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The Impact of Global Budgets on Pharmaceutical Spending and Utilization: Early Experience From the Alternative Quality Contract

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Abstract

In 2009, Blue Cross Blue Shield of Massachusetts implemented a global budget-based payment system, the Alternative Quality Contract (AQC), in which provider groups assumed accountability for spending. We investigate the impact of global budgets on the utilization of prescription drugs and related expenditures. Our analyses indicate no statistically significant evidence that the AQC reduced the use of drugs. Although the impact may change over time, early evidence suggests that it is premature to conclude that global budget systems may reduce access to medications.

Keywords

pharmaceutical spending, global budgeting, bundled payment, health insurance

Introduction

Global budgeting, under which provider organizations are at risk of total medical spending above a predetermined budget, is seen as one of the most promising current approaches to control health care spending.[1,2] In 2009, Blue Cross Blue Shield (BCBS) of Massachusetts, the state's largest commercial payer, implemented the Alternative Quality Contract (AQC) in response to continued health care spending growth.[3] The AQC is a contracting model that combines a global budget with pay-for-performance, similar to the Accountable Care Organization model established by the Centers for Medicare and Medicaid Services (CMS).[4] BCBS implemented the AQC among its health maintenance organization (HMO) and point-of-service (POS) enrollee populations, who are required to designate a primary care physician (PCP), similar to some patient-centered medical home models.[5-9] The contracting arrangements, quality bonuses, and technical support provided to AQC practices have been described elsewhere.[10]

Recent work has demonstrated that the AQC reduced aggregate spending in its first two years, both by shifting referrals to providers who were paid lower fees and by reducing use of medical services.[10,11] However, it is unclear what impact the AQC had on the use of prescription drugs. Pharmaceutical spending growth could be slower in AQC physician groups because global budgets provide incentives to prescribe fewer drugs, and shift prescriptions toward lower cost branded drugs and generics. Moreover, changing referral patterns may send more patients to specialists with lower cost prescribing patterns. To the extent that prescription drugs offset the use of non-drug services,[12] however, the AQC may lead to an increased use of drugs because providers have incentives to keep total spending below their budget.

The objective of this study was to examine the effects of this global budget system on drug-prescribing patterns and related expenditures.

Methods

Study Population

BCBS enrollees from January 2006 through December 2010 were included. From 1,648,994 HMO and POS members who were continuously enrolled for at least one calendar

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year, we excluded 267,595 who did not have drug coverage in their plans. The remaining 1,381,399 members comprised our analysis sample. All AQC and non-AQC providers with BCBS patients were included.

Study Design

We used a difference-in-differences approach with a pre-post, intervention-control design to examine the AQC effect. The pre-intervention period was 2006 through 2008; post-intervention was 2009 through 2010. The intervention group consisted of all enrollees with PCPs in the seven physician organizations that began assuming risk under the program in 2009 (physician groups could choose whether to accept the terms of the AQC).

Drug spending and utilization were quantified for four drug categories: all drugs (both branded and generic), drugs for conditions included in the AQC quality-incentive, and drugs for conditions that do not appear in the previous category. Drug classes in the quality-incentive category that were analyzed separately included cholesterol-lowering agents, oral diabetes drugs, anti-depressants, anti-hypertensives, and smoking cessation medications.

Variables

For each of the dependent variables described above, we calculated prescriptions filled and spending in each class per member per quarter (combining BCBS spending and enrollee cost sharing). To account for prescriptions that covered smaller time periods, we divided the number of days supply by 30 if the script count was 30 or more, otherwise we counted the record as a single prescription. Because of the low prescription rate for some of the classes of drugs under study, we multiplied these counts by 100 for ease of presentation. We computed spending from claim-level payments made within the global budget. These measures of spending did not capture quality bonuses or end-of-year budget reconciliation in the AQC. Our spending measure is the total allowed amount (i.e., plan payment plus patient payment), as defined by the BCBS formulary. These spending amounts do not reflect any rebates paid to BCBS.

To control for differences in benefit generosity, we also constructed three measures of the cost sharing faced by enrollees in each BCBS plan: one specific to prescription drugs, another for physician visits, and a third for all non-prescription drug utilization. To calculate each of these measures (which vary by calendar year), we divided the sum of out-of-pocket spending (including deductible, cost sharing, and co-pays) across all enrollees in each plan by the total allowed amount summed across all enrollees.

