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Zero Dollar Drug Copay Program Increases Medication Adherence and Utilization among Members with Diabetes in Louisiana

Tiange Tang, MPH[1]; Debra Winberg, MSc, MA[1]; Jian Li, PhD[1]; Charles Stoecker, MA, PhD[1]; Alessandra N. Bazzano, MPH, PhD[1]; Hui Shao, MD, PhD[2]; Mingyan Cong, PhD[3]; Brice Labruzzo Mohundro, PharmD, BCACP[3]; Miao Liu, MS[3]; Jason Ouyang, MD, MPH[3]; Mollie Carby, PharmD[3]; Elizabeth Nauman, MPH, PhD[4]; Eboni Price-Haywood, MD, MPH, MMM, FACP[5]; Somesh C. Nigam, PhD[6]; Gang Hu, MD, PhD[7]; Yun Shen, MD[7]; Lizheng Shi, MSPharm, MA, PhD[1]

Affiliations: [1]School of Public Health and Tropical Medicine, Tulane University. [2]Hubert Department of Global Health, Rollins School of Public Health, Emory University. [3]Blue Cross and Blue Shield of Louisiana. [4]Louisiana Public Health Institute. [5]Ochsner Clinical School - University of Queensland. [6]Somesh Nigam Consulting, LLC. [7]Pennington Biomedical Research Center

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INTRODUCTION

Louisiana has one of the highest diabetes prevalence rates in the U.S. In 2022:

- About 500,800 Louisianans were diagnosed with diabetes[1].
- 7.7% of the Louisiana population was estimated to have prediabetes[1].
- Diabetes in Louisiana had an estimated cost of around $5.7 billion[1].

Non-adherence to diabetes treatment can pose a great threat to diabetes management.

- Reductions in HbA1C are significantly correlated with decreased risk of complications[2].
- However, more than 45% of patients with diabetes have poor glycemic control, with medication non-adherence being a factor. Medication non-adherence is associated with increased morbidity and mortality, increased healthcare utilization, and poor management of complications[3].

Eliminating or reducing copays for medication can improve adherence[4,5] and reduce medical spending[6].

Blue Cross and Blue Shield of Louisiana (BCBSLA) formulated the $0 Drug Copay (ZDC) program to reduce financial barriers by offering $0 copays for certain drugs, mostly generics, used to treat certain chronic conditions for eligible members with copay pharmacy benefits.

AIM

This study aimed to assess the effectiveness of the ZDC program on members' medication adherence and use.

METHODS

Study Design

This is an observational retrospective cohort study.

Data Source

- BCBSLA medical claims: Include ICD-10 code, primary diagnosis code, and diagnosis date.
- BCBSLA pharmacy claims: Include national drug code (NDC), generic product identifier code (GPI), refill dates, and days' supply.

Study Period

- Index date: July 1, 2020, when the ZDC program became available to eligible BCBSLA members.
- Jan. 1, 2019-Dec. 31, 2021 (18 months pre-intervention, 18 months post-intervention).

Main Eligibility Criteria

- Members with type 2 diabetes identified by ICD-10 code E11 or antidiabetic medication use and who were continuously enrolled with BCBSLA for at least three years.
- Members 18 years and older at baseline (June 2020).
- Members with no prior participation in the ZDC program.
- Members with high-deductible health plans or Medicare supplemental plans were excluded.
- Members with BCBSLA pharmacy benefit.
- Members who were not pregnant.
- Members who reside within the state of Louisiana.

Study Cohort

- Treatment group: Fully insured BCBSLA members.
- Control group: Members who have Administrative Services Only (ASO) plans.

Outcomes of Anti-Diabetic Medications

All Medications

- Monthly Proportion of Days Covered (PDC)
- Monthly Drug Counts
- Monthly Drug Use

ZDC-Eligible Medications

- Monthly PDC
- Monthly Drug Counts
- Monthly Drug Use

METHODS *(Cont.)*

Statistical Analysis

- Counts and percentages were reported for categorical variables. Means and standard deviations were reported for continuous variables.
- Probit regression was used to generate inverse propensity treatment weight (IPTW) with members in the treatment group being assigned a weight of 1 and members in the control group being assigned a weight of (Propensity Score)/(1-Propensity Score).
- A two-way fixed effect difference-in-difference (DID) regression analysis with IPTW was performed while controlling for pre-period plan type by treatment status linear time trend, chronic conditions, healthcare utilizations, medication spending, diabetes complications severity index, and age.

