

# Evaluation of Value-Based Insurance Design for Primary Care

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Recent reports suggest that healthcare expenditures in the United States will continue to grow by 5% to 6% per year, creating additional pressure on employers and insurers to contain spending.<sup>1</sup> One approach widely adopted by insurers and employers has been to shift financial responsibility to consumers through higher premiums, co-pays, and deductibles. Based on the RAND Health Insurance Experiment, cost-sharing provisions seem especially promising in curbing “excessive” or potentially unnecessary healthcare utilization without any repercussions for patient health.<sup>2,3</sup> Increasing cost-sharing provisions resulted in ballooning out-of-pocket payments for patients, which grew by 94% between 2012 and 2015.<sup>4</sup>

Another promising approach has been the use of value-based insurance design (VBID), in which cost sharing is removed or reduced for high-value services and retained or increased for low-value services.<sup>5</sup> The idea behind VBID is that some healthcare encounters are beneficial in detecting and treating negative health events at an early stage, events that could become compounded later, and they therefore reduce down-the-road hospitalizations and other costly healthcare encounters. So far, VBID has been implemented relatively widely in the area of prescription medications—mostly in managing chronic conditions. One exception is the Mayo Clinic, which coupled cost-sharing reductions in the primary care setting and for general preventive services with increased cost sharing for specialty care and outpatient procedures.<sup>6</sup> Other examples include Connecticut, which provided substantial incentives to state employees to lower their out-of-pocket costs for medications and office visits associated with chronic disease.<sup>7</sup> More recently, in January 2017, CMS began testing a VBID model in the Medicare Advantage population by offering reduced cost sharing for enrollees falling into specific clinical categories, such as those with diabetes, congestive heart failure, or chronic obstructive pulmonary disease.<sup>8</sup>

Several studies have identified access and continuity of care in the primary care setting as promising high-value opportunities that improve health outcomes while lowering total healthcare expenditures. Primary care utilization improves care continuity, intensifies the patient–provider relationship, emphasizes potential disease

## ABSTRACT

**OBJECTIVES:** To evaluate the impact of value-based insurance design (VBID), which removed patient cost sharing for primary care visits, on healthcare spending in a large, geographically diverse employer.

**STUDY DESIGN:** Quasi-experimental, difference-in-differences (DID) design, administrative claims–based study.

**METHODS:** Healthcare spending during the preintervention period (2008 and 2009) was compared with the postintervention period (2011 through 2014) to measure the impact of removing primary care cost sharing. The study population included Anthem commercially insured enrollees with continuous medical eligibility from 2008 to 2014 who were younger than 65 years. The VBID cohort included health plan enrollees from a national large employer that implemented the benefit change. The comparison cohort included other Anthem enrollees who did not have a similar benefit change and were propensity score–matched to the VBID cohort. Utilization of various types of healthcare services was also examined.

**RESULTS:** The VBID cohort experienced a \$12.0 per member per month relative reduction in overall spending compared with the comparison cohort ( $P = .02$ ). The trend was driven by reductions in expenditures for emergency department (ED) visits (\$1.3 relative reduction; DID,  $-10.0\%$ ;  $P = .03$ ) and other outpatient services (\$7.6 relative reduction; DID,  $-5.8\%$ ;  $P = .02$ ), which aligned with reduced utilization of ED visits (DID,  $-4.5\%$ ;  $P = .07$ ) and other outpatient services (DID,  $-4.1\%$ ;  $P = .004$ ). For physician office visits, the VBID cohort did not experience a significant relative increase compared with the comparison cohort (DID,  $0.9\%$ ;  $P = .25$ ).

**CONCLUSIONS:** The attempt to increase primary care access by reducing cost sharing did not produce a negative outcome in terms of total spending for healthcare.

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## TAKEAWAY POINTS

Our study evaluated the impact of removing cost sharing for primary care on healthcare spending and utilization among commercially insured children and adults in a large employer group over a 6-year period.

- ▶ Previous research demonstrates that increased cost sharing reduces use of low-value services, but it has not demonstrated an increase in use of high-value services.
- ▶ Patients included in value-based insurance design (VBID) in this study did not experience significantly increased use of primary care.
- ▶ VBID patients in this study experienced a lower total healthcare spending trend through decreases in medical utilization, driven by reduced utilization of the emergency department.

prevention, and improves the management of existing conditions, which can reduce unnecessary specialist care, hospitalizations, and emergency department (ED) visits.<sup>9-16</sup>

In this study, we evaluated the impact of a large national employer's decision to remove cost sharing for primary care physician (PCP) office visits. Previously, Sepulveda et al evaluated this initiative on the employees' children during the 2 years following implementation and found a significant increase in PCP visits and a reduction in ED visits while total healthcare expenditures per child were unchanged.<sup>17</sup> Our study, intending to examine the long-term impacts of the initiative on a comprehensive population, evaluated how the removal of cost sharing in primary care affects healthcare spending and utilization among commercially insured children and adults over a 6-year period.