Our analysis file also included variables indicating the enrollee's age (in groups), sex, and interactions between age and sex. We also controlled for differences in risk across enrollees. One possibility was to employ a single risk score using methods developed by DxCG.[13] However, this approach may not be appropriate for prescription drug utilization and spending: The DxCG algorithm predicts overall medical care spending, and not prescription drug spending in isolation. Furthermore, a single risk score may mask important multidimensional differences in health across enrollees. To this end, we have constructed a series of 84 condition category variables, using the same methods that the CMS uses to construct its risk adjustment scores for the Medicare Part D prescription drug program. We retain these 84 variables for use in our regressions, rather than collapsing them to a single score as CMS does.

Statistical Analysis

We created a separate record for each enrollee, for every quarter they appeared in the BCBS enrollment files. With this enrollee-quarter-year-level file, we estimated three related regression models for each of the dependent variables described earlier. Each of the models takes the following general form:

$$\begin{aligned} f\left(E\left(Y_{igpt}\right)\right) &= \alpha + \beta \mathrm{AQC}_g + \gamma\, \mathrm{post}_t + \delta \mathrm{AQC}_g \cdot \\ &\mathrm{post}_t + \zeta\, \mathrm{time}_t + \eta_q \sum_{q=1}^{3} \mathrm{qtr}_q + \theta \mathrm{AQC}_g \cdot \mathrm{time}_t + \\ &\kappa_q \sum_{q=1}^{3} \mathrm{AQC}_g \cdot \mathrm{qtr}_q + Z_{pt}'\lambda + X_{it}'\nu, \end{aligned} \tag{1}$$

where $f(\,)$ is the link function, Y_{igpt} is the outcome measure for enrollee i enrolled with provider group g and plan p in quarter-year t (e.g., 1Q 2006), AQC_g is an indicator for whether the enrollee's provider group was part of the AQC intervention, post_t is an indicator for years 2009 and later, time_t is a time trend (counting each of the 20 quarter-year combinations in our data, with 4Q 2010 as the omitted category), qtr_q is a set of quarter indicators (with 4Q as the omitted category), Z_{pt} contains the plan-year cost-sharing measures, and X_{it} contains the following enrollee-level variables: age groups (17 total, one omitted), sex, age-sex interactions, and the 84 condition category risk adjustment indicators described earlier. Our estimate of interest is δ, the coefficient on the interaction between the AQC and post-period indicators. We also included an AQC-time trend interaction, and AQC-quarter interactions.

We estimated three models for each dependent variable: a logit model of the probability of any drug utilization, an exponential (Poisson) model of the number of scripts conditional on positive utilization, and an exponential model (with a variance function proportional to the mean) of drug spending conditional on positive utilization. (We investigated alternative models: a negative binomial model for the prescription count regressions, and an exponential model with a variance function equal to the square of the mean for the

Table 1. Characteristics of the Study Population.

Variable	All AQC groups (n = 365,605)		Control group (n = 1,097,460)	
	Pre-AQC (2006-2008)	Post-AQC (2009-2010)	Pre-AQC (2006-2008)	Post-AQC (2009-2010)
Member characteristics				
Age (years)[a]	34.5 ± 18.6	35.7 ± 18.5	35.2 ± 18.8	35.4 ± 19.0
Female sex (%)	52.3	51.8	50.7	50.5
Health risk score[a]	1.09 (0.12-1.31)	1.17 (0.13-1.40)	1.12 (0.11-1.34)	1.16 (0.12-1.38)

Note. ± values are *M* ± *SD*. Values in parentheses are the 25th and 75th percentiles. AQC = Alternative Quality Contract; CMS = Centers for Medicare and Medicaid Services.

[a]Health risk score denotes enrollee health status and expected spending. It is calculated using current year diagnoses, claims, and demographic information in a statistical model similar to the method used by CMS for risk adjustment of prospective payments to Medicare Advantage plans.

spending regressions. The results from these models were similar in magnitude and statistical significance to our main results.) For all models, we used propensity weights.[14] We first ran a logit regression of the probability of being in the AQC group, using age, sex, and risk score as independent variables. We then weighted each treatment group case by the inverse of this probability, and each control group case by 1 minus the inverse of this probability. Huber-White corrections were used to adjust standard errors for clustering of multiple observations for each physician group.[15-17]

All analyses used STATA software, Version 13. The Harvard Medical School Office for Research Subject Protection approved the study.

