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Original Articles

The Impact of a Value-Based Insurance Design Plus Health Coaching on Medication Adherence and Medical Spending

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Abstract

The objective of this study was to evaluate medication adherence, medical services utilization, and combined medical and pharmacy expenditures associated with diabetes and hypertension value-based insurance design (VBID) plus health/disease coaching programs implemented by a large employer. A pre/post participant versus nonparticipant study design was used to measure medication possession ratios (MPRs), inpatient admissions, emergency room utilization, and combined medical and pharmacy expenditures for employees/spouses with diabetes (n = 1090; average 23 months follow-up) and hypertension (n = 3254; average 13 months follow-up) participating in a VBID plus health/disease coaching relative to eligible nonparticipants. Outcome measures were propensity score weighted and regression adjusted to estimate the independent impact of the programs. MPRs for diabetes and hypertension were significantly increased 3 to 4 percentage points for VBID participants, while MPRs for respective nonparticipants decreased by about 10 percentage points. Employer-paid pharmacy expenditures increased significantly for both participants with diabetes and hypertension while out-of-pocket patient co-payments decreased significantly. Medical expenditures for diabetes VBID participants decreased but not significantly. Hypertension participants experienced medical expenditure increases. Medical services utilization of inpatient admissions and emergency room visits underwent minimal change. Thus employer-sponsored diabetes and hypertension VBID plus health/disease coaching programs can be expected to lower patient co-payments and significantly increase medication adherence. Meanwhile, medical spending outcomes indicated that increased diabetes and hypertension pharmacy expenditures were partially offset by medical savings (for diabetes) but not sufficiently to be cost neutral. (*Population Health Management* 2015;18:151–158)

Introduction

Value-based insurance designs (VBIDs) have been used to improve quality of care, encouraging improved adherence to pharmaceutical protocols by selectively lowering patients' out-of-pocket medication spending. Generally, VBID programs provide reduced prescription drug co-payment costs for target chronic conditions such as diabetes,[1–10] hypertension,[1,6–10] hyperlipidemia,[6,8–13] and asthma.[1,7,10] VBID programs have been implemented successfully in both health plan[3,5,8,9,13] and employer markets.[1,2,4,6,7,10–12]

In recent years, consumer prescription drug price sharing and co-payment levels have increased steadily. The unintended consequence of these strategies was that as patient co-payments increased, medication adherence decreased. According to one meta-analysis, it was estimated that for every 10% increase in cost sharing, prescription drug spending decreased by 2% to 6%.[14] In another study, every $10 increase in patient cost sharing resulted in a 5.4% reduction in adherence to oral diabetic medications.[15] Of clinical importance, it has been demonstrated that medication nonadherence was associated with documented adverse outcomes (eg, higher blood pressure, higher HbA1c levels among patients with diabetes, increased rates of diabetic complications, higher low-density lipoprotein cholesterol levels).[15–17] Meanwhile, improved medication adherence was associated with fewer complications, lower medical spending, fewer emergency room visits, lower all-cause hospitalization rates, and lower all-cause mortality rates.[14–16,18]

Large employers have been experimenting with various VBID models for some time—the most notable of these being Pitney Bowes. Its VBID program was systematically designed

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and subsequently evaluated to measure improved medication adherence for 2 selected drug classes (ie, cholesterol-lowering statins; clopidogrel, a blood clot inhibitor).[10,11,19] Contrary to traditional insurance designs that price medications to the consumer based on their purchasing costs, VBID programs lower cost sharing for selected high-value medications with evidence-based outcomes. In a recent Mercer report,[20] about 23% of large (500+) employers indicated currently using VBID programs with 27% planning to use them in the future.

Although these plans are growing in popularity, currently no standard approach to VBID programs exists. There are variations in the chronic conditions targeted[1–10] and, commonly, programs reduce selected generic drug co-payments to $0 and reduce co-payments for other preferred/non-preferred brand name drugs.[5,6,8–10] However, other programs reduce coinsurance co-payment percentages based on established drug costs (eg, 10% of prescription cost from 20% to 50% coinsurance rates)[1,2,7] or reduce co-payments to flat rates (eg, $10 flat co-payment).[3,4] More recently, some VBID programs have begun to include disease management coaching.[2,6,10]