## METHODS

### Data Source

This quasi-experimental study with difference-in-differences (DID) design used 6 years of administrative medical claims data from the HealthCore Integrated Research Environment, which links medical claims and eligibility files from 14 commercial health plans across the United States. All data were accessed as a limited data set in a manner compliant with the Health Insurance Portability and Accountability Act of 1996.

### Study Population

The study population consisted of Anthem commercially insured members with continuous medical eligibility from 2008 to 2014, with 2008 and 2009 designated as the preintervention period (before the cost sharing was removed) and 2011 through 2014 designated as the postintervention period. The year 2010 was excluded because it represents the transition period when the benefit change was implemented.

Members 65 years or older were excluded from the study. Members with very complex health scenarios or conditions (eg, organ transplantation, hemophilia, cystic fibrosis, end-stage renal disease, and long-term respiratory failure; detailed list in [eAppendix A](#) [eAppendices available at [ajmc.com](http://ajmc.com)]) were also excluded, as these members were more likely to have their care coordinated by a specialist.

The study subjects were divided into 2 cohorts. The VBID cohort consisted of employees and their family members from the single large national employer that made the decision to remove PCP cost sharing. Other aspects of benefit design remained unchanged over the study period for the VBID cohort. The comparison cohort was selected from the population of other Anthem enrollees who did not undergo a similar benefit change, using 1:1 propensity score matching. To evaluate whether there was a difference in impact by age group,

the study population was stratified to subgroups of individuals aged 18 years or younger, 19 to 50 years, and 51 to 64 years.

### Outcome Measures

The primary outcomes measured the utilization rate of physician office visits and the annual total healthcare spending. The total spending was the sum of plan-paid amounts, out-of-pocket amounts, and amounts paid by other insurances for all medical services, including hospitalizations, ED visits, physician office visits, and other outpatient services (ie, services occurring in an outpatient setting that are not physician office visits, such as laboratory tests, imaging, and procedures), for all causes. Other types of all-cause healthcare utilization, including hospitalizations, ED visits, and other outpatient services, were assessed for exploratory purposes. Furthermore, several specific utilization types, such as hospital admissions due to ambulatory care-sensitive conditions and ED visits for primary care-treatable conditions (defined by the New York University Emergency Department Algorithm), were also examined.<sup>18,19</sup> Average annual utilization and spending for the preintervention and postintervention periods were calculated respectively and compared across the cohorts. All spending was adjusted to 2015 values using the Consumer Price Index.<sup>20</sup>

### Statistical Analyses

Multivariate logistic regression was used to estimate the association of having PCP cost sharing removed (ie, being in the VBID cohort) with covariates of baseline characteristics, including age, gender, health plan type, residence region, metropolitan statistical area, enhanced Elixhauser Comorbidity Index (ECI) score, comorbid conditions, and healthcare utilization and expenditures during 2008.<sup>21,22</sup> The VBID and comparison cohorts with similar estimated likelihood (maximum permitted difference of 0.0001) were selected using a greedy algorithm, to ensure the baseline comparability of the 2 cohorts after matching.<sup>23</sup> For outcome measures, a DID analysis was conducted to compare changes from the preintervention to postintervention period between the 2 cohorts. A generalized estimating equation approach was used with a zero-inflated Poisson distribution and a log link for utilization, and a  $\gamma$  distribution with log link for spending, at the conventional significance level of  $\alpha < .05$ . Analyses were also performed on the 3 age subgroups.

## RESULTS

### Patient Characteristics

Among members in the VBID cohort, 25,725 (53%) met the population inclusion criteria. The main reason for exclusion was lack of continuous eligibility, which accounted for 45% of the population drop. The members who were not included were slightly younger (average age of 31.0 vs 33.5 years), more likely to be from the South region (27.6% vs 15.2%), and more likely to have a mental disorder (3.0% vs 2.2%; all  $P < .0001$ ) compared with those included in the study (eAppendix B). However, they did not differ in other characteristics. After matching, the VBID and comparison cohorts each had 25,725 subjects with comparable baseline characteristics in 2008—all standardized differences were less than 20% (Table 1). Both cohorts had a mean age of 33.4 to 33.5 years, and most were aged 19 to 50 years. A slight majority of the subjects were men (51.2%–51.3%) and lived in the Midwest or Northeast regions. Both cohorts had the same mean (SD) ECI scores (0.5 [0.9]); more than 68% of subjects had an ECI score of 0. The most common comorbidity was hyperlipidemia (9.7% in VBID cohort vs 10.3% in comparison cohort), followed by hypertension (7.4% vs 7.8%, respectively). All subjects were followed for the entire 6-year study period.

