Understanding the cost dynamics of antidiabetic medications: A trend analysis (2016-2024)

Sponsored by Virta Health Corporation

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In recent years, new treatment options for type 2 diabetes have resulted in a paradigm shift in how blood sugar levels are managed. As such, commercial payers, which include self-funded employers, have witnessed a surge in the overall costs of their prescription drug benefits, driven largely by spending on antidiabetic medications including GLP-1 and SGLT-2 medications. This white paper provides historical trends for antidiabetic medications from 2016 through 2023 and projected trends for 2024 to help plan sponsors better understand these cost drivers.

Annual trends from 2016 through 2023 ranged from a low of 5.8% to a high of 34.0% prior to manufacturer rebates (see Figure 1). Since 2022, utilization increases for glucagon-like peptide-1 (GLP-1) and sodium-glucose cotransporter-2 (SGLT-2) medications are the key drivers of overall cost trends, resulting in substantial increases in the average cost of antidiabetic medications. From 2023 to 2024, we project a 23.7% increase in the gross cost of antidiabetic medications for commercial payers, even after accounting for reductions in insulin prices. It is important to note that gross costs do not include manufacturer pricing concessions (i.e., rebates), which can substantially reduce the costs of these medications for plan sponsors.

FIGURE 1: ANTIDIABETIC TRENDS (COMMERCIAL POPULATION)

Year	Total Gross Trend	Unit Cost	Cost – Mix of Drugs[a]	Utilization
2016 to 2017	**15.2%**	3.6%	2.7%	8.2%
2017 to 2018	**5.8%**	2.9%	4.3%	-1.4%
2018 to 2019	**10.8%**	2.0%	4.4%	4.0%
2019 to 2020	**11.1%**	-0.6%	4.4%	6.9%
2020 to 2021	**12.7%**	2.3%	5.1%	4.8%
2021 to 2022	**19.9%**	2.9%	8.4%	7.6%
2022 to 2023	**34.0%**	4.7%	16.7%	9.7%
2023 to 2024[b]	**23.7%**	-0.6%	12.1%	11.0%
2024 Estimated Gross Costs: $39.55 PMPM 2024 Estimated Net[c] Costs: $17.74 PMPM - $23.39 PMPM				

(a) "Mix of Drugs" is the increase in total unit costs driven by the increased relative frequency of higher-cost drug classes. For example, as more patients use newer, more expensive medications such as GLP-1s rather than less expensive drugs, the overall average cost of medications increases. This may occur even if the cost of each medication remains stable.
(b) The 2024 trend is estimated. Trends will vary by employer and for specific subpopulations, such as members diagnosed with obesity.
(c) "Net Costs" represent costs for a commercial population after reflecting manufacturer pricing concessions. Actual rebate values vary by plan; we provide estimates for low- and high-rebate formularies.
(d) Our study includes all antidiabetic drugs, GLP-1s for weight loss, and diabetic supplies as identified by Medi-Span. This includes anti-obesity agents (GLP-1 receptor agonists), biguanides, dipeptidyl peptidase-4 (DPP-4) inhibitors, incretin mimetic agents (GLP-1 receptor agonists), insulin, sodium-glucose cotransporter-2 (SGLT-2) inhibitors, sulfonylureas, diabetic supplies, diagnostic reagents, alpha-glucosidase inhibitors, antidiabetic – amylin analogs, antidiabetic combinations, diabetic other, dopamine receptor agonists – antidiabetic, insulin sensitizing agents, antidiabetic-antibodies, meglitinide analogues, diabetic supplies, and diagnostic reagents.

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Brief history of antidiabetic drug classes

For our analysis, we identified and included nine classes of antidiabetic medications. This section provides an overview of each class included in our analysis along with common example medications. The drugs are ordered from oldest to newest.

Insulin is a hormone that helps cells in the body absorb glucose (sugar) from the blood to use for energy. People with type 1 and advanced type 2 diabetes mellitus (T2DM) may need to inject insulin to help control their blood sugar levels. Challenges with insulin as an injectable medication include hypoglycemia (low blood sugar) and weight gain. Common products include insulin glargine (Lantus), insulin aspart (NovoLog), and insulin lispro (Humalog). Insulin was first used to treat a patient with diabetes in 1922 and longer-acting formulations were first introduced in 1946.[2]

Biguanides lower blood sugar levels by decreasing the amount of sugar produced by the liver and absorbed in the gastrointestinal tract while improving the body's sensitivity to insulin, which helps cells absorb sugar more effectively. Common products include metformin. Metformin was introduced for medical use in 1957 and became commercially available in the United States in the 1990s. Metformin is the most commonly prescribed antihyperglycemic throughout the world.