A recent review of VBID programs[21] concluded that VBID programs are generally successful in improving quality of care by increasing adherence to medication protocols. However, the expected program impact of reduced medical spending has been less well documented. The general consensus across several studies was that VBID programs were cost neutral,[1,2,6,12,21,22] generating sufficient medical savings to offset increased prescription drug spending.[21]

Because of employers' continued interest in the implementation of VBID models, the research team undertook the evaluation of a newly introduced diabetes and hypertension VBID program at a large employer. The purpose of the study was to evaluate the impact of the VBID program design plus health/disease coaching on medication adherence, medical services utilization, and medical and pharmacy expenditures. Key outcomes included comparisons of participants and nonparticipants with respect to: (1) medication possession ratios (MPRs), (2) utilization rates for inpatient admissions and emergency room visits, and (3) combined medical and pharmacy expenditures.

Methods

Study design

This study utilized a pre/post participant and nonparticipant comparison group design to evaluate a diabetes and hypertension VBID plus health/disease coaching program implemented by a large employer. The diabetes program initiated in 2010 utilized a baseline period 3 to 12 months prior to the enrollment date with 3 to 36 months (average 23 months) of follow-up through June 2013. The hypertension program initiated in 2011 utilized similar baseline criteria prior to the enrollment date and 3 to 24 months (average 13 months) of follow-up through June 2013.

Participation in the program was documented with enrollment dates and from payments made by the pharmaceutical benefit management (PBM) provider. Eligible nonparticipants must have used at least 1 prescription within the respective therapeutic classes or had at least 2 diagnosis codes to confirm the target diagnosis. The difference-in-difference (DID) design compared pre to post defined medication adherence and medical spending outcomes for VBID participants and nonparticipants.

Sample

Employees and spouses enrolled in lifestyle management health coaching or disease management coaching programs who had been diagnosed with either diabetes or hypertension were eligible for the VBID programs. The lifestyle management and disease management programs were part of a broader corporate health management program. Eligible VBID participants and nonparticipants must have had at least 3 months of continuous medical plan enrollment prior to their enrollment date and at least 3 months of continuous enrollment after enrollment (ie, a minimum of 6 months of continuous medical enrollment).

To better understand the costs associated with patients who regularly use pharmaceuticals to manage their condition (ie, chronic pharmacy utilizers), the research team implemented an additional criterion that VBID participants and nonparticipants must have had at least 2 prescriptions in the pre and post time periods within the respective therapeutic classes. Outliers were removed to equalize the total health care and pharmacy expenditure distributions between participants and nonparticipants in the pre and post periods, resulting in the exclusion of 3% of observations. Maternity cases also were excluded. The final study populations included 814 diabetes VBID employee/spouse participants and 276 diabetes nonparticipant controls and 2674 hypertension VBID participants and 580 hypertension nonparticipant controls. Study groups were not mutually exclusive, thus allowing individuals to be enrolled in either or both of the chronic condition programs.

VBID plus health/disease coaching program

Eligible VBID participants and nonparticipants must have been currently enrolled in either lifestyle management or disease management coaching programs and referred to the VBID program by the respective health/disease coaches. Coverage for diabetic and hypertension medications and diabetic supplies were made available with reduced or eliminated co-payments. Similar to other plans, generic drug co-payments were eliminated (ie, $0). Preferred brands were available with $5 co-payments for a 34-day supply or $15 for a 90-day supply. Non-preferred brands were available at 50% coinsurance rates with applicable minimum/maximum levels. Diabetic supplies were made available at no cost to members with diabetes.

Measures

Outcome measures. Key outcome measures for this evaluation included pre/post comparisons of: (1) MPRs, (2) medical services utilization (ie, inpatient admissions, emergency room visits), and (3) combined medical and pharmacy expenditures for participants and nonparticipants, respectively.

Medication possession ratios. Medication adherence was defined as MPRs based on the percentage of days that a member had his or her medication available over the pre

period and the subsequent time enrolled in the program. The dates when prescriptions were filled and the number of days' supply on the prescription drug claims were used to determine how many days medications were on hand. The research team calculated the ratio as a combined metric for all drugs prescribed within a therapeutic class. Post period results are presented as 2-year averages for participants with diabetes and as a 1-year average for those with hypertension. Use of electronic pharmacy records to determine medication adherence and/or nonadherence have been previously validated comparing patient reports, pharmacy records, and pill counts to verify pharmacy records.[23]

Medical services utilization. All-cause medical services utilization rates for inpatient admissions and emergency room visits were calculated from place of service codes within medical claims. Emergency room visits and inpatient admission utilization rates were calculated for the pre period prior to enrollment and for the follow-up post periods for participants and nonparticipants with diabetes and hypertension, respectively. Because baseline and follow-up periods could be variable, rates were annualized for participant and nonparticipant comparisons (ie, total inpatient or emergency room events divided by the total member years).