Subgroup Analysis

- Pre-ZDC Users: Members who used only ZDC-eligible medications in the pre-period.
- Pre-ZDC Non-Users: Members who did not use ZDC-eligible medications in the pre-period.
- Complex Users: Members who used both ZDC and non-ZDC medications in the pre-period.

RESULTS

Baseline Characteristics

- Table 1 displays the weighted (with IPTW) and unweighted baseline characteristics for all members.

Table 1. Baseline Covariates Balance, All Members, Pre-Period PDC

Balancing Tables of Covariates at Baseline – All Members PDC (N = 7,603)						
	Unweighted Group Monthly Average			Weighted Group Mean Monthly Average		
Variables	Control (N = 4,558)	Treatment (N = 3,045)	SMD	Control (N = 3,039)	Treatment (N = 3,045)	SMD
Age	52.93 (11.27)	48.78 (12.45)	-0.35	48.74 (12.52)	48.78 (12.45)	0.00
Age (≤45)	1047 (22.97%)	1103 (36.22%)	0.29	1112 (36.6%)	1103 (36.22%)	-0.01
Age (46 - 64)	3032 (66.52%)	1750 (57.47%)	-0.19	1735 (57.08%)	1750 (57.47%)	0.01
Age (≥65)	479 (10.51%)	192 (6.31%)	-0.15	192 (6.32%)	192 (6.31%)	0.00
Sex (Women)	2532 (55.55%)	1747 (57.37%)	0.04	1732 (57%)	1747 (57.37%)	0.01
Covid	60 (1.32%)	55 (1.81%)	0.04	55 (1.82%)	55 (1.81%)	0.00
Anxiety	938 (20.58%)	576 (18.92%)	-0.04	581 (19.13%)	576 (18.92%)	-0.01
Cancer	517 (11.34%)	284 (9.33%)	-0.07	287 (9.44%)	284 (9.33%)	0.00
CHF	177 (3.88%)	56 (1.84%)	-0.12	60 (1.97%)	56 (1.84%)	-0.01
CAD	527 (11.56%)	205 (6.73%)	-0.17	210 (6.9%)	205 (6.73%)	-0.01
CKD	302 (6.63%)	123 (4.04%)	-0.12	128 (4.23%)	123 (4.04%)	-0.01
COPD	153 (3.36%)	57 (1.87%)	-0.09	57 (1.87%)	57 (1.87%)	0.00
ESRD	43 (0.94%)	13 (0.43%)	-0.06	14 (0.48%)	13 (0.43%)	-0.01
Hypertension	3369 (73.91%)	1565 (51.4%)	-0.48	1576 (51.87%)	1565 (51.4%)	-0.01
Osteoarthritis	770 (16.89%)	384 (12.61%)	-0.12	386 (12.71%)	384 (12.61%)	0.00
SAD	187 (4.11%)	125 (4.11%)	0.00	127 (4.19%)	125 (4.11%)	0.00
Urban	3686 (80.87%)	2346 (77.04%)	-0.09	2344 (77.14%)	2346 (77.04%)	0.00
Brand AA	460.67 (1583.3)	376.25 (953.87)	-0.06	428.79 (2845.56)	376.25 (953.87)	-0.02
Generic AA	87.09 (345.77)	59.08 (107.75)	-0.11	59.77 (97.28)	59.08 (107.75)	-0.01
IA	0.01 (0.03)	0.01 (0.03)	-0.05	0.01 (0.03)	0.01 (0.03)	-0.02
OP Surgery	0.05 (0.11)	0.04 (0.12)	-0.09	0.04 (0.1)	0.04 (0.12)	0.00
PCP Visit	0.22 (0.2)	0.18 (0.18)	-0.21	0.19 (0.17)	0.18 (0.18)	0.00
SO Visit	0.59 (0.84)	0.53 (0.77)	-0.08	0.54 (0.94)	0.53 (0.77)	-0.01
Office Visit	0.82 (0.89)	0.71 (0.81)	-0.12	0.72 (0.97)	0.71 (0.81)	-0.01
UC Visit	0.04 (0.08)	0.03 (0.06)	-0.09	0.03 (0.06)	0.03 (0.06)	0.01
ER Visit	0.02 (0.06)	0.02 (0.05)	-0.12	0.02 (0.05)	0.02 (0.05)	0.00
DCSI Score	2.17 (2.76)	1.42 (2.4)	-0.29	1.44 (2.4)	1.42 (2.4)	-0.01
Drug Counts	1.23 (0.94)	0.92 (0.81)	-0.35	0.94 (0.78)	0.92 (0.81)	-0.02
Pre-Period PDC (Not Included in the Probit Model)	0.67 (0.34)	0.56 (0.36)	-0.32	0.57 (0.36)	0.56 (0.36)	-0.04