### Physician Office Visits

Physician office visits increased in both cohorts from the preintervention to the postintervention period (Table 2): 3588 to 3681 visits per 1000 members per year in the VBID cohort and 3792 to 3866 visits per 1000 members per year in the comparison cohort. However, the magnitudes of increase were similar between the VBID and comparison cohorts (2.6% increase vs 1.7% increase; DID, 0.9%;  $P = .25$ ).

The plan-paid amount for physician visits had the same trend as utilization. Both cohorts had increased plan-paid amounts in the postintervention period, but the VBID cohort had a relatively greater increase compared with the comparison cohort (DID, 9.4%;  $P = .03$ ). Not surprisingly, out-of-pocket amounts for physician visits decreased annually by 12.8% in the VBID cohort, driven by the removal of cost sharing for PCP visits, compared with a 9.8% annual increase in the comparison cohort (DID, -22.6%;  $P < .0001$ ). As the sum of plan-paid and out-of-pocket amounts, the total spending for physician office visits in the VBID cohort had a relative but marginal increase (DID, 2.1%;  $P = .09$ ).

### Overall Healthcare Spending

Trends of overall healthcare spending, including the total and out-of-pocket amounts, were favorable for the VBID cohort. Total medical spending for the VBID cohort increased annually by 12.2% compared with a 17.3% annual increase for the comparison cohort (DID, -5.1%;  $P = .02$ ) (Figure). This difference in trend translates to a \$12.0 relative reduction in total spent per member per month (PMPM) for the VBID cohort. ED visits and other outpatient services significantly contributed to the trend toward lower spending

**TABLE 1.** Baseline Characteristics (in 2008) by Cohort After Propensity Score Matching

Characteristics	VBID Cohort (n = 25,725)	Comparison Cohort (n = 25,725)	Standardized Difference
Age in years as of 1/1/2008			
Mean (SD)	33.5 (18.4)	33.4 (19.0)	0.007
0-18, n (%)	8613 (33.5)	8579 (33.3)	0.090
19-50, n (%)	12,120 (47.1)	11,180 (43.5)	
≥51, n (%)	4992 (19.4)	5966 (23.2)	
Gender, n (%)			
Male	13,200 (51.3)	13,166 (51.2)	
Female	12,525 (48.7)	12,559 (48.8)	
Residence region, n (%)			
Northeast	8230 (32.0)	8229 (32.0)	
South	3910 (15.2)	3918 (15.2)	
Midwest	9507 (37.0)	9599 (37.3)	
West	4078 (15.8)	3979 (15.5)	
Residence area, n (%)			
MSA	24,116 (93.7)	24,049 (93.5)	
Non-MSA	1609 (6.3)	1676 (6.5)	
ECI score			
Mean (SD)	0.5 (0.9)	0.5 (0.9)	-0.035
0, n (%)	17,986 (69.9)	17,620 (68.5)	0.030
1-5, n (%)	7679 (29.9)	8053 (31.3)	
≥6, n (%)	60 (0.2)	52 (0.2)	
Comorbid disease conditions, n (%)			
Hypertension	1916 (7.4)	2007 (7.8)	-0.013
Acute myocardial infarction	11 (0.04)	12 (0.05)	-0.002
Congestive heart failure	43 (0.2)	45 (0.2)	-0.002
Coronary artery disease	320 (1.2)	366 (1.4)	-0.016
Atrial fibrillation	51 (0.2)	50 (0.2)	-0.001
Hyperlipidemia	2506 (9.7)	2640 (10.3)	0.017
Asthma	631 (2.5)	654 (2.5)	-0.006
Chronic obstructive pulmonary disease	124 (0.5)	129 (0.5)	-0.003
Chronic kidney disease	102 (0.4)	108 (0.4)	-0.004
Diabetes	691 (2.7)	732 (2.8)	-0.010
Mental disorder	568 (2.2)	596 (2.3)	-0.007
Osteoporosis	97 (0.4)	93 (0.4)	-0.003
Rheumatoid arthritis/osteoarthritis	482 (1.9)	504 (2.0)	0.006

ECI indicates Elixhauser Comorbidity Index; MSA, metropolitan statistical area; VBID, value-based insurance design.