Health care and pharmacy costs. Health care expenditures (per member per month [PMPM]) were calculated in US dollars for each eligible employee and spouse, including all inpatient, outpatient, professional, and pharmacy paid claims, for at least 3 months and up to 12 months prior to the enrollment date and for at least 3 months and up to 36 months (diabetes) or 24 months (hypertension) after the enrollment date. All costs were adjusted to 2013 dollars using the medical care services component in the Consumer Price Index. Employer-paid claims were used to provide medical and pharmacy expenditure trend outcomes, enabling the employer to assess potential medical savings relative to the investment in additional pharmacy coverage. Pharmaceutical co-payments for participants and nonparticipants were calculated separately to document changes in patient co-payments after enrollment in the VBID program.

Covariates. Covariates were included to adjust for other factors that may influence the selection bias often associated with program participation. These covariates included measures of demographics, health status, and other characteristics taken from health plan eligibility and claims files. Demographic variables included the participant's age, sex, and location. Age was stratified into 4 groups (age: 18–34, 35–44, 45–54, and 55+ years). Insurance plans included: Blue Cross Blue Shield, Aetna, UnitedHealthcare, and Other. Income and location were geocoded from zip codes to: High, Upper Medium, Lower Medium, and Low for income; Metropolitan and Other for location. The number of available months in the pre and post periods were added to account for different lengths of time in the programs.

Health status covariates were measured from claims data and included the calculated Charlson Comorbidity Index (CCI),[24] Psychiatric Diagnostic Group score (PDG),[25] and the annual number of physician office visits, emergency room visits, and inpatient admissions. The CCI is a measure of the risk of 1-year all-cause mortality attributable to selected comorbidities that also has been shown to be highly predictive of morbidity and health care expenditures. The PDG score includes validated psychiatric diagnostic groups analogous to major diagnostic groups in the diagnostics-related group system but provides better classification of individuals with substance abuse and/or mental health disorders. Measures of health services availability included: acute hospital beds per 1000 and primary care physicians per 100,000. Differences in covariates between participants and nonparticipants were tested with chi-square tests for categorical variables or Student *t* tests for continuous variables.

Statistical analyses

Propensity score weighting. Propensity score weighting used information about the demographic, socioeconomic, and health status variables already described to adjust for potential selection bias often associated with participation in programs, thereby allowing the comparison of participants to similar nonparticipants. This information was used to estimate the underlying probability of VBID program participation for each individual. The research team then used that estimated probability to create a weighting variable applied to the data from those who chose not to participate in the programs, to make them better resemble all eligible employees/spouses. The value of the weighting variable equals 1/predicted probability of specific program participation. The utility of propensity score models to adjust for external validity threats are described elsewhere.[26,27]

Regression modeling. After propensity score weighting, statistical differences between diabetes and hypertension VBID program participants and nonparticipants are expected to be minimized or eliminated. Any remaining differences, however, were subsequently adjusted for using generalized linear regression models as a final adjustment in comparing the outcome variables as reported elsewhere.[28] Differences in the weighted outcome measures (ie, medical expenditures, MPRs, utilization measures) between participants and nonparticipants (ie, DID) thus controlled for demographics, health status, and health plan characteristics.

Results

Take-up rates for the VBID programs were very high among those chronic pharmacy utilizers identified for the evaluation: 75% of those with diabetes and 82% of those with hypertension. Baseline characteristics of participants and nonparticipants in the diabetes and hypertension VBID programs are shown in Tables 1 and 2. Participants in the diabetes and hypertension programs were less healthy than their respective nonparticipant controls (eg, higher CCI scores, higher medical utilization), further documenting the need for propensity score weighting. The weighting worked well, as the significant differences between participants and respective nonparticipant controls were generally removed or minimized as illustrated in Table 1 and Table 2, respectively. Because some case-mix differences still remained between the groups, subsequent regression adjustments were warranted to further minimize these differences.