Sulfonylureas stimulate the pancreas to produce more insulin, which helps lower blood sugar levels. However, due to the stimulation of insulin from the pancreas this class can cause low blood sugar and is also associated with weight gain. First-generation sulfonylureas (e.g., chlorpropamide) were introduced in the United States in 1956, with second-generation agents (glipizide and glyburide) approved by the U.S. Department of Food and Drug Administration (FDA) in 1984, and a third-generation sulfonylurea (glimepiride) approved in 1995.

Diabetic supplies include diabetic supplies, diagnostic reagents, glucose monitors, insulin pumps, and insulin pump cartridges. Common manufacturers of glucose test strips include OneTouch and FreeStyle. The first blood glucose test strip was developed in 1965. The first insulin pump was developed in the late 1970s.

GLP-1 receptor agonists mimic the action of the incretin hormone GLP-1, which works in multiple ways in the human body by increasing insulin secretion, slowing down gastric emptying, increasing satiety, and decreasing hepatic glucose production. The result of these various effects on the body is lower blood sugar levels and weight loss. Common products include liraglutide (Victoza) and semaglutide (Ozempic/Rybelsus). This subclass includes tirzepatide (Mounjaro) which is a dual-action gastric inhibitory polypeptide (GIP) and GLP-1 receptor agonist. The first GLP-1 receptor agonist, exenatide (Byetta), was approved by the FDA in 2005 and long-acting GLP-1s with additional positive comorbidity outcomes began to be approved in 2014.

Dipeptidyl peptidase-4 (DPP-4) inhibitors work by blocking the enzyme DPP-4, which degrades naturally occurring incretin hormones. Because DPP-4 is blocked, incretin hormones have a longer-lasting effect on the body as described above. DPP-4 inhibitors are less effective than GLP-1s. Common products include sitagliptin (Januvia) and linagliptin (Tradjenta). The first DPP-4, Januvia, was approved by the FDA in 2006.

SGLT-2 inhibitors work by preventing the kidneys from reabsorbing glucose back into the blood. Instead, glucose is excreted in the urine, which lowers blood sugar levels. Common products include dapagliflozin (Farxiga) and empagliflozin (Jardiance). The first SGLT-2, Invokana, was approved by the FDA in 2013.

[2] White, J.R. (May 1, 2014). A Brief History of the Development of Diabetes Medications. *Diabetes Spectrum*; 27 (2): 82–86. Retrieved December 8, 2024, from https://doi.org/10.2337/diaspect.27.2.82.

Anti-obesity GLP-1 receptor agonists are bioequivalent to GLP-1 receptor agonists but are specifically approved for weight management. They help reduce appetite and increase feelings of fullness, which can lead to weight loss. Common products include liraglutide (Saxenda), semaglutide (Wegovy), and tirzepatide (Zepbound). This subclass also includes dual-action GIP and GLP-1 receptor agonists. Because these products are bioequivalent to antidiabetic medications and because of the possibility of off-label prescribing, we have included these medications in our trend study. Similarly, we recognize that GLP-1 receptor agonists indicated for T2DM may be prescribed and utilized for weight loss rather than the labeled indication. The first medication in the anti-obesity subclass, Saxenda, was approved for weight loss in 2014.[3]

Other/combinations include other medications as well as combinations. Combination medications include two or more different types of diabetes medications in one pill. These combinations can help improve blood sugar control by combining different mechanisms to lower blood sugar while decreasing pill burden on patients. Common products include metformin and sitagliptin (Janumet) and metformin and empagliflozin (Synjardy). Generally speaking, most combinations have been introduced in the 2000s and 2010s. Other antidiabetic medications include alpha-glucosidase inhibitors, thiazolidinediones, amylin analogs, dopamine receptor agonists, meglitinides, and bile acid sequestrants.