Results

There were 365,260 subjects with at least 1 year of continuous enrollment from 2006 through 2010 in the intervention group and 1,097,460 such subjects in the control group. (A small number of members were part of both the AQC and non-AQC groups.) Table 1 presents statistics on characteristics of the two groups, before and after the introduction of the AQC. At baseline, individuals in the intervention group were somewhat younger, more likely to be male, and of better health status than those in the control group, although none of these differences were statistically significant. Table 2 shows that spending (conditional on positive utilization) prior to the intervention in the two groups was similar ($330.34 per member per quarter among enrollees in AQC practices, compared with $324.60 per member per quarter in non-AQC practices). More importantly, our difference-in-differences study design requires only that the trends are similar, not that baseline spending levels are the same. Our analysis supports this assumption. Specifically, regression analysis indicates no substantively or statistically significant difference in the trends in spending across the two groups prior to the intervention. The results for the AQC-time trend interaction term indicate that for all drugs, the trend in the probability of positive utilization (coefficient estimate 0.00033, p = .73), script count per 100 enrollees (coefficient estimate 0.00064, p = .55), and spending (coefficient estimate 0.00074, p = .68) are all statistically similar between the AQC and non-AQC groups. The results are similar for the other dependent variables.

When all drug classes were examined, the regression-adjusted estimates indicate no statistically significant impact of the AQC on the use of drugs. The probability of positive utilization fell 0.83% for AQC enrollees compared with controls (absolute change −0.004, 95% confidence interval [CI] = [−0.02, 0.01]). Conditional on utilization greater than zero, the average number of prescriptions per 100 AQC members compared with controls fell by 0.21% (absolute change −1.23, 95% CI = [−15.22, 12.76]) and spending fell by 0.18% (absolute change −$0.59, 95% CI = [−13.88, 12.69]). None of these estimated effects are statistically significant, nor are any of the results for specific drug classes.

Results presented in Table 2 that do not account for confounding suggest that the AQC may have *increased* the use of drugs. We prefer the models that adjust for confounding, but a positive finding could arise if AQC groups felt that drug use reduced non-drug spending, tried to increase drug use to capture quality incentives, or if the AQC induced use of generic drugs with lower co-pays and thus had higher adherence.

Discussion

Policy makers have advocated global budgets as a potential way to control health care spending growth.[18] As with any form of bundled payment, concerns arise that important medical services may be underutilized. Along with global budgets, the AQC incorporated a sophisticated pay-for-performance component into the system to offset concerns regarding underuse of established preventive services. Our analysis of drug utilization and spending in the first 2 years of the AQC allays these concerns. We found very little evidence of impacts in the use of prescription drugs. Although the point estimates for some of our models indicate a reduction in drug utilization, none of the results were statistically significant.

Our study has several limitations. The study population was young and included only members enrolled in a BCBS

Table 2. Change in Drug Utilization and Spending per Member per Quarter in the Intervention and Control Groups.