Comparisons of descriptive unadjusted MPRs for participants with diabetes indicated that medication adherence

Table 1. Baseline Characteristics of Diabetes VBID Participants and Nonparticipants Before and After Propensity Score Weighting

	Unweighted			*Propensity Score Weighted*		
	Participant	*Nonparticipant*		*Participant*	*Nonparticipant*	
	Mean or %	*Mean or %*	P *value*	*Mean or %*	*Mean or %*	P *value*
	814	276		814	276	
Age (average age)	49.6	47.4	0.001	49.0	49.3	0.69
18–34	6.5	7.3	0.001	6.5	6.1	0.99
35–44	23.1	33.7		25.5	25.2	
45–54	36.0	36.2		36.3	37.2	
55+	34.4	22.8		31.7	31.6	
Sex						
Female	36.1	36.6	0.88	35.8	33.8	0.55
Male	63.9	63.4		64.2	66.2	
Relationship						
Employee	80.8	80.8	0.99	80.6	84.1	0.20
Spouse	19.2	19.2		19.4	15.9	
Health plan						
Aetna	41.2	45.3	0.0001	42.5	42.3	0.19
BCBS	31.6	22.1		30.0	34.5	
UHC	23.7	23.6		23.2	17.7	
Other	3.6	9.1		4.4	5.6	
Income						
High	66.2	64.5	0.41	65.4	65.3	0.16
Upper Medium	15.7	15.6		16.0	15.6	
Lower Medium	7.1	10.5		7.2	10.9	
Low	3.8	4.0		4.0	3.8	
Location						
Metropolitan	95.0	94.6	0.80	95.1	94.1	0.53
Other	5.0	5.4		4.9	5.9	
Inpatient admissions (annual %)	6.8	3.3	0.01	5.9	7.1	0.48
Emergency room visits (annual %)	17.8	11.2	0.005	16.7	13.6	0.24
Physician office visits per year	6.5	5.9	0.07	6.3	6.3	0.91
Acute hospital beds per 1000	2.0	2.0	0.94	2.0	2.0	0.96
Primary care physicians per 100,000	67.2	67.3	0.93	67.0	68.3	0.27
Pre period (months)	11.2	10.7	0.007	11.0	10.9	0.75
Post period (months)	22.6	28.9	<0.0001	22.6	27.6	<0.0001
Charlson Comorbidity Index (CCI)	1.5	1.2	<0.0001	1.4	1.4	0.36
CCI=0	4.7	17.8	<0.0001	7.9	7.7	0.90
CCI=1	62.9	58.3	0.18	61.7	60.5	0.71
CCI ≥2	32.4	23.9	0.008	30.3	31.9	0.64
Psychiatric Diagnostic Group	0.2	0.2	0.27	0.2	0.2	0.65
No (score=0)	84.9	81.9	0.24	84.3	85.7	0.56
Yes (score ≥1)	15.1	18.1	0.24	15.7	14.3	0.56

BCBS, Blue Cross Blue Shield; UHC, UnitedHealthcare; VBID, value-based insurance design

improved by 4 percentage points for participants while medication adherence for nonparticipants decreased by about 10 percentage points, as illustrated in Figure 1. Similarly, MPRs for participants with hypertension increased by about 3 percentage points and decreased for nonparticipants by about 9 percentage points. Regression-adjusted weighted DIDs for MPRs comparing participant and nonparticipant trends indicated a significant 14.1 percentage point gain for participants with diabetes ($P<0.0001$) and a significant 14.3 percentage point gain for participants with hypertension ($P<0.0001$) as illustrated in Tables 3 and 4, respectively.

Adjusted health care expenditures for participants with diabetes indicated significantly increased pharmacy costs relative to nonparticipants ($P<0.0001$) and small but nonsignificant savings in medical costs ($P=0.58$), as shown in Table 3. Overall, although savings in medical expenditures for participants with diabetes partially offset increased pharmaceutical payments, those savings were not sufficient for the program to be considered cost neutral. However, adjusted combined medical and pharmacy expenditure DIDs comparing participants and nonparticipants were not statistically significant ($P=0.48$). Participants with diabetes, meanwhile, experienced significant co-payment reductions: $20.60 savings per month or about $250 per year ($P<0.0001$; data not shown). Annualized adjusted differences for inpatient admissions and emergency room utilization rates for participants with diabetes indicated no

