Diabetes Therapeutic Drug Class: Evaluating Adherence and Total Cost of Care

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Background

An estimated 30.3 million Americans, or 9.4% of the population, are affected by diabetes.[1] In 2015, 28% of individuals enrolled in Medicare were treated for diabetes.[2] Medication therapy plays an important role in controlling glycemic levels in patients with diabetes, thereby helping to prevent complications.[3] Diabetes cost an estimated $245 billion in 2012, where inpatient care and prescription medications to treat diabetes complications made up the largest portions.[3] A previous study suggested that increased adherence to diabetes medications can reduce hospitalizations and emergency department visits, resulting in decreased total cost of care, despite increased pharmacy spend.[3]

Objective

To compare adherence across the type 2 diabetes pharmacologic drug classes and evaluate the effect of adherence within pharmacologic classes on other CMS Star measures, disease complication severity, and total cost of care.

Methods

Data Source:

- This study utilized administrative claims data from Humana Inc., a healthcare company that offers Commercial, Medicare Advantage, Prescription Drug and Medicaid coverage to millions of people across the country. The data set included medical and pharmacy claims data, as well as eligibility information.

Inclusion and Exclusion Criteria:

- Individuals with Medicare Advantage Prescription Drug (MAPD) coverage, continuously enrolled in 2016, with at least 90 days from date of first medication fill date to the end of year, and at least 2 pharmacy claims for a diabetic pharmacologic category of interest (Biguanide, Sulfonylurea, DPP-4 Inhibitor, TZD, GLP-1 Analog, DPP-4/Biguanide, and SGLT2 Inhibitor).
- Age 19 or older as of January 1, 2016.
- Excluded individuals included those contractually obligated to be excluded from research and those with a diagnosis of ESRD or a claim for insulin in 2016.

Outcomes:

- Adherence was measured as having a proportion of days covered (PDC) ≥ 80%.
- Medical and Pharmacy Costs included plan and patient paid amounts.
- Diabetes complication severity index (DCSI) was measured on a scale of 0 to 13.[4]
  - Based on presence and degree of 7 diabetes complication categories.
  - Classified as low (0 to 3), medium (4 to 7), or high (8 to 13) severity.
- Overlap was measured by the count of other CMS measures for which individuals met eligibility requirements. These CMS measures are defined as measures with a diabetic component, or without a diabetic component and shown in the data to possess a significant overlap to diabetic individuals.

Statistical Analyses:

- Descriptive statistics (frequency and means) were calculated for demographic/descriptive characteristics.
- P-values were calculated using a 2-sample t-test for differences in total cost of care by adherence status.

Results

Table 1. Demographic Characteristics

Measure	
N	426,144
Age, mean (SD)	71.5 (8.8)
Diabetes Complication Severity Index, n (%)	
Low	271,487 (63.7%)
Medium	136,904 (32.1%)
High	13,071 (3.1%)
Pharmacologic Categories, n (%)	
Biguanide	341,101 (53.5%)
SU	177,411 (27.8%)
DPP-4 Inhibitor	42,399 (6.6%)
TZD	28,252 (4.4%)
GLP-1 Analog	12,248 (1.9%)
DPP-4/Biguanide	12,092 (1.9%)
SGLT2 Inhibitor	11,624 (1.8%)
Count of Overlap of other CMS measures, n (%)	
0	95,456 (22.4%)
1	58,543 (13.7%)
2	22,330 (5.2%)
3	157,306 (36.9%)
4	74,483 (17.5%)
5	16,975 (4.0%)
6	1,051 (0.2%)

SU=Sulfonylurea; DPP-4=Dipeptidyl Peptidase 4; TZD = Thiazolidinedione; GLP-1=Glucose-like Peptide 1; SGLT2=Sodium/Glucose Cotransporter 2
Demographic characteristics of unknown for diabetes disease complication severity were not included. The top 7 pharmacologic categories by volume were included. Other CMS measures are Statin Use in Persons with Diabetes (SUPD), Statin Therapy for Patients with Cardiovascular Disease (SPC), two Comprehensive Diabetes Care (CDC) measures, Care of Older Adults (COA), and Comprehensive Medical Review (CMR).

