TRENDS IN ANTIDIABETIC AGENT USE AND OUTPATIENT PHARMACY COSTS IN A COMMERCIALLY INSURED DIABETES POPULATION FROM A US PAYER PERSPECTIVE

Bertha De Los Santos MS PharmD[1], Kibum Kim PhD[1]
[1]UIC College of Pharmacy, Department of Pharmacy Systems, Outcomes, and Policy

INTRODUCTION

- The prevalence of type 2 diabetes (T2D) in the US was estimated at 38.4 million (11.6%) in 2021.[1]
- The American Diabetes Association estimates healthcare expenditures for patients with T2D at $19,736 per year, contributing to a total economic burden of $412.9 billion in the US for 2022.[2]
- Prior studies have described rising pharmacy costs for individuals with T2D.[3,4]
- Producing recent estimates of antidiabetic agent (ADA) use along with trends in payer spending attributable to specific classes can help inform future benefit design and cost-containment strategies in managed care plans.

OBJECTIVE

To evaluate trends in ADA utilization patterns and outpatient pharmacy costs in a T2D population from a US payer's perspective.

METHOD

Design	Retrospective observational study
Cost estimation	Prevalence-based cost estimate
Data source	Merative MarketScan Commercial Claims and Encounters insurance database
Study period	January 2016 – December 2021
Actively managed T2D calendar year cohorts	**Inclusion** (all) • T2D claim (E11% - E14%) in 2 different quarters from outpatient setting OR ≧1 inpatient T2D claim within a calendar year • ≧1 outpatient pharmacy claim for antidiabetic drug in two different quarters within a year • Continuous calendar year enrollment **Exclusion** (any) • ≧1 service claims for Type 1 (E10%) or gestational diabetes (O24%) • ≧1 Medicare supplemental service claim
Primary Outcomes	**ADA utilization patterns** • 8 ADA classes: DPP4-I, GLP1-RA, insulin, metformin, SGLT2-I, SU, TZD, multiple **Outpatient pharmacy costs** • Aggregated payer net paid amount for outpatient pharmacy services
Data Analysis	**Demographics** • Mean and standard deviation (SD), frequency and percentages (%) **ADA utilization patterns** • Cohort class use reported as percentages (%) • Rate of ADA utilization change calculated using geometric mean **Outpatient pharmacy costs** • Annual proportion of all-cause pharmacy costs attributable to each ADA class • All costs adjusted to January 2024 US dollars[5]

DPP4-I: dipeptidyl peptidase-4 inhibitors, GLP1-RA: glucagon-like peptide-1 receptor agonists, SGLT2-I: sodium-glucose cotransporter-2 inhibitors, SU: sulfonylureas, TZD: thiazolidinediones

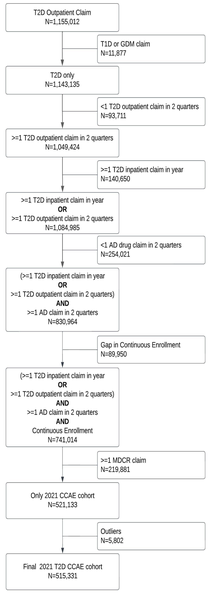


Figure 1. Example of annual cohort selection

T1D: Type 1 Diabetes; GDM: Gestational Diabetes; AD: Antidiabetic; T2D: Type 2 Diabetes; MDCR: MarketScan Medicare Database; CCAE: MarketScan Commercial Database

RESULTS

Study population and baseline demographics

- Overall, 639,213 prevalent cases of T2D with continuous management were identified in 2016, and 515,331 in 2021 **(Table 1)**.
- The mean age of individuals with T2D and continuous management remained 53 years across the study period.
- Users of DPP4-I, SU, and TZD were slightly older with a mean age of 54.
- Females accounted for ~46% of total annual T2D prevalent cases.
- Females comprised a larger proportion of the GLP1-RA subgroup (~51%) and a smaller proportion of the TZD subgroup (~35%).