Table 2. Baseline Characteristics of Hypertension VBID Participants and Nonparticipants Before and After Propensity Score Weighting

	Unweighted			*Propensity Score Weighted*		
	Participant	*Nonparticipant*		*Participant*	*Nonparticipant*	
	Mean or %	*Mean or %*	P *value*	*Mean or %*	*Mean or %*	P *value*
Hypertension	2674	580		2674	580	
Age (average age)	49.8	49.3	0.20	49.8	50.1	0.46
18–34	5.2	4.8	0.41	5.2	5.6	0.44
35–44	24.1	24.8		23.8	20.6	
45–54	38.0	40.9		38.5	39.9	
55+	32.8	29.5		32.5	34.0	
Sex						
Female	31.4	42.8	<0.0001	33.5	34.3	0.68
Male	68.6	57.2		66.6	65.7	
Relationship						
Employee	87.2	65.5	<0.0001	82.6	81.2	0.40
Spouse	12.8	34.5		17.4	18.8	
Health plan						
BCBS	29.9	28.5	0.72	29.8	27.2	0.03
UHC	58.2	58.8		57.4	56.0	
Other	11.9	12.8		12.8	16.8	
Income						
High	71.4	74.7	0.47	72.1	72.4	0.63
Upper Medium	12.8	12.1		12.6	14.1	
Lower Medium	6.9	5.2		6.6	6.3	
Low	2.8	2.4		2.7	2.6	
Missing	6.1	5.7		6.1	4.7	
Location						
Metropolitan	95.6	96.2	0.48	95.6	95.6	0.94
Other	4.5	3.8		4.4	4.5	
Inpatient admissions (annual %)	5.0	4.8	0.88	5.3	6.9	0.15
Emergency room visits (annual %)	15.6	15.3	0.86	15.8	18.5	0.11
Physician office visits per year	5.7	5.6	0.55	5.7	6.0	0.32
Acute care hospital beds per 1000	2.0	1.9	0.002	2.0	2.0	0.50
Primary care physicians per 100,000	68.2	69.8	0.08	68.4	68.9	0.56
Pre period (months)	11.5	11.2	0.003	11.4	11.5	0.76
Post period (months)	13.3	18.2	<0.0001	13.3	19.1	<0.0001
Charlson Comorbidity Index (CCI)	0.67	0.45	<0.0001	0.65	0.73	0.08
CCI=0	58.7	69.7	<0.0001	59.9	55.4	0.04
CCI=1	25.5	21.0	0.02	25.1	25.7	0.79
CCI ≥2	15.8	9.3	<0.0001	15.0	19.0	0.02
Psychiatric Diagnostic Group	0.25	0.35	0.001	0.26	0.30	0.14
No (score=0)	80.3	74.0	0.001	79.2	77.3	0.31
Yes (score ≥1)	19.8	26.0	0.001	20.8	22.7	0.31

BCBS, Blue Cross Blue Shield; UHC, UnitedHealthcare; VBID, value-based insurance design

significant differences over the follow-up period compared to nonparticipants.

As with participants with diabetes, employer-paid pharmacy expenditures significantly increased for participants with hypertension ($P<0.0001$) but, with the shorter follow-up time period, medical expenditures also increased, although not significantly ($P=0.34$), as shown in Table 4. Overall, the adjusted DID for combined medical and pharmacy expenditures for participants and nonparticipants with hypertension were not statistically significant ($P=0.11$). Pharmaceutical co-payments for participants with hypertension decreased significantly by $8.90 per month or about $110 per year ($P\leq0.0001$; data not shown). Annualized adjusted differences for inpatient admissions and emergency room utilization rates for participants with hypertension indicated significant increases in both inpatient and emergency room use over the follow-up period compared to nonparticipants.