Reviewing the history of the antidiabetic medications above, one might note that there were no new classes of antidiabetic medications from the 1950s to the early 2000s. During this time period, there was significant progress in the development of synthetic insulin. However, there is a time period from the 1980s to the early 2000s known as the “incretin gap”—during which no major developments were made in the treatment of diabetes. Scientific progress did not occur until researchers began to understand the impacts of incretin hormones on the human body.

The incretin gap is particularly relevant to our trend study. As these medications have become better understood, clinical guidelines have evolved to place increased emphasis on the use of GLP-1s. For example, clinical guidelines shifted in 2022 to recommend combination therapy of both insulin and a GLP-1 for adults with type 2 diabetes who have already begun treatment with insulin.[4]

Data sources

We relied on Milliman’s proprietary health research databases to complete this study. Our research databases allow for the tracking of de-identified patients across multiple years. The most recent available underlying databases contain more than 900 million member years of data dating from 2010 to 2024. This data source is a combination of Milliman’s Consolidated Health Cost Guidelines Sources Database (CHSD) and Merative’s MarketScan. The database contains annual enrollment and paid medical and pharmacy claims for over 80 million commercially insured individuals covered by the benefit plans of large employers, health plans, and governmental and public organizations nationwide.

National Drug Codes (NDCs) for relevant drugs were identified using the Wolters Kluwer Medi-Span Master Drug Data Base v2.5 based upon the generic product identifier (GPI). More details about our approach and classification of classes can be found in the Methodology section below.

[3] Tan, Q., Akindehin, S. E., Orsso, C. E., Waldner, et al. (February 28, 2022). Recent Advances in Incretin-Based Pharmacotherapies for the Treatment of Obesity and Diabetes. *Frontiers in Endocrinology*, 13, 838410. Retrieved December 8, 2024, from https://doi.org/10.3389/fendo.2022.838410.
[4] Khardori, R. (September 12, 2024). Type 2 Diabetes Mellitus Guidelines: American Diabetes Association. Medscape. Retrieved December 8, 2024, from https://emedicine.medscape.com/article/117853-guidelines?form=fpf (registration required).

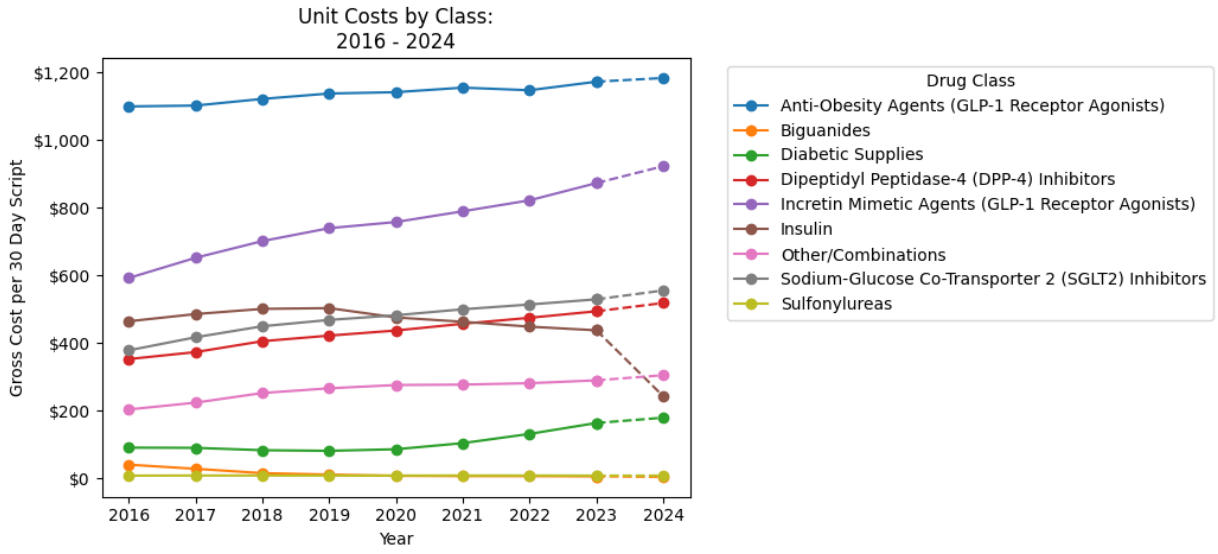
Unit cost and utilization

Figure 2 shows the historical average gross (allowed) cost by drug class for a 30-day supply from 2016 through 2024. Generally speaking, we observed increasing gross unit costs for all drug classes, with the greatest increases occurring for GLP-1s. For our analysis, we consider unit cost trends to represent the average increase in unit costs for a basket of drugs from one year to the next. Trends in unit costs represent a portion of overall trends each year although typically unit cost trends have remained at about 2.0% to 3.0%. As discussed below in further detail, we also anticipate a reduction in unit costs for insulins from $438 per 30-day supply in 2023 to $243 in 2024.