**TABLE 2.** Utilization of and Spending on Physician Office Visits for Each Cohort in Preintervention and Postintervention Periods Among All Study Subjects

Measures	VBID Cohort				Comparison Cohort				DID Relative % Difference	P
	Pre Mean	Post Mean	Relative % Difference	Absolute Difference	Pre Mean	Post Mean	Relative % Difference	Absolute Difference		
<b>Utilization Rate per 1000 Members per Year</b>										
Physician office visit	3588	3681	2.6%	93	3792	3856	1.7%	64	0.9%	.25
<b>Annual Spending per Member</b>										
Physician office visits										
Plan paid	\$476	\$548	15.3%	\$73	\$439	\$465	5.8%	\$26	9.4%	.03
Out-of-pocket	\$119	\$104	-12.8%	-\$15	\$132	\$145	9.8%	\$13	-22.6%	.08
Total	\$596	\$653	9.6%	\$57	\$573	\$616	7.5%	\$43	2.1%	.09

DID indicates difference-in-differences; VBID, value-based insurance design.

for the VBID cohort (Table 3), with \$1.3 (DID, -10.0%; *P* = .03) and \$7.6 (DID, -5.8%; *P* = .02) relative reductions in PMPM spending, respectively. No significant relative reduction was observed for hospitalization expenses (\$4.2 PMPM relative reduction; DID, -10.0%; *P* = .17). The aforementioned total spending for physician office visits stayed relatively stable (DID, 2.1%; *P* = .09).

There was a relative reduction of \$5.5 in out-of-pocket PMPM spending that favored the VBID cohort (DID, -11.1%; *P* < .0001). Significant relative reductions in out-of-pocket amount were seen for other outpatient services (13.2% increase for VBID vs 24.3% increase for comparison cohort; DID, -11.2%; *P* = .004). The change in overall plan-paid amount was similar between the 2 cohorts (DID, -2.3%; *P* = .39), but VBID had favorable decreasing trends of plan-paid amounts for ED visits (DID, -9.2%; *P* = .001) and other outpatient services (DID, -3.4%; *P* = .003).

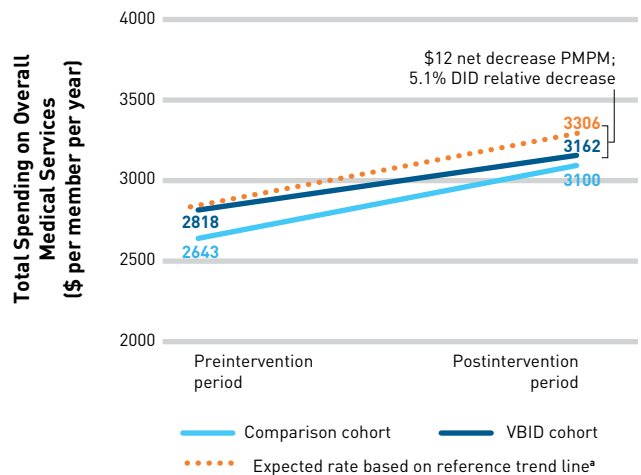
**Overall Healthcare Utilization**

The utilization trend aligned with the trend of spending (Table 4<sup>18</sup>). The VBID cohort experienced a statistically significant relative reduction in use of other outpatient visits compared with the comparison cohort (DID, -4.1%; *P* = .004). Both cohorts experienced similar flat trends in all-cause hospitalizations and ED visits, so these results did not reach statistical significance (hospitalizations: DID, -4.7%; *P* = .33; ED visits: DID, -4.5%; *P* = .07). Another statistically significant relative reduction for the VBID cohort was observed in ED visits for primary care-treatable conditions (DID, -7.4%; *P* = .01).

**Subgroup Analysis**

Both cohorts had similar baseline characteristics among each age category subgroup. The most favorable trend for total medical spending was found in younger adults (aged 19-50 years) (DID, -9.2%; *P* = .02) (Table 3), and the trend mainly was driven by other outpatient visits—average annual decrease of \$117 (6.5%) in the VBID cohort versus increase of \$63 (4.3%) in the comparison cohort (DID, -10.7%; *P* = .002)—followed by ED visits: \$35 (23.0%) increase versus \$66 (40.5%) increase, respectively (DID, -17.5%; *P* = .01). The increase in physician office visits occurred most often among older adults (aged 51-64 years) in both cohorts (6.4% increase in VBID cohort vs

**FIGURE.** Total Spending on Overall Medical Services for VBID and Comparison Cohort



DID indicates difference-in-differences; PMPM, per member per month; VBID, value-based insurance design.

\*Reference trend line is the expected parallel trend between the VBID and comparison cohorts in the absence of any benefit design intervention.

4.8% increase in comparison cohort) in a similar magnitude (DID, 1.6%; *P* = .34) (eAppendix C). Notably, the same subgroup had a statistically significant positive finding for ED visits that favored the VBID group (all-cause ED visits: DID, -16.5%; *P* = .0003; ED visits for primary care-treatable conditions: DID, -16.1%; *P* = .02).