Discussion

The VBID plus health/disease coaching program design implemented by this large employer leveraged information suggested by the scientific literature that VBID programs are more effective if program designs include coaching options.[2,6,10] The present evaluation included several methodological improvements to more reliably evaluate medical and pharmacy utilization and expenditure outcomes. Eligible nonparticipants within the same company were used as controls for this study design. This assured equivalent

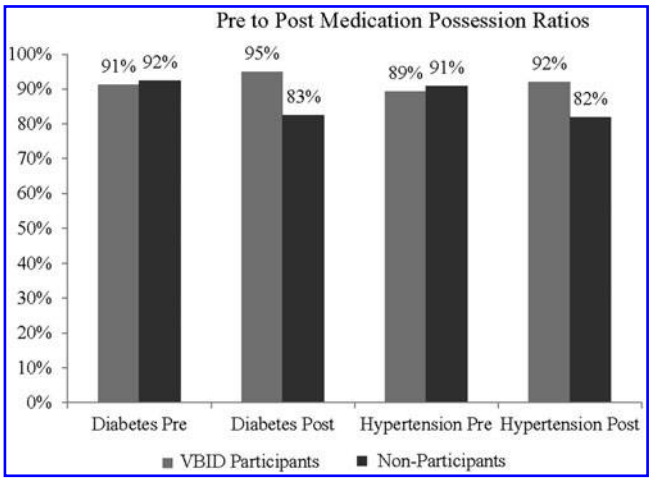

FIG. 1. Unadjusted descriptive pre to post MPRs for diabetes and hypertension VBID participants and nonparticipants.
Diabetes: N = 814 participants/276 nonparticipants.
Hypertension: N = 2674 participants/580 nonparticipants.
MPR, medication possession ratio; VBID, value-based insurance design

corporate benefits, health messaging, and optional health management programs across both participants and controls. The take-up rates for the VBID programs were very high, a tribute to the recruitment and referral strategies of the health/disease coaches and to the perceived value of the VBID co-payment reduction design. Some VBID designs minimize pharmacy co-payment reductions with lowered coinsurance rates rather than elimination of some co-payments (especially for high-value generic medications).[2,7] Rather than population-based evaluations, the research team documented VBID participation with documented enrollment dates and payment verification by the PBM provider. Use of propensity score weighting and subsequent regression adjustments, and exclusion of outliers and maternity cases improved on previous methodologies utilized in the measurement of health care expenditure trends over time.[21]

Key outcomes for VBID programs generally focus on changes in patient pharmacy co-payments (substantially decreased) and significantly improved medication adherence. MPRs for both participants with diabetes and hypertension increased about 3 to 4 percentage points—in the general range of what is reported in the literature for other VBID studies.[2,4–6,8,9] Some VBID programs have indicated that time is required to build on medication adherence rates or that medication adherence improvements may not be sustainable.[1,2,9] The present program showed relatively consistent MPRs over the respective follow-up periods, likely a benefit of the coaching interactions integrated into the program.

However, nonparticipants in both programs, decreased medication adherence by about 10 percentage points. This increase in nonadherence over time among nonparticipants has been noted by other researchers.[5,6,8,9] Thus, the medication adherence advantages of VBID participants relative to nonparticipants apparently includes not only increased medication adherence with decreased pharmacy co-payments but also functions to prevent pharmacy discontinuation (ie, increasing rates of nonadherence over time).[5] The overall gain in medication adherence for participants with diabetes or hypertension, relative to controls, was about 14 percentage points.

Medical services utilization including both inpatient admissions and emergency room visits was minimally impacted. It is possible that longer term studies are needed in order to demonstrate a program impact of reduced emergency room visits or inpatient admissions among employee/spouse populations. In this evaluation, participants with diabetes with an average of about 2 years of follow-up showed changes in utilization that were not statistically significant after adjustments for covariates. In contrast, the hypertension program with about 1 year of follow-up showed a short-term increase in medical utilization likely because of increased focus on management of the condition. Perhaps longer (eg, 3–5 year) follow-ups may be needed—although, to date, only 1-,[3,6,8,10,11,13] 2-,[4,9] or 3-year[1,2,7] VBID studies have been published.

VBID programs are used to improve quality of care by encouraging improved adherence to prescription drug medications. Although such programs are often evaluated for cost efficiency, profitability is not necessarily a requirement for success. For example, several VBID studies

Table 3. Differences in MPRs, Medical Utilization Rates, and Combined Medical and Pharmacy Expenditures for Diabetes VBID Participants Relative to Nonparticipants