The unit of analysis in our study is a 30-day supply of medication regardless of the dosing. Therefore, trends for unit costs in our study may reflect both increases in medication costs per unit and potential increases in dosage. For example, if the average member with T2DM is taking more units of insulin between 2016 and 2023, that would be reflected in our estimates for unit cost trends. The dotted line in Figure 2 represents our estimate for 2024.

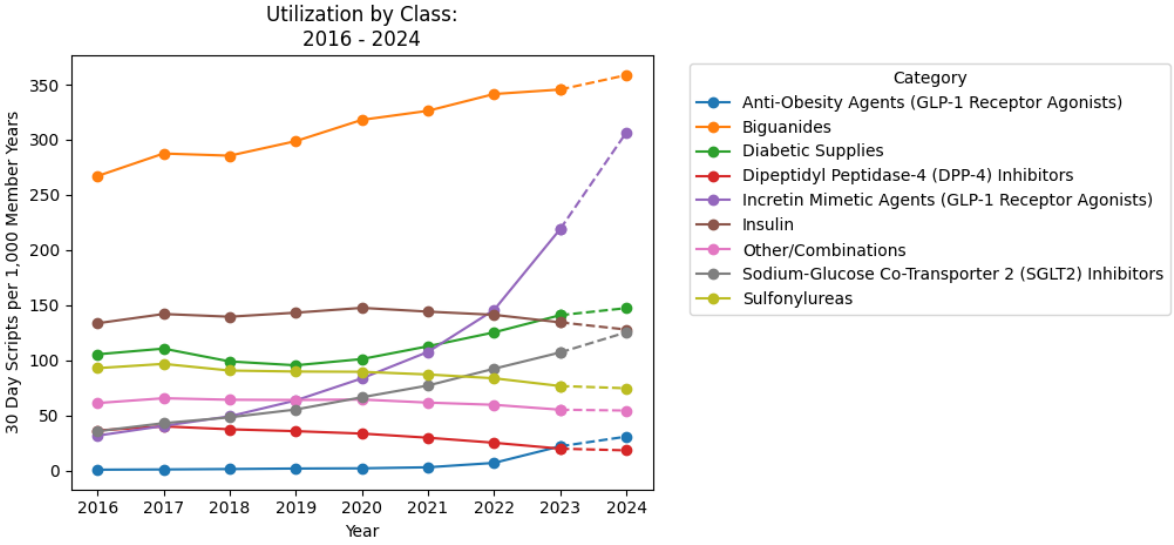
Throughout this paper the terms “gross” cost and “allowed” cost are used interchangeably and have the same meaning.

FIGURE 2: Unit Costs by Class



Our analysis evaluated historical utilization from 2016 through 2024. As seen in Figure 3, both GLP-1s and SLGT-2s have seen a substantial increase in utilization. The dotted line in Figure 3 represents our estimate for 2024.

FIGURE 3: Utilization by Class



How utilization impacts overall unit costs: Mix

Because GLP-1s are more costly than most other antidiabetic drug classes and utilization has been increasing at a higher rate for GLP-1s than other classes, the overall unit cost for antidiabetic drugs has risen faster than unit costs within any given class. We expect that to continue in 2024.

Trend by drug class

The table in Figure 4 provides a view of trends in gross per member per month (PMPM) costs by class. Trends for all drug classes and the total reflect gross (allowed) cost trends prior to manufacturer pricing concessions. Further details can be found in Figure 11 below.