**DISCUSSION**

The decision to implement VBID by removing enrollees' cost sharing for all PCP visits marked a departure from conventional cost structures at a time when a continually growing portion of healthcare expenditures was being transferred to consumers. Rather than using the blunt tool of a fixed cost-sharing rate with the purpose of decreasing the use of low-value services, our research sought to determine the impact of VBID in encouraging the use of

**TABLE 3.** Healthcare Spending for Each Cohort in Preintervention and Postintervention Periods

Annual Spending per Member	VBID Cohort				Comparison Cohort				DID Relative % Difference	P
	Pre Mean	Post Mean	Relative % Difference	Absolute Difference	Pre Mean	Post Mean	Relative % Difference	Absolute Difference		
<b>All Study Subjects</b>										
Overall medical services										
Plan paid	\$2225	\$2521	13.3%	\$296	\$2209	\$2554	15.6%	\$345	-2.3%	.39
Out-of-pocket	\$588	\$641	9.1%	\$53	\$425	\$510	20.2%	\$86	-11.1%	<.0001
Total	\$2819	\$3162	12.2%	\$344	\$2643	\$3100	17.3%	\$457	-5.1%	.02
Physician office visits	\$596	\$653	9.6%	\$57	\$573	\$616	7.5%	\$43	2.1%	.09
Hospitalizations	\$497	\$573	15.3%	\$76	\$533	\$668	25.3%	\$135	-10.0%	.17
ED visits	\$155	\$185	19.3%	\$30	\$162	\$210	29.3%	\$48	-10.0%	.03
Other outpatient services	\$1591	\$1805	13.4%	\$214	\$1386	\$1652	19.2%	\$266	-5.8%	.02
<b>Subgroup Aged 0-18 Years</b>										
Overall medical services										
Plan paid	\$1245	\$1353	8.7%	\$108	\$1220	\$1325	8.6%	\$105	0.1%	.98
Out-of-pocket	\$339	\$365	7.7%	\$26	\$270	\$325	20.6%	\$56	-12.9%	.0003
Total	\$1588	\$1718	8.2%	\$130	\$1491	\$1661	11.4%	\$170	-3.2%	.46
Physician office visits	\$589	\$570	-3.1%	-\$18	\$526	\$512	-2.6%	-\$14	-0.5%	.76
Hospitalizations	\$201	\$237	18.0%	\$36	\$216	\$274	26.9%	\$58	-9.0%	.70
ED visits	\$91	\$93	2.8%	\$3	\$99	\$104	5.1%	\$5	-2.3%	.86
Other outpatient services	\$656	\$751	14.5%	\$95	\$581	\$700	20.6%	\$120	-6.1%	.37
<b>Subgroup Aged 19-50 Years</b>										
Overall medical services										
Plan paid	\$2404	\$2288	-4.8%	-\$116	\$2375	\$2428	2.2%	\$53	-7.1%	.14
Out-of-pocket	\$659	\$622	-5.7%	-\$37	\$460	\$500	8.7%	\$40	-14.4%	<.0001
Total	\$3072	\$2910	-5.3%	-\$161	\$2839	\$2952	4.0%	\$113	-9.2%	.02
Physician office visits	\$554	\$566	2.1%	\$12	\$552	\$559	1.3%	\$7	0.8%	.76
Hospitalizations	\$582	\$510	-12.4%	-\$72	\$655	\$649	-0.8%	-\$5	-11.6%	.19
ED visits	\$153	\$188	23.0%	\$35	\$163	\$229	40.5%	\$66	-17.5%	.01
Other outpatient services	\$1801	\$1685	-6.5%	-\$117	\$1484	\$1547	4.3%	\$63	-10.7%	.002
<b>Subgroup Aged 51-64 Years</b>										
Overall medical services										
Plan paid	\$3361	\$3666	9.1%	\$305	\$3241	\$3652	12.7%	\$411	-3.6%	.46
Out-of-pocket	\$819	\$869	6.2%	\$51	\$570	\$666	16.9%	\$96	-10.7%	.001
Total	\$4183	\$4535	8.4%	\$352	\$3842	\$4388	14.2%	\$546	-5.8%	.18
Physician office visits	\$697	\$816	17.0%	\$118	\$674	\$763	13.3%	\$90	3.6%	.32
Hospitalizations	\$773	\$898	16.1%	\$125	\$746	\$995	33.4%	\$249	-17.3%	.22
ED visits	\$159	\$186	16.8%	\$27	\$151	\$204	35.4%	\$53	-18.6%	.76
Other outpatient services	\$2589	\$2733	5.5%	\$144	\$2289	\$2511	9.7%	\$222	-4.1%	.33

DID indicates difference-in-differences; ED, emergency department; VBID, value-based insurance design.

high-value services (primary care). In this study, we examined both children and adults during a 4-year period after implementation of the VBID initiative for primary care in a large employer group.