	Intervention group (n = 332,624)			Control group (n = 1,296,399)							
Dependent variable	Before the implementation of AQC	After the implementation of AQC	Change	Before the implementation of AQC	After the implementation of AQC	Change	Between-group difference (intervention-control)	Adjusted difference	Adjusted percentage difference	*SE*	95% CI
All drugs											
Overall											
Any utilization	0.511	0.510	−0.001	0.504	0.496	−0.009	0.008	−0.004	−0.83	−0.007	[−0.018, 0.010]
Scripts per 100 enrollees	597.32	609.33	12.01	583.68	589.75	6.06	5.95	−1.23	−0.21	−6.42	[−15.22, 12.76]
Spending	330.34	355.32	24.98	324.60	346.01	21.41	3.57	−0.59	−0.18	−6.10	[−13.88, 12.69]
Branded											
Any utilization	0.240	0.193	−0.046	0.243	0.194	−0.049	0.002	−0.004	−1.50	−0.003	[−0.010, 0.003]
Scripts per 100 enrollees	378.15	349.13	−29.02	373.34	341.68	−31.66	2.64	−1.84	−0.49	−4.76	[−12.21, 8.52]
Spending	481.33	612.15	130.83	463.90	585.53	121.62	9.20	−3.12	−0.67	−10.22	[−25.39, 19.16]
Generic											
Any utilization	0.450	0.466	0.016	0.443	0.451	0.008	0.008	−0.003	−0.70	−0.006	[−0.016, 0.010]
Scripts per 100 enrollees	477.54	522.47	44.93	460.05	500.92	40.88	4.05	−0.32	−0.07	−4.56	[−10.25, 9.61]
Spending	118.93	135.04	16.11	115.55	128.52	12.97	3.13	0.42	0.36	1.75	[−3.36, 4.20]
Incented											
Overall											
Any utilization	0.176	0.183	0.007	0.176	0.181	0.005	0.003	−0.001	−0.32	−0.003	[−0.007, 0.006]
Scripts per 100 enrollees	428.73	434.40	5.67	412.70	415.69	2.98	2.68	−1.07	−0.26	−4.12	[−10.05, 7.90]
Spending	214.01	195.88	−18.13	209.97	191.62	−18.35	0.22	0.14	0.07	3.55	[−7.58, 7.87]
Statins											
Overall											
Any utilization	0.074	0.084	0.009	0.074	0.081	0.007	0.003	0.000	−0.08	0.000	[−0.001, 0.001]
Scripts per 100 enrollees	292.13	292.75	0.62	284.80	286.95	2.15	−1.53	−1.71	−0.60	−2.53	[−7.14, 3.73]
Spending	174.20	110.26	−63.94	177.13	116.58	−60.55	−3.39	−0.06	−0.03	−4.82	[−10.56, 10.44]
Diabetes, oral											
Overall											
Any utilization	0.018	0.019	0.001	0.019	0.019	0.000	0.001	0.000	0.10	0.000	[0.000, 0.000]
Scripts per 100 enrollees	426.68	402.65	−24.03	410.28	384.70	−25.58	1.55	−2.12	−0.52	−2.90	[−8.34, 4.10]
Spending	183.12	148.24	−34.88	185.37	145.13	−40.24	5.36	6.29	3.39	5.32	[−5.19, 17.77]

(continued)

Table 2. (continued)

Dependent variable	Intervention group (n = 332,624)			Control group (n = 1,296,399)							
	Before the implementation of AQC	After the implementation of AQC	Change	Before the implementation of AQC	After the implementation of AQC	Change	Between-group difference (intervention-control)	Adjusted difference	Adjusted percentage difference	*SE*	95% CI
Diabetes, injectable											
Overall											
Any utilization	0.007	0.008	0.001	0.007	0.008	0.001	0.000	0.000	−0.23	0.000	[0.000, 0.000]
Scripts per 100 enrollees	384.83	384.72	−0.11	362.35	365.10	2.76	−2.86	−8.28	−2.29	−7.52	[−24.52, 7.96]
Spending	495.12	685.59	190.47	465.28	638.20	172.92	17.54	−19.03	−4.09	−11.13	[−43.27, 5.22]
Anti-depressants											
Overall											
Any utilization	0.082	0.083	0.001	0.081	0.082	0.000	0.000	0.000	0.24	0.001	[−0.002, 0.002]
Scripts per 100 enrollees	327.11	332.94	5.83	301.18	306.98	5.80	0.02	−1.51	−0.50	−3.95	[−9.99, 6.98]
Spending	169.17	170.01	0.84	154.59	156.03	1.44	−0.60	−2.05	−1.33	−4.06	[−10.75, 6.65]
Anti-hypertensives											
Overall											
Any utilization	0.052	0.054	0.002	0.055	0.055	0.000	0.002	0.000	−0.46	0.000	[−0.001, 0.000]
Scripts per 100 enrollees	304.54	303.38	−1.17	292.96	293.81	0.85	−2.02	−1.13	−0.39	−1.88	[−5.21, 2.96]
Spending	69.22	73.68	4.46	69.03	74.12	5.09	−0.63	−1.06	−1.53	−1.37	[−4.05, 1.94]
Smoking cessation											
Overall											
Any utilization	0.004	0.003	0.000	0.004	0.003	−0.001	0.000	0.000	0.67	0.022	[−0.046, 0.046]
Scripts per 100 enrollees	142.19	142.05	−0.13	138.02	138.11	0.09	−0.22	3.67	2.66	2.10	[−0.79, 8.13]
Spending	139.76	153.35	13.59	134.95	145.15	10.19	3.40	4.91	3.64	4.31	[−4.33, 14.15]
Not incented											
Overall											
Any utilization	0.475	0.472	−0.003	0.470	0.460	−0.011	0.007	−0.004	−0.94	−0.007	[−0.019, 0.010]
Scripts per 100 enrollees	483.90	489.73	5.83	471.50	472.45	0.95	4.89	−1.08	−0.23	−4.38	[−10.55, 8.39]
Spending	276.16	307.89	31.72	269.53	297.75	28.21	3.51	−2.41	−0.89	−5.25	[−13.85, 9.03]