FIGURE 4: GROSS (ALLOWED) PMPM TREND BY DRUG CLASS

Drug Class	2017 / 2016	2018 / 2017	2019 / 2018	2020 / 2019	2021 / 2020	2022 / 2021	2023 / 2022	2024 / 2023 *
Anti-Obesity Agents (GLP-1 receptor agonists)	35.3%	40.1%	39.1%	11.3%	50.5%	136.2%	226.3%	41.3%
Biguanides	-24.7%	-45.4%	-23.9%	-28.3%	-6.6%	1.4%	-8.2%	-19.4%
Diabetic Supplies	4.2%	-17.5%	-5.6%	12.0%	34.8%	40.3%	40.0%	14.5%
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	16.7%	1.4%	-0.7%	-2.8%	-7.2%	-12.1%	-18.2%	-3.3%
Incretin Mimetic Agents (GLP-1 receptor agonists)	40.9%	30.6%	36.4%	34.8%	34.1%	41.0%	59.7%	48.0%
Insulin	11.2%	1.4%	3.1%	-2.6%	-4.9%	-5.1%	-7.1%	-47.2%
Other/Combinations	17.8%	10.3%	5.2%	4.3%	-3.9%	-1.8%	-4.6%	3.8%
Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors	32.9%	21.1%	19.5%	23.6%	20.3%	23.2%	19.4%	22.9%
Sulfonylureas	9.4%	-6.3%	-3.4%	-0.5%	-0.5%	-4.7%	-12.0%	-2.7%
Total	**15.2%**	**5.8%**	**10.8%**	**11.1%**	**12.7%**	**19.9%**	**34.0%**	**23.7%**

* Estimated

Trend decomposition by drug class

In addition to a decomposition of annual trends into unit costs, mix, and utilization, we also include a decomposition of trend by therapeutic class. Figure 5 provides another view of gross PMPM cost trends by class, with detail on how each drug class contributes to total trend.

FIGURE 5: TREND DECOMPOSITION BY DRUG CLASS

Drug Class	2017 / 2016	2018 / 2017	2019 / 2018	2020 / 2019	2021 / 2020	2022 / 2021	2023 / 2022	2024 / 2023 *
Anti-Obesity Agents (GLP-1 receptor agonists)	0.2%	0.3%	0.3%	0.1%	0.5%	1.9%	6.2%	2.8%
Biguanides	-1.9%	-2.3%	-0.6%	-0.5%	-0.1%	0.0%	-0.1%	-0.1%
Diabetic Supplies	0.3%	-1.1%	-0.3%	0.5%	1.4%	2.0%	2.3%	0.9%
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	1.5%	0.1%	-0.1%	-0.2%	-0.5%	-0.7%	-0.8%	-0.1%
Incretin Mimetic Agents (GLP-1 receptor agonists)	5.4%	5.0%	7.3%	8.6%	10.2%	14.6%	24.9%	23.9%
Insulin	4.9%	0.6%	1.3%	-1.0%	-1.6%	-1.4%	-1.6%	-7.2%
Other/Combinations	1.6%	0.9%	0.5%	0.4%	-0.3%	-0.1%	-0.3%	0.2%
Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors	3.1%	2.3%	2.5%	3.2%	3.1%	3.7%	3.2%	3.4%
Sulfonylureas	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	**15.2%**	**5.8%**	**10.8%**	**11.1%**	**12.7%**	**19.9%**	**34.0%**	**23.7%**

* Estimated

Other considerations

Insulin price reduction

Manufacturers reduced list prices on most insulin products in Q1 2024, which we have reflected in our 2024 projections. The American Rescue Plan Act (ARPA), enacted in March 2021, included a provision that removed a cap on the amount of rebates paid under the Medicaid Drug Rebate Program for manufacturers with large increases in drug prices. This was likely a driving reason for manufacturer list price reductions for certain drugs, including insulin.

Manufacturer rebates and other pricing concessions

Our analysis shows gross costs that are net of rebates in Figures 1 and 11. Manufacturer rebates and other pricing concessions are typically passed back to the plan sponsor, which are then used to reduce healthcare premiums and/or fund administrative costs. While manufacturer rebates are proprietary in nature, we aim to provide some rough estimates of manufacturer rebates to help our readers grasp a more complete picture of the net cost of antidiabetic medications.

Manufacturer rebates are typically used to encourage preferred formulary placement with the overall goal of enhancing sales of the participating manufacturer's products. The negotiation of these channel incentives between pharmacy benefit managers (PBMs) or plan sponsors and manufacturers is a form of

contracting that has been in place since the 1980s.[5] Typically, rebates are available for brand and trademarked specialty medications. Due to the dynamics of PBMs and commercial plan sponsors, there has been an increasing appetite for rebates over the last 10 years or so.