Abbreviations: Congestive Heart Failure (CHF), Coronary Artery Disease (CAD), Chronic Kidney Disease (CKD), Chronic Obstructive Pulmonary Disease (COPD), End-Stage Renal Disease (ESRD), Substance Abuse Disorder (SAD), Allowed Amount (AA), Inpatient Admission (IA), Outpatient Surgery (OP), Primary Care Physician (PCP), Specialty Office (SO), Urgent Care (UC), Emergency Room (ER), Diabetes Complication Severity Index (DCSI), Proportion of Days Covered (PDC), Standardized Mean Difference (SMD).

Notes: Table displays counts and percentages for categorical variables and means and standard deviations for continuous variables. PDC was not included in the probit regression that predicted treatment status; it is displayed to assess balance across treatment and control groups.

RESULTS

Event Studies

Event studies were performed to test the pre-parallel trend assumption. The event study of monthly PDC and ZDC – monthly PDC are displayed.

Figure 1. Impact of ZDC Program on Monthly PDC for All Medications Relative to Program Start Date, All Members

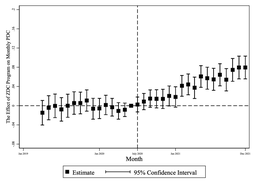
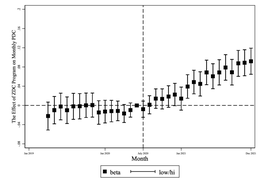


Figure 2. Impact of ZDC Program on Monthly PDC for ZDC-Eligible Medications Relative to Program Start Date, All Members



Regression Results

Table 2 provides the regression results for PDC and drug utilization outcomes for all members. For members who used all anti-diabetic medications, the ZDC-program was associated with:

- 4.4 percentage points increase in monthly PDC
- 6.2 percentage points increase in monthly drug use
- 0.090 increase in drug counts

For members who used only ZDC-eligible antidiabetic medications, the ZDC-program was associated with:

- 5.4 percentage points increase in monthly PDC
- 7.6 percentage points increase in monthly drug use
- 0.074 increase in drug counts

Table 2: ZDC Program Impact on Drug Utilization, All Users

	All Antidiabetic Medications			ZDC-Eligible Antidiabetic Medications		
Outcomes	PDC (N = 7,603)	Drug Counts (N = 7,603)	Any Monthly Drug Use (N = 7,603)	PDC (N = 6,419)	Drug Counts (N = 6,419)	Any Monthly Drug Use (N = 6,419)
ZDC Effect (Monthly)	0.044*** (0.0078)	0.090*** (0.012)	0.062*** (0.079)	0.054*** (0.0087)	0.074*** (0.010)	0.076*** (0.0092)
BOA	0.56	0.92	0.64	0.48	0.63	0.56
Impact (%)	7.79	9.75	9.59	11.16	11.76	13.53
Annual Impact	15.93 days	1.08 drugs	0.74 months	19.71 days	0.89 drugs	0.91 months
P-value	***	***	***	***	***	***

Notes: Table displays estimates of ZDC program impact from difference-in-difference regression.
Abbreviations: Baseline Outcome Average (BOA); ***: P-value < 0.001.

Table 3 provides the regression results for PDC and drug utilization outcomes for pre-ZDC users. For members who used all anti-diabetic medications, the ZDC-program was associated with:

- 3.9 percentage points increase in monthly PDC
- 5.8 percentage points increase in monthly drug use
- 0.053 increase in drug counts

For members who used only ZDC-eligible antidiabetic medications, the ZDC-program was associated with:

- 4.4 percentage points increase in monthly PDC
- 6.4 percentage points increase in monthly drug use
- 0.063 increase in drug counts

Table 3: ZDC Program Impact on Drug Utilization, Pre-ZDC Users

	All Antidiabetic Medications			ZDC-Eligible Antidiabetic Medications		
Outcomes	PDC (N = 3,955)	Drug Counts (N = 3,955)	Any Monthly Drug Use (N = 3,955)	PDC (N = 3,955)	Drug Counts (N = 3,955)	Any Monthly Drug Use (N = 3,955)
ZDC Effect (Monthly)	0.039 (0.011)	0.053 (0.015)	0.058 (0.012)	0.044 (0.011)	0.063 (0.013)	0.064 (0.012)
BOA	0.49	0.62	0.58	0.49	0.62	0.58
Impact (%)	7.96	8.46	10.11	9.01	10.05	11.13
Annual Impact	14.27 days	0.63 drugs	0.70 months	16.15 days	0.75 drugs	0.77 months
P-value	***	***	***	***	***	***

Notes: Table displays estimates of ZDC program impact from difference-in-difference regression.
Abbreviations: Baseline Outcome Average (BOA); ***: P-value < 0.001.