The VBID cohort in our study experienced a lower total healthcare spending trend relative to the comparison cohort, driven by decreases in medical utilization. In contrast to the results of a prior study of the initiative,<sup>17</sup> which was limited to children and found no change in overall medical expenditures, our results

speak favorably for the implementation of VBID for primary care. One explanation for the difference is that inclusion of adults, a population expected to have more chronic conditions, generated more opportunity for improved disease management through PCPs. Additionally, our study assessed healthcare spending over a 4-year period compared with 2 years in the previous study, which also allowed for improvements in chronic disease management to affect outcomes to a greater degree.

**TABLE 4.** Healthcare Utilization for Each Cohort in Preintervention and Postintervention Periods Among All Study Subjects<sup>18</sup>

Utilization Rate per 1000 Members per Year	VBID Cohort			Comparison Cohort			DID Relative % Difference	P
	Pre Mean	Post Mean	Absolute Difference (Relative %)	Pre Mean	Post Mean	Absolute Difference (Relative %)		
<b>Inpatient Hospitalization</b>								
All cause	32	31	-0.6 [-2.0]	41	42	1.1 [2.7]	-4.7%	.33
ACSC <sup>a</sup> related	2.1	1.8	-0.3 [-12.0]	3.3	3.0	-0.3 [-7.1]	-4.9%	.74
<b>ED Visits</b>								
All cause	116	113	-2.6 [-2.3]	140	143	3.1 [2.2]	-4.5%	.07
Primary care treatable	73	65	-7.2 [-9.9]	90	88	-2.2 [-2.5]	-7.4%	.01
<b>Other Outpatient Services</b>								
Other overall services	4423	4782	359.4 [8.1]	4252	4772	519.8 [12.2]	-4.1%	.004

ACSC indicates ambulatory care-sensitive condition; DID, difference-in-differences; ED, emergency department; VBID, value-based insurance design.

<sup>a</sup>ACSCs defined according to the Dartmouth Atlas of Health Care, including angina, asthma, bacterial pneumonia, cellulitis, congestive heart failure, convulsions, chronic obstructive pulmonary disease, dehydration, diabetes, gastroenteritis, hypertension, and kidney/urinary infections.<sup>18</sup>

In our study, the VBID cohort did not experience a statistically significant increase in physician office visits compared with the comparison cohort from the preintervention to the postintervention period (2.6% increase vs 1.7% increase). Given the benefit change, it was expected that office visits might increase to a greater extent than was actually observed. We found that the increase in office visits primarily occurred within individuals aged 51 to 64 years in both cohorts, who may have more ongoing healthcare needs than younger members. For the same age group, we observed that the VBID cohort had a large relative reduction in ED visits for both all-cause and primary care-treatable conditions. One hypothesis about the reduction in ED visits and the relatively small increase in office visits is that removing financial barriers to primary care may have improved timeliness of care, which in turn led to positive health outcomes—reduced need for ED use and for follow-up care office visits.<sup>18,24,25</sup> In addition, timely evaluation can result in the treatment of an urgent condition before it turns into an emergent condition, and proper management of chronic conditions tends to decrease morbidity and associated healthcare spending.<sup>25,26</sup>

Evaluations of VBID initiatives for medical services are relatively limited. The existing evidence suggests that increased cost sharing leads to reduced use of low-value services, but encouraging use of high-value services—and establishing a corresponding return on investment—is harder to demonstrate. For example, the Mayo Clinic study reported a decrease of 0.7 visits per person to specialists in response to increased cost sharing for specialty care services; however, no change in PCP visits was associated with the removal of cost sharing.<sup>6</sup> Although the 2008 Oregon Medicaid Experiment did not report the impact on expenditures, the study found that beyond the improved receipt of primary care and preventive services at community health centers, use of other health services increased with Medicaid expansion.<sup>27</sup> In the 2011 Connecticut experience, participants had used more preventive services within 2 years of receiving incentives; however, the impact on expenditures was inconclusive, and researchers concluded that longer-term follow-up was needed.<sup>28</sup>

### Strengths and Limitations

Our study contributes to the existing evidence on the impact of VBID initiatives in the area of primary care. There are several unique features of this study. First, our study, building on recommendations from earlier studies, covered a time period spanning several years, which might be required to see benefits from improved PCP care. Second, prior implementations focused on patients who had chronic diseases or were previously uninsured, whereas this initiative targeted, other than those with severe health issues, employees and their family members regardless of their underlying risks. Making primary care more accessible increases the potential to prevent development of chronic conditions and to avoid subsequent treatment expenses. Additionally, aspects of primary care, such as care continuity and the patient-provider relationship, have considerable clinical benefits above and beyond simple disease management in patients with chronic conditions. Examples include higher vaccination rates and higher utilization of recommended screening services, which have been shown to decrease under the pressure of increases in cost sharing.<sup>10,17,29,30</sup> This raises some worthy ideas for future research: Evaluating quality of care in subsets of individuals with chronic conditions, or age groups eligible for certain cancer screenings, will complete understanding of the impact of the initiative; directly assessing patient satisfaction and perception will help understand how the initiative works.