Table 1. Annual cohort demographics

	2016	2017	2018	2019	2020	2021
Entire Cohort [N]	639213	604764	593843	567451	522653	515331
Age [Mean (SD)]	53.7 (8.3)	53.6 (8.4)	53.6 (8.3)	53.6 (8.3)	53.5 (8.4)	53.4 (8.4)
Female [N (%)]	298377 (46.7)	279620 (46.2)	269197 (45.3)	256527 (45.2)	237911 (45.5)	235076 (45.6)
DPP4-I						
Age [Mean (SD)]	54.2 (7.6)	54.2 (7.6)	54.2 (7.6)	54.3 (7.5)	54.4 (7.6)	54.4 (7.5)
Female [N (%)]	60079 (43.7)	55308 (43.4)	51546 (42.7)	45263 (42.4)	38064 (43.0)	32915 (42.8)
SGLT2-I						
Age [Mean (SD)]	53.1 (7.8)	53.2 (7.8)	53.4 (7.7)	53.5 (7.6)	53.6 (7.7)	53.7 (7.7)
Female [N (%)]	46317 (43.28)	49102 (42.16)	48702 (40.42)	51094 (39.66)	52357 (39.43)	56887 (39.34)
GLP1-RA						
Age [Mean (SD)]	53.2 (8.0)	53.0 (8.0)	53.1 (8.0)	53.1 (8.0)	53.0 (8.1)	52.9 (8.2)
Female [N (%)]	44407 (53.1)	51873 (52.7)	59793 (51.2)	67786 (50.6)	73835 (50.4)	87556 (51.1)
SU						
Age [Mean (SD)]	54.3 (7.6)	54.2 (7.6)	54.2 (7.6)	54.3 (7.6)	54.2 (7.7)	54.2 (7.7)
Female [N (%)]	82156 (42.23)	73513 (41.67)	69362 (40.82)	62777 (40.57)	55992 (41.09)	52324 (41.02)
TZD						
Age [Mean (SD)]	54.8 (7.3)	54.6 (7.4)	54.5 (7.4)	54.5 (7.4)	54.5 (7.5)	54.5 (7.5)
Female [N (%)]	15301 (35.1)	14095 (34.9)	14178 (35.0)	13625 (35.2)	12521 (35.8)	12617 (36.2)
Insulin						
Age [Mean (SD)]	53.1 (9.3)	53.0 (9.2)	53.0 (9.2)	53.1 (9.2)	53.0 (9.2)	53.0 (9.2)
Female [N (%)]	92979 (47.6)	87046 (47.4)	83351 (46.7)	74450 (46.3)	68352 (46.4)	64189 (46.5)
Metformin						
Age [Mean (SD)]	53.8 (7.9)	53.7 (7.9)	53.7 (7.9)	53.7 (7.9)	53.6 (8.1)	53.5 (8.1)
Female [N (%)]	167884 (44.7)	159871 (44.4)	157112 (43.6)	151780 (43.5)	144737 (43.9)	145876 (44.3)

DPP4-I: dipeptidyl peptidase-4 inhibitors, GLP1-RA: glucagon-like peptide-1 receptor agonists, SGLT2-I: sodium-glucose cotransporter-2 inhibitors, SU: sulfonylureas, TZD: thiazolidinediones

Anti-diabetes agent utilization trends

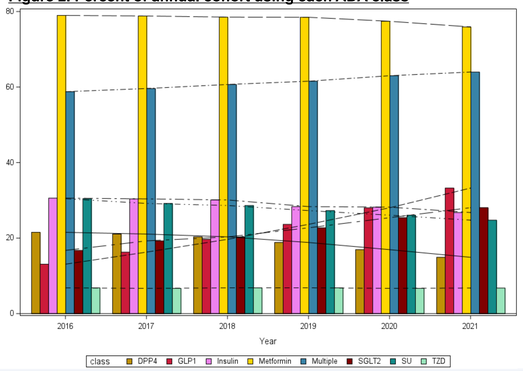
- Users of GLP1-RA composed 13.1% of the study cohort in 2016 and 33.3% in 2021. **(Table 2 and Figure 2).**
- There was a 20.5% average annual increase in the number of GLP1-RA users across the study period.
- Users of SGLT2-I composed 16.7% of the study cohort in 2016 and 28.1% in 2021.
- There was a 10.9% average annual increase in the number of SGLT2-I users across the study period.
- DPP4-I users decreased from 21.5% to 14.9%, SU users from 30.4% to 24.8%, and insulin users from 30.6% to 26.8%.
- TZD use remained low at 6.8% throughout.

Table 2. Cohort ADA class use

	2016	2017	2018	2019	2020	2021	Annual increase (%)[‡]
N	639213	604764	593843	567451	522653	515331	
Class [(%)]							
DPP4-I	21.5	21.1	20.3	18.8	16.9	14.9	-7.1
SGLT2-I	16.7	19.3	20.3	22.7	25.4	28.1	10.9
GLP1-RA	13.1	16.3	19.7	23.6	28.0	33.3	20.5
SU	30.4	29.2	28.6	27.3	26.1	24.8	-4.0
TZD	6.8	6.7	6.8	6.8	6.7	6.8	-0.2
Insulin	30.6	30.4	30.1	28.3	28.2	26.8	-2.6
Metformin	79.0	78.8	78.5	78.4	77.4	75.9	-0.8
Multiple[a]	58.8	59.6	60.7	61.5	63.0	64.0	1.7

‡Calculated using geometric mean. [a]Individuals using more than one class of antidiabetic agents were categorized as both a "Multiple" user and a user of the individual antidiabetic agents making up their combination therapy.

Figure 2. Percent of annual cohort using each ADA class



RESULTS

Pharmacy costs

- The annual amounts paid by healthcare payers on the outpatient pharmacy benefit overall and by ADA class are described in **Table 3** and **Figure 3**, respectively.
- Payers spent over 4 billion annually on the all-cause outpatient pharmacy benefit for individuals with continuously managed T2D.
- The proportion of all-cause outpatient pharmacy costs spent by payers on GLP-1 RAs increased from 9.6% in 2016 to 26.9% in 2021.
- Payer spending on SGLT2-Is increased from 7.3% of all-cause outpatient pharmacy costs in 2016 to 14.0% in 2021.