Table 4 provides the regression results for PDC and drug utilization outcomes for pre-ZDC non-users. For members who used all anti-diabetic medications, the ZDC-program was associated with:

- 0.44 percentage points increase in monthly PDC
- 2.2 percentage points increase in monthly drug use
- 0.025 increase in drug counts

For members who used only ZDC-eligible antidiabetic medications, the ZDC program was associated with:

- 8.1 percentage points increase in monthly PDC
- 0.58 percentage points increase in monthly drug use
- 0.020 increase in drug counts

Table 4: ZDC Program Impact on Drug Utilization, Pre-ZDC Non-Users

ZDC Program Impact on Drug Utilizations – Pre-ZDC Non-Users						
	All Antidiabetic Medications			ZDC-Eligible Antidiabetic Medications		
Outcomes	PDC (N = 1,304)	Drug Counts (N = 1,304)	Any Monthly Drug Use (N = 1,304)	PDC (N = 177)	Drug Counts (N = 177)	Any Monthly Drug Use (N = 177)
ZDC Effect (Monthly)	0.0044 (0.017)	0.025 (0.031)	0.022 (0.016)	0.081 (0.049)	0.020 (0.052)	0.0058 (0.0044)
BOA	0.65	1.10	0.77	0	0	0
Impact (%)	0.67	2.23	2.78	NA	NA	NA
Annual Impact	1.60 days	0.29 drugs	0.26 months	29.52 days	0.24 drugs	0.070 months
P-value	0.8	0.424	0.189	0.098	0.701	0.896
Abbreviations: Baseline Outcome Average (BOA); Not Available (NA)						

RESULTS *(Cont.)*

Table 5 provides the regression results for PDC and drug utilization outcomes for complex users. For members who used all anti-diabetic medications, the ZDC-program was associated with:

- 9.1 percentage points increase in monthly PDC
- 10 percentage points increase in monthly drug use
- 0.18 increase in drug counts

For members who used only ZDC-eligible antidiabetic medications, the ZDC-program was associated with:

- 10 percentage points increase in monthly PDC
- 13 percentage points increase in monthly drug use
- 0.13 increase in drug counts

Table 5: ZDC Program Impact on Drug Utilization, Complex Users

ZDC Program Impact on Drug Utilizations, Complex Users						
	All Anti-Diabetic Medications			ZDC-Eligible Anti-Diabetic Medications		
Outcomes	PDC (N = 2,343)	Drug Counts (N = 2,343)	Any Monthly Drug Use (N = 2,343)	PDC (N = 2,286)	Drug Counts (N = 2,286)	Any Monthly Drug Use (N = 2,286)
ZDC Effect (Monthly)	0.091 (0.014)	0.18 (0.029)	0.10 (0.014)	0.10 (0.016)	0.13 (0.021)	0.13 (0.017)
BOA	0.64	1.50	0.69	0.52	0.72	0.58
Impact (%)	14.21	12.26	14.80	19.38	17.93	22.41%
Annual Impact	33.31 days	2.21 drugs	1.23 months	36.43 days	1.54 drugs	1.56 months
P-value	***	***	***	***	***	***

Notes: Table displays estimates of ZDC program impact from difference-in-difference regression.
Abbreviations: Baseline Outcome Average (BOA); ***: P-value < 0.001.

DISCUSSION

Discussion

- The finding of our study is consistent with previous research on medication adherence. For example, Erin M. Schikowski et al. found that copay was inversely related to medication adherence based on the analysis of administrative claims[7].
- Todd H. Wagner et al. also found a strong positive association between copays and cost-related medication underuse such as taking fewer doses, postponing taking a medication, failing to fill a prescription at all, and taking medication less frequently than prescribed[8].

Limitations

- Members covered by earlier designs of the ZDC program are not included.
- ZDC usage was not randomly assigned. Individual fixed effects were used to avoid identification based on unobserved differences between the treatment and control groups that are time-invariant. Inverse probability of treatment weighting further made the two groups alike on observable pre-period characteristics.
- ASO and FI plans differ notably in their benefit design. This may be problematic if those differences changed coincidently with the index date for ZDC implementation.

CONCLUSION

This study associates the ZDC program with an increase in members' medication adherence and use.

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