The results of this study were subject to several limitations. First, study subjects were affected by other changes in the marketplace. One major change was the enactment in March 2010 of the Affordable Care Act (ACA), which requires insurers to offer free preventive services to all members.<sup>31</sup> This may contribute to the observed improvement of the comparison cohort during the postintervention period driven by the preventive services provision of ACA, and it potentially attenuates the impact of the VBID intervention. Second, there were some unobserved characteristics within the 2 matched cohorts, such as marital status, income, and primary care site-level

information, which might affect members' healthcare behaviors. Third, the VBID cohort consisted of a relatively young and healthy employed population, so the results may not apply to complex chronically ill populations who would consume more healthcare resources. The VBID cohort also had good access to care at baseline and continuous healthcare coverage for a long time, which may affect the study generalizability. In the aforementioned 2008 Oregon Medicaid Experiment, the uninsured population sought more primary care services after receiving insurance coverage; however, they also had more ED visits and hospitalizations and little change in overall health measures after 2 years of participation.<sup>27,32-35</sup> The type of VBID intervention demonstrated in our study may offer additional potential for populations with limited provider access and higher price sensitivity, but as seen with the Oregon Medicaid study, it is difficult to predict the impact.

## CONCLUSIONS

This real-world analysis, using quasi-experimental design, demonstrates the potential for favorable spending trends with carefully crafted benefit design. Removing cost sharing for PCP care was associated with a moderate favorable trend in total medical expenditures through reduced use of healthcare services relative to a matched comparison group. Preserving and promoting access to care while keeping expenditure trends stable is an attractive outcome for all participants in the healthcare system. The favorable results for spending are encouraging. Further investigations of this VBID initiative are needed to understand patient perceptions and evaluate its impact on quality of care and on populations with different socioeconomic factors and levels of access to care. ■

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**eAppendix A. Code List for Conditions\***

<b>Conditions</b>	<b>ICD-9 Diagnosis Codes</b>	<b>ICD-9 Procedure Codes</b>	<b>CPT/HCPCS Codes</b>
Organ Transplant		33.6x, 46.97, 50.5x,55.6x, 52.8x, 37.5x (excluding 37.55), 41.0x	
Hemophilia	286.0x, 286.1x, 286.4x, 286.5x		With the following codes in the same claim: J2597, J7190-J7195, J7199
Cystic Fibrosis	277.0x		
End-stage Renal Disease (ESRD)		39.95, 54.98	90919-90921, 90923-90925, 90935,90937,90939, 90940, 90945, 90947, 90989,90993,90997,90999, 99512
Respiratory Failure	518.83, 518.84		A4611-A4613, A4483, E0460, E0450, E0464, E0461, E0483, 94002-94005

\*Cancer patients are not considered as having a complex condition. Oncology diagnosis is relatively common and primary care physicians could be involved during the course of treatment.