Note. Unadjusted amounts use propensity score weights. Standard errors were calculated using the delta method. Results for scripts and spending are conditional on positive utilization. AQC = Alternative Quality Contract; CI = confidence interval.

HMO or POS plan. Therefore, the results may not be generalizable to other populations, such as Medicare beneficiaries, enrollees in preferred provider organization plans, or other states. In addition, our analyses cover only the first 2 years of the AQC. The AQC targets were set on the basis of actuarial projections to save money over the course of the 5-year contract. Provider groups may adjust referral and prescribing patterns as the contract period progresses, leading to results different from those presented here. Consistent with this is the finding of increased savings in Year 2 of the AQC as compared with Year 1.[10,19] Moreover, as with all quasi-experimental studies, there is a risk that unmeasured confounders could bias the results. Our study design requires only that the trend in the treatment and control group be similar and our statistical analysis supports that assumption. Finally, our analysis essentially reports a null finding (no effect).

There are several reasons why the AQC may not have reduced the use of prescription drugs. First, the AQC includes bonuses for quality. Several of them relate to outcomes affected by use of drugs (e.g., blood pressure and cholesterol). As a result, physicians may increase the use of these drugs to earn the quality bonus. Second, in some cases, prescription drugs may offset other, more costly, medical expenditures, such as HIV and congestive heart failure treatment. Thus, physicians may have maintained prescribing patterns to preserve these non-drug offsets. Third, physician groups who were part of the intervention may have prioritized other types of spending in their cost containment efforts.[11] In our 5-year sample, prescription drug spending accounted for 13% of total spending. Finally, most of these provider organizations in the BCBS network, both in and out of the AQC, were previously operating under incentives to increase the use of generic medications. Moreover, Massachusetts had a mandatory generic substitution law in place that would affect all groups. Thus, all of these groups had incentives in this area preceding the AQC and there might have been little room for improvement.

Sustainability of the AQC and the financial viability of the model for providers will ultimately depend on identifying and addressing clinically inefficient care and changing utilization patterns. Although findings from other works suggest that such changes occurred, the evidence presented here suggests that prescription drugs were not a major target of cost containment efforts in the first 2 years of the AQC. Physician groups participating in the AQC may have had success reducing the utilization of other medical services (e.g., imaging) by altering referral patterns, but perhaps this was more difficult to achieve for drug spending.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dr. Chernew has served on the boards of CNSTAT, the Pharmaceutical Research and Manufacturers Association, and Abbott. He has served as a consultant for Cubist, Hamilton, Humana, America's Health Insurance Plans, Abbott, Genentech, Excellus, BCBS, and Sanofi-Aventis. He has received grant funding from CareFirst Blue Cross Blue Shield of Maryland, Pfizer Inc., the Pharmaceutical Research and Manufacturers Association, AstraZeneca International, and Universal American Corp. He holds equity in VBID Health. Dr. Fendrick has served as a consultant for IMS Health, Janssen Global Services LLC, Kinetix, Merck and Co., Pfizer, Sanofi, Truven Health Analytics, and Zansors LLC. He also a member of the Merck and Co. speaker's bureau, and holds equity in VBID Health. Dr. Afendulis has received grant funding from and served as a consultant to the Pharmaceutical Research and Manufacturers Association. Dr. Safran is a fulltime employee of Blue Cross Blue Shield of Massachusetts.

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