	Diabetes VBID							
	Combined Medical Expenditures (Paid)		*MPRs*		*Inpatient Admissions*		*Emergency Room Visits*	
	DID (PMPM)	P *value*	*DID**	P *value*	*DID**	P *value*	*DID**	P *value*
Descriptive Unadjusted	−$17.30	0.74	13.6	<0.0001	−2.7	0.10	−6.7	0.01
Descriptive Weighted by PS	−$91.30	0.08	13.4	<0.0001	1.9	0.34	−2.5	0.40
Medical Expenditures	$29.00	0.58						
Pharmacy Expenditures	−$120.30	<0.0001						
Regression Adjusted Weighted by PS	−$75.13	0.48	14.1	<0.0001	2.4	0.24	−1.0	0.74

N = 814 participants and 276 nonparticipants.
*DID percentage point difference in MPRs or annualized medical services utilization rates.
DID, difference in difference; MPR, medication possession ratio; PMPM, per member per month; PS, propensity score; VBID, value-based insurance design

Table 4. Differences in MPRs, Medical Utilization Rates, and Combined Medical and Pharmacy Expenditures for Hypertension VBID Participants Relative to Nonparticipants

	Hypertension VBID							
	Combined Medical Expenditures (Paid)		*MPRs*		*Inpatient Admissions*		*Emergency Room Visits*	
	DID (PMPM)	P *value*	*DID**	P *value*	*DID**	P *value*	*DID**	P *value*
Descriptive Unadjusted	−$74.98	0.02	11.5	<0.0001	1.0	0.40	1.5	0.43
Descriptive Weighted by PS	−$70.08	0.03	13.7	<0.0001	1.8	0.16	2.8	0.17
Medical Expenditures	−$30.41	0.34						
Pharmacy Expenditures	−$39.72	<0.0001						
Regression Adjusted Weighted by PS	−$75.91	0.11	14.3	<0.0001	3.5	0.02	5.0	0.04

N = 2674 participants and 580 nonparticipants.
*DID percentage point differences in MPRs or annualized medical services utilization rates.
DID, difference in difference; MPR, medication possession ratio; PMPM, per member per month; PS, propensity score; VBID, value-based insurance design

considered successful have concluded that their programs were cost neutral.[1,2,6,10,12,21] Although the diabetes program did show some medical cost savings (about $350 per member per year), that was not enough savings to offset the increased pharmacy expenditures by the employer (about $1445 per member per year). The average age of participants was about 50 years in a relatively highly educated workforce with multiple options for other health management programs. In this environment, it may take more time for the investment in additional medication consumption to provide a documented return on that investment. In their recent review of published VBID studies Lee et al[21] concluded that, given the various program designs, study time lines, and analytic methodologies, the programs do not increase or decrease medical cost trends. The present study would fall within those parameters in that combined medical and pharmacy expenditures changes (ie, increases) associated with the programs were not statistically significant.

Limitations

Propensity score weighting and regression adjustments were utilized to account for differences between participant and nonparticipant populations in order to evaluate the impact of the VBID program on health care utilization and expenditures for pharmaceuticals and health care spending. However, additional unmeasured differences may still exist between the populations (eg, attitudes toward health, engagement levels). The research team did not have information on the disease stages but, with an average age of about 50, most individuals likely would be in the early stages of their disease. This justifies the program focus on prevention and improved management but will necessitate longer term studies with additional years of follow-up to demonstrate potential positive cost outcomes.[1,2,6,12,21,22] Using nonparticipants from the same company who were eligible but chose not to enroll in the VBID program ensured that these individuals had the same benefits programs, similar health messaging, and the advantages of the same on-site and online health management programs. Furthermore, the research team qualified the study population (participants and nonparticipants) as chronic pharmacy utilizers by requiring at a minimum at least 2 prescriptions pre and post to further ensure equivalent comparison populations.

This VBID program design included health/disease coaching and was integrated into a well-designed, multiyear health management program targeting a younger, healthier workforce. The combination of the VBID program with coaching provided a highly effective initial take-up of the program with immediate medication adherence improvements. However, these results may not generalize to other employer groups with different workforce characteristics and/or limited options for health management programming.

Conclusions

This newly implemented VBID program significantly reduced pharmacy co-payments for participants and significantly increased medication adherence for both participants with diabetes and hypertension while nonparticipants had a significant medication adherence drop-off. Inpatient admissions and emergency room utilization were not significantly impacted. Significantly increased pharmacy expenditures (both diabetes and hypertension medications) were partially offset by medical savings (for diabetes) but not sufficiently to be considered cost neutral.

Author Disclosure Statement

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