**eAppendix B. Baseline Characteristics of VBIID Members Who Were Included vs. Excluded**

Characteristics	VBIID Cohort Included (n=25,725)	VBIID Cohort Excluded (n=22,938)	<i>P</i> values
Age as of 1/1/2008			
mean (SD), years	33.5 (18.4)	31.0 (18.4)	<.0001
0-18 years old, N (%)	8,613 (33.5)	7,711 (33.6)	<.0001
19-50 years old, N (%)	12,120 (47.1)	11,342 (49.4)	
≥51 years old, N (%)	4,992 (19.4)	3,885 (16.9)	
Gender, N (%)			.31
Male	13,200 (51.3)	11,665 (50.9)	
Female	12,525 (48.7)	11,273 (49.1)	
Residence Region, N (%)			<.0001
Northeast	8,230 (32.0)	5,872 (25.6)	
South	3,910 (15.2)	6,327 (27.6)	
Midwest	9,507 (37.0)	7,773 (33.9)	
West	4,078 (15.8)	2,966 (12.9)	
Residence Area, N (%)			.67
MSA <sup>a</sup>	24,116 (93.7)	21,528 (93.9)	
Non-MSA <sup>a</sup>	1,609 (6.3)	1,410 (6.1)	
Comorbid Disease conditions			
Elixhauser comorbidity index (ECI) (mean, SD)	0.5 (0.9)	0.5 (1.0)	.36
=0, N (%)	17,986 (69.9)	15,823 (69.0)	.02
1-5, N (%)	7,679 (29.9)	7,042 (30.7)	
≥6, N (%)	60 (0.2)	73 (0.3)	
Hypertension, N (%)	1,916 (7.4)	1,705 (7.4)	.95
Acute Myocardial Infarction, N (%)	11 (0.04)	5 (0.02)	.22
Congestive Heart Failure, N (%)	43 (0.2)	44 (0.2)	.45
Coronary Artery Disease, N (%)	320 (1.2)	303 (1.3)	.45
Atrial Fibrillation, N (%)	51 (0.2)	71 (0.3)	.01
Hyperlipidemia, N (%)	2,506 (9.7)	2,251 (9.8)	.79
Asthma, N (%)	631 (2.5)	639 (2.8)	.02
Chronic Obstructive Pulmonary Disease (COPD), N (%)	124 (0.5)	115 (0.5)	.76
Chronic Kidney Disease (CKD), N (%)	102 (0.4)	142 (0.6)	.0005
Diabetes, N (%)	691 (2.7)	655 (2.9)	.26
Mental disorder, N (%)	568 (2.2)	698 (3.0)	<.0001
Osteoporosis, N (%)	97 (0.4)	91 (0.4)	.73
Rheumatoid Arthritis / Osteoarthritis, N (%)	482 (1.9)	474 (2.1)	.13

<sup>a</sup>MSA=Metropolitan Statistical Areas

**eAppendix C. Healthcare Utilization for Each Cohort in Preintervention and Postintervention Period for Subgroups**

Utilization Rate per 1000 Members per Year	VBID Cohort			Comparison Cohort			DID <sup>b</sup> Relative % Difference	P value
	Preintervention period	Postintervention period	Absolute Difference (Relative %)	Preintervention period	Postintervention period	Absolute Difference (Relative %)		
	Mean	Mean		Mean	Mean			
<b>0-18 years old</b>								
<b>Physician office visit</b>	3,744	3,422	-322(-8.6)	3,618	3,341	-277(-7.7)	-0.9%	.47
<b>Inpatient hospitalization</b>								
All cause	16	14	-2(-12.0)	20	18	-2(-9.9)	-2.2%	.85
ACSC <sup>a</sup> related	4	2	-2(-48.2)	4	3	-1(-33.3)	-14.9%	.32
<b>ED visits</b>								
All cause	146	137	-9(-6.2)	179	164	-15(-8.4)	2.2%	.56
Primary care treatable	99	86	-13(-12.8)	124	110	-14(-11.0)	-1.8%	.67
<b>Other Outpatient services</b>	2,521	2,829	308(12.2)	2,330	2,870	540(23.2)	-10.9%	.01
<b>19-50 years old</b>								
<b>Physician office visit</b>	3,240	3,255	15(0.5)	3,591	3,576	-15(-0.4)	0.9%	.54
<b>Inpatient hospitalization</b>								
All cause	40	32	-8(-20.7)	52	46	-6(-12.1)	-8.6%	.12
ACSC <sup>a</sup> related	1	1	0.4(39.8)	3	2	-0.3(-11.0)	50.8%	.15
<b>ED visits</b>								
All cause	102	114	12(11.1)	130	151	21(16.1)	-4.9%	.30
Primary care treatable	61	64	3(25)	80	91	11(14.5)	-9.4%	.10
<b>Other Outpatient services</b>	5,013	4,572	-441(-8.8)	4,631	4,562	-69(-1.5)	-7.3%	.0002
<b>51-64 years old</b>								
<b>Physician office visit</b>	4,108	4,371	263(6.4)	4,369	4,579	210(4.8)	1.6%	.34
<b>Inpatient hospitalization</b>								
All cause	39	43	4(11.7)	49	56	7(14.4)	-2.7%	.79
ACSC <sup>a</sup> related	2	2	0.2(7.3)	3	4	1(36.0)	-28.7%	.47
<b>ED visits</b>								
All cause	100	95	-4(-4.1)	104	117	13(12.4)	-16.5%	.003
Primary care treatable	57	51	-6(-10.0)	62	66	4(6.1)	-16.1%	.02
<b>Other Outpatient services</b>	6,095	6,486	391(6.4)	6,162	6,491	329(5.3)	1.1%	.65

<sup>a</sup>ACSC=Ambulatory Care Sensitive Conditions defined according to the Dartmouth Atlas of Health Care, including Angina, Asthma, Bacterial pneumonia, Cellulitis, Congestive heart failure, Convulsions, COPD, Dehydration, Diabetes, Gastroenteritis, Hypertension, Kidney/urinary infections.<sup>18</sup>

<sup>b</sup>DID=Difference in Differences