price index captures any changes to benefits, including stricter formularies which affect utilization by altering prices. It is more difficult to address the concern that other quality or cost containment initiatives that affect performance were correlated with copay changes. To the extent that employers raising copayment rates systematically adopted other health care management strategies, our results would also capture the effects of those changes. However, some evidence that copay changes were not systematically related to participation in disease management programs ameliorates this concern (Chernew, Rosen, & Fendrick, 2006).

Fourth, our sample definition for each measure relied on claims data. In theory, these might be influenced by copayment changes. However, this concern is mitigated somewhat because the sample definition period is generally based on a plausibly exogenous event (discharge for an AMI) or based on lagged data. For example, the sample for asthma is lagged by 1 year. A copayment change on January 1, 2003 will affect adherence in 2003 but not affect the 2003 sample, because that sample was based on 2002 data. Depression is a little more complicated because there is some overlap in the sample definition period and measurement period, but the sample period and measurement period are largely distinct.

Fifth, we include only a subset of HEDIS measures because of the nature of our data. Broader measures may be more sensitive to copay changes, but the basic issue remains salient—that the sample definition of HEDIS measures and the time window for their measurement may affect their sensitivity to copays. Trivedi, Rakowski, and Ayanian (2008) have reported findings consistent with ours using a non-drug HEDIS measure (screening mammography).

Finally, we make no claims regarding the cost-benefit associated with employer copay increases. If these were the only measures of quality, one might conclude the case against raising copays is small because of the modest response. Yet an important finding from our work is that these measures may not be sufficiently sensitive to copay changes. Thus, such a conclusion would not be justified based on these findings. Furthermore, a broader evaluation of the merits of copay increases would depend heavily on the perspective used. Although the employers may view the savings associated with higher copays as beneficial, social welfare analysis would consider this a transfer and focus only on the aggregate costs (or savings) associated with the change in utilization.

More important, we believe that it is crucial to recognize the connection between copayments and performance because of the pervasiveness of performance improvement initiatives and the lack of coordination between different aspects of plan design. Purchasers and benefit-plan managers that hold plans and providers accountable for performance standards should also be cognizant of the effects of their decisions regarding patient cost sharing on the provision of high-quality health care. Because HEDIS measures are narrowly defined, purchasers should not take great comfort in the relatively modest effects reported here. The challenge is to balance

the need for cost containment and quality improvement. Greater attention to the connection between copayment rates and use of important services would allow more effective design of patient cost sharing and improve the effectiveness and efficiency of other quality improvement initiatives.

References

Barr, P. (2004). The "it" plan. Consumer-directed health plans are taking off. *Modern Healthcare*, *34*(48), 8-9.

California Healthcare Foundation. (2005). *Snapshot: Health care costs 101* (Issue Brief 69). Oakland, CA: Author.

Chernew, M. E., Rosen, A. B., & Fendrick, M. A. (2006). Rising out-of-pocket costs in disease management programs. *The American Journal of Managed Care*, *12*(3), 150-154.

D'Hoore, W., Bouckaert, A., & Tilquin, C. (1996). Practical considerations on the use of the Charlson Comorbidity Index with administrative data bases. *Journal of Clinical Epidemiology*, *49*(12), 1429-1433.

Gibson, T. B., McLaughlin, C. G., & Smith, D. G. (2005). A copayment increase for prescription drugs: The long-term and short-term effects on use and expenditures. *Inquiry*, *42*(3), 293-310.

Gibson, T. B., Ozminkowski, R. J., & Goetzel, R. Z. (2005). The effects of prescription drug cost sharing: A review of the evidence. *American Journal of Managed Care*, *11*(11), 730-740.

Goldman, D. P., Joyce, G. F., Escarce, J. J., Pace, J. E., Soloman, M. D., Laouri, M., et al. (2004). Pharmacy benefits and the use of drugs by the chronically ill. *Journal of the American Medical Association*, *291*(19), 2344-2350.

Hillman, A. L., Pauly, M. V., Escarce, J. J., Ripley, K., Gaynor, M., Clouse, J., et al. (1999). Financial incentives and drug spending in managed care. *Health Affairs—The Policy Journal of the Health Sphere*, *18*(2), 189-200.

Huskamp, H. P., Deverka, P. A., Epstein, A. M., Epstein, R. S., McGuigan, K. A., & Frank, R. G. (2003). The effect of incentive-based formularies on prescription-drug utilization and spending. *The New England Journal of Medicine*, *349*(23), 2224-2232.

Landsman, P. B., Yu, W., Liu, X., Teutsch, S. M., & Berger, M. L. (2005). Impact of 3-tier pharmacy benefit design and increased consumer cost-sharing on drug utilization. *The American Journal of Managed Care*, *11*(10), 621-628.

McGlynn, E. A., Asch, M. S., Adams, J., Keesey, J., Hicks, J., DeCristofaro, A., et al. (2003). The quality of health care delivered to adults in the United States. *The New England Journal of Medicine*, *348*(26), 2635-2645.

National Committee for Quality Assurance. (2003). *HEDIS 2004 technical specifications*. Washington, DC: Author.

National Committee for Quality Assurance. (2005). *Commercial HEDIS 2004 means, percentiles and ratios*. Washington, DC: Author. Retrieved July 20, 2005, from www.ncqa.org/programs/hedis/audit/Commercial2004MPR.htm

National Committee for Quality Assurance. (2008). *HEDIS and quality compass*. Retrieved March 6, 2008, from http://www.ncqa.org/tabid/187/Default.aspx

Pawlson, L. G., Scholle, S. H., & Powers, A. (2007). Comparison of administrative-only versus administrative plus chart review data for reporting HEDIS hybrid measures. *American Journal of Managed Care*, *13*(10), 553-558.

Robinson, J. C. (2005). Health savings accounts—the ownership society in health care. *The New England Journal of Medicine*, *353*(12), 1199-1202.

Soumerai, S. B., McLaughlin, T. J., Ross-Degnan, D., Casteris, C. S., & Bollini, P. (1994). Effects of a limit on Medicaid drug-reimbursement benefits on the use of psychotropic agents and acute mental health services by patients with schizophrenia. *The New England Journal of Medicine*, *331*(10), 650-655.

Tamblyn, R., Laprise, R., Hanley, J. A., Abrahamowicz, M., Scott, S., Mayo, N., et al. (2001). Adverse events associated with prescription drug cost sharing among poor and elderly persons. *Journal of the American Medical Association*, *285*(4), 421-429.

Trivedi, A. N., Rakowski, W., & Ayanian, J. Z. (2008). Effect of cost-sharing on screening mammography in Medicare health plans. *The New England Journal of Medicine*, *358*(4), 375-383.

Trude, S., Au, M., & Christianson, J. B. (2006). Health plan pay-for-performance strategies. *The American Journal of Managed Care*, *12*(9), 537-542.

Weingarten, S. R., Henning, J. M., Badamgarav, E., Knight, K., Hasselblad, V., Gano, A., Jr., et al. (2002). Interventions used in disease management programmes for patients with chronic illness—which ones work? Meta-analysis of published reports. *British Medical Journal*, *325*(7370), 92.