Figure 3. All-Cause Pharmacy Spending Attributable to ADA

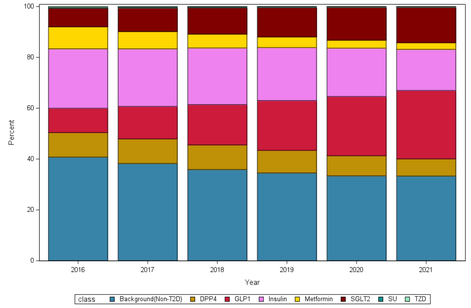


Table 3. Pharmacy outpatient pharmacy spending[a]

	2016	2017	2018	2019	2020	2021
Pharmacy spend ($)	4226.7	4126.7	4245.1	4194.5	4113.4	4167.5
Class-specific spend [$ (%)]						
DPP4-I	407.5 (9.6)	399.7 (9.7)	410.4 (9.7)	372.5 (8.9)	325.2 (7.9)	281.7 (6.8)
SGLT2-I	310.0 (7.3)	383.8 (9.3)	440.4 (10.4)	486.8 (11.6)	532.6 (13)	581.6 (14.0)
GLP1-RA	404.3 (9.6)	526.8 (12.8)	674.7 (15.9)	821.6 (19.6)	958.2 (23.3)	1120.6 (26.9)
SU	10.9 (0.3)	9.3 (0.2)	8.8 (0.2)	7.4 (0.2)	6.1 (0.2)	6.0 (0.1)
TZD	15.6 (0.4)	11.7 (0.3)	9.6 (0.2)	6.8 (0.2)	5.2 (0.1)	5.1 (0.1)
Insulin	987.9 (23.4)	934.3 (22.6)	944.5 (22.3)	874.3 (20.8)	781.8 (19.0)	674.3 (16.2)
Metformin	365.9 (8.7)	281.6 (6.8)	232.5 (5.5)	175.7 (4.2)	129.3 (3.1)	108.7 (2.6)
Background[b]	1724.6 (40.8)	1579.5 (38.3)	1524.2 (35.9)	1449.5 (34.6)	1374.9 (33.4)	1389.5 (33.3)

[a]Reported in millions of dollars. [b]Background medication therapy defined as non antidiabetic agents. DPP4-I: dipeptidyl peptidase-4 inhibitors, GLP1-RA: glucagon-like peptide-1 receptor agonists, SGLT2-I: sodium-glucose cotransporter-2 inhibitors, SU: sulfonylureas, TZD: thiazolidinediones

LIMITATIONS

- Our findings may not be generalizable beyond the commercially insured patient population.
- There could be potential misclassification owing to the use of paid claims.
- The skewness of cost data is not fully addressed and described in our statistics.
- Claims data analyzed here only provide direct paid amounts by payers, which do not equate to the cost of care. Thus, our findings have limited utility to the sectors and stakeholders other than payers.

DISCUSSION

- Users of GLP1-RAs more than doubled over the study period, and users of SGLT2-I increased 68% from 2016 to 2021.
- The payer net paid amounts on diabetes medications exceeded 4 billion dollars in 2021. The proportion of this total spend on GLP1-RAs and SGLT2-Is nearly tripled and doubled across the study period.
- There seem to be differences in ADA utilization by sex, and these differences fluctuate over time.
- These results can be utilized by programs targeting the efficient allocation of medical costs in a population of individuals with T2D.
- Considering new indications for GLP1-RAs have been approved since this study period, further studies evaluating drug utilization and payer spending trends during a more recent time period are warranted.

REFERENCES

1.Centers for Disease Control and Prevention. (2024, May 15). National Diabetes Statistics Report: Centers for Disease Control and Prevention. 2. Parker, E. D., Lin, J., Mahoney, T., Ume, N., Yang, G., Gabbay, R. A., ElSayed, N. A., & Bannuru, R. R. (2024). Economic Costs of Diabetes in the U.S. in 2022. Diabetes care, 47(1), 26–43. https://doi.org/10.2337/dci23-0085 3.Shao H, Lavy M, Benoit SR, Cheng YJ, Gregg EW, Zhang P. Trends in Total and Out-of-pocket Payments for Noninsulin Glucose-Lowering Drugs Among U.S. Adults With Large-Employer Private Health Insurance From 2005 to 2018. Diabetes Care. 2021;44(4):925-934. doi:10.2337/dc20-2871 4.Zhao X, Zhang P, Kahn HS, Bardenheier BH, Li R, Gregg EW. Change in Medical Spending Attributable to Diabetes: National Data From 1987 to 2011. Diabetes Care. 2015;38(4):581-587. doi:10.2337/dc14-1687 5.United States. Bureau of Labor Statistics. (1977). The consumer price index : concepts and content over the years. [Washington]:The Bureau.

Disclosures: Bertha De Los Santos is a graduate student at the University of Illinois Chicago and HEOR Fellow for Takeda Pharmaceuticals
Presented at 2025 ISPOR, Montreal QC, May 14th 2025