Figure 1. Adherence by Pharmacologic Category and Diabetes Complication Severity Index

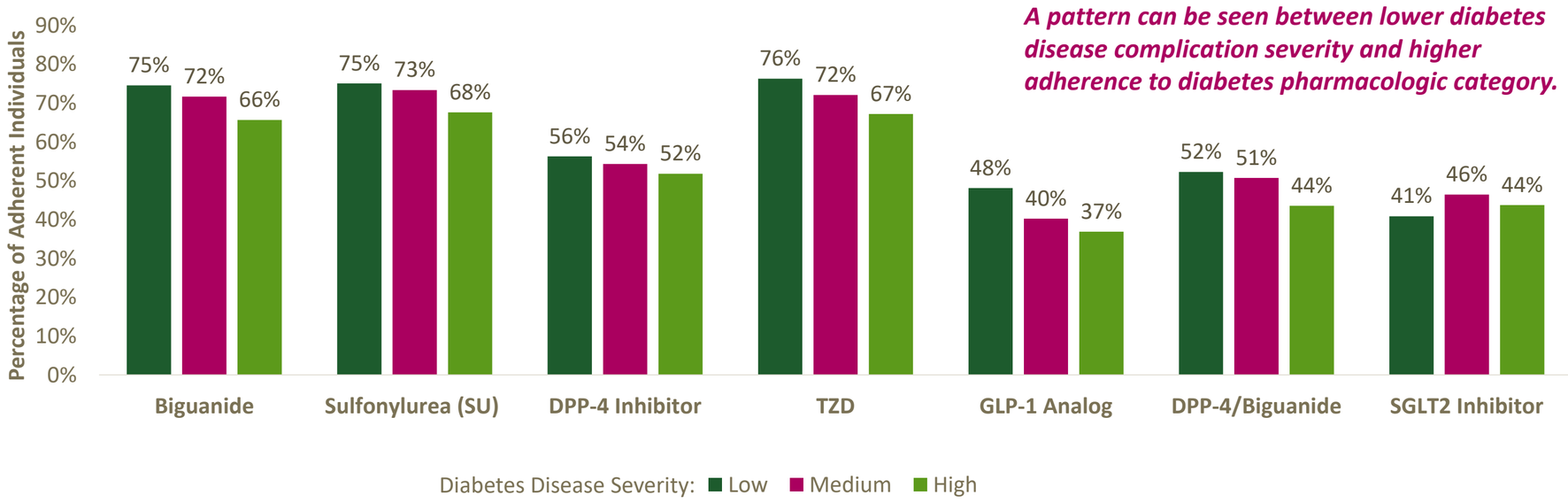

Figure 2. Count of Overlap between CMS Measures by Drug Class

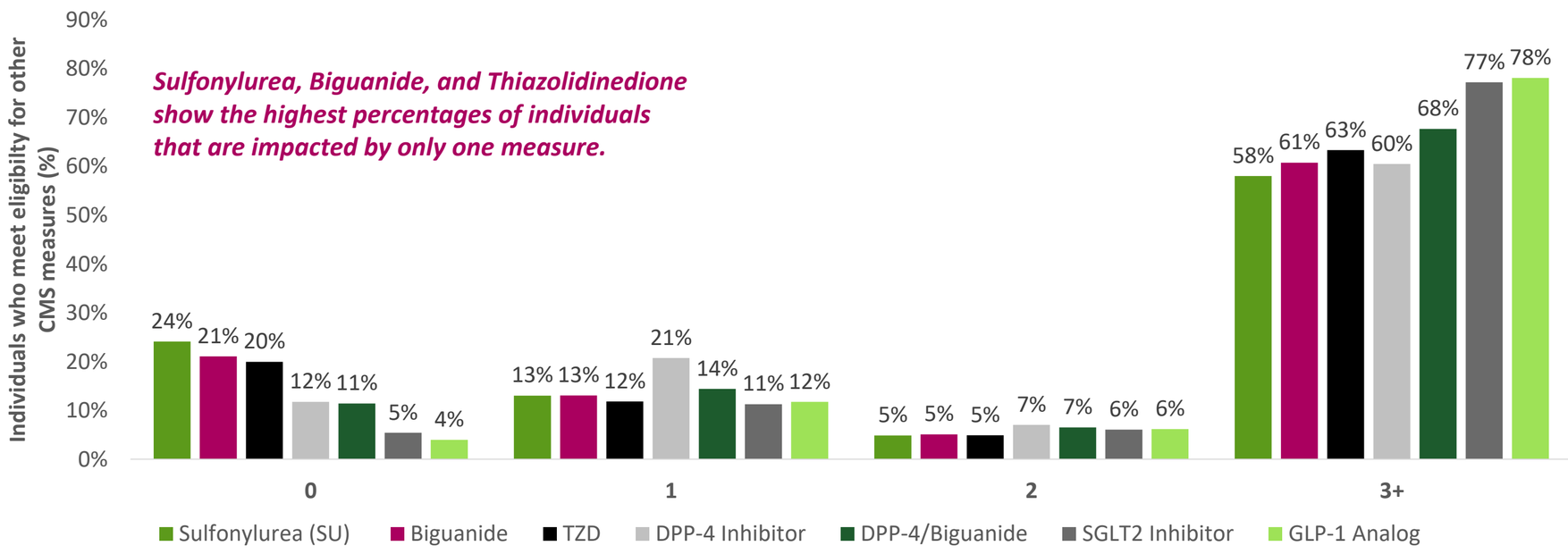

Table 2. Total Costs of Care

Drug Category	Adherent PPPM Medical Cost	Adherent PPPM Pharmacy Cost	Non-Adherent PPPM Medical Cost	Non-Adherent PPPM Pharmacy Cost	Difference in Total Costs Based on Adherence Status	P-value
Biguanide	$405.74	$241.76	$548.17	$239.98	$140.65	<.0001
Sulfonylurea (SU)	$430.78	$264.77	$592.46	$251.79	$148.70	<.0001
DPP-4 Inhibitor	$482.24	$640.00	$569.52	$384.60	-$168.11	<.0001
TZD	$384.01	$273.11	$539.66	$255.82	$138.35	<.0001
GLP-1 Analog	$479.97	$947.35	$529.76	$518.18	-$379.38	<.0001
DPP-4/Biguanide	$396.94	$603.83	$453.86	$369.28	-$177.63	<.0001
SGLT2 Inhibitor	$404.86	$759.23	$422.99	$442.05	-$299.06	<.0001

Adherent individuals have higher PPPM (per person per month) pharmacy costs than non-adherent individuals while the reverse is true of medical PPPM costs.

Conclusions

- Higher diabetes disease complication severity is associated with lower medication adherence.
- There is no observable difference in adherent individuals from non-adherent individuals, as it relates to overlapping with other CMS measures.
- Total cost of care was found to be less in individuals who were adherent to diabetes pharmacologic drug classes comprised largely of generics (Biguanide, SU, and TZD).
- In pharmacologic drug classes comprised largely of branded medications, adherence was associated with lower medical costs, higher pharmacy-related cost of care, and overall higher total cost of care.

Limitations

- Limitations common to studies using administrative claims data apply to this study. These include incomplete information in the database including diagnosis codes, errors in claims coding, and individuals paying out of pocket for prescriptions. There is no guarantee that the disease complication severity is correctly ranked.
- No causal inference can be ascertained from this study, as it is an observational study using retrospective claims data.
- This study uses data from Humana Medicare individuals only, the results may not be generalized. However, Humana is a large national health plan with individuals residing in a broad array of geographic regions.

References

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