Antidiabetic medications are predominantly comprised of brand medications, and thus manufacturers often offer rebates or channel incentives for preferred formulary placement for these products. The overall level of rebates will vary by plan sponsor depending on the formulary selected and placement of drugs with the highest rebates available. For example, a plan with a very open formulary might receive total rebates worth less than 30% of the total gross costs of antidiabetic medications. A plan wishing to maximize its rebates could receive 60% or more of the total gross costs for antidiabetic medications.

The magnitude of rebates will also vary by prescribing patterns and the mix of classes, as rebates can vary substantially by drug class and manufacturer strategy. Prior to the reduction in insulin prices, rebates for insulins may have reached 80% or higher.[6] While rebates for insulins are likely still available in 2024, they may be much lower because the list prices have gone down for many products. All GLP-1s were brand medications through May 2024 with considerable rebates available. We expect that rebates for GLP-1s indicated for T2DM may be 50% or greater.[7] Generic Victoza was announced in June 2024, but it will still be a few years until generics are released for Ozempic and Mounjaro.

The overall level of rebates also depends on the purchasing power of the PBM and, if applicable, its group purchasing organizations (GPOs). In recent years, GPOs have formed to use their collective purchasing power to obtain better pricing concessions from manufacturers. That said, these arrangements may sometimes contain opaque language, and it is not always clear that the full value of pricing concessions is passed back to plan sponsors.[8]

Prevalence of type 2 diabetes

The prevalence of type 2 diabetes has generally increased in the United States over the past few decades, which contributes to the increased use of antidiabetic medications in a commercial population.

Figure 6 provides trends in the age-adjusted prevalence of diagnosed, undiagnosed, and total diabetes among adults aged 18 years or older, United States, 2001-2020.[9] This information was provided by the Centers for Disease Control and Prevention (CDC).

[5] California Health Benefits Review Program (January 4, 2022). Abbreviated Analysis of Assembly Bill 933: Prescription Drug Cost Sharing. Retrieved December 10, 2024, from https://www.chbrp.org/sites/default/files/bill-documents/AB933/AB%20933%20Abbreviated%20Report%2001042022%20FINAL.pdf.
[6] Feldman, W.B. & Rome, B.N. (June 14, 2023). The Rise and Fall of the Insulin Pricing Bubble. *JAMA Network Open*. Retrieved December 10, 2024, from https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2806020.
[7] Hernandez, I. & Sullivan, S.D. (January 16, 2024). Net Prices of New Antiobesity Medications. *Obesity: A Research Journal*. Retrieved December 10, 2024, from https://onlinelibrary.wiley.com/doi/10.1002/oby.23973.
[8] Federal Trade Commission. (July 2024). Pharmacy Benefit Managers: The Powerful Middlemen Inflating Drug Costs and Squeezing Main Street Pharmacies. Retrieved December 10, 2024, from https://www.ftc.gov/system/files/ftc_gov/pdf/pharmacy-benefit-managers-staff-report.pdf.
[9] CDC (May 15, 2024). National Diabetes Statistics Report: Appendix A: Detailed Tables. Retrieved December 10, 2024, from https://www.cdc.gov/diabetes/php/data-research/appendix.html.

FIGURE 6: PREVALENCE OF DIABETES (CDC DATA)

Time Period	Diagnosed Diabetes	Undiagnosed Diabetes	Total
2001–2004	7.1%	3.2%	10.3%
2003–2006	7.4%	2.8%	10.2%
2005–2008	7.7%	2.9%	10.6%
2007–2010	7.9%	3.2%	11.1%
2009–2012	8.1%	3.2%	11.3%
2011–2014	8.7%	2.7%	11.5%
2013–2016	9.4%	2.6%	12.0%
2015–2018	9.8%	2.9%	12.7%
2017–2020	10.1%	3.1%	13.2%

Source: CDC.

Our study relies on commercial payers that have submitted both pharmacy claims and medical claims for inclusion in Milliman's research databases. In a pattern similar to the CDC's data, we also observe the increasing prevalence of type 2 diabetes diagnoses in Milliman's research databases. Figure 7 provides trends in the claims-based prevalence of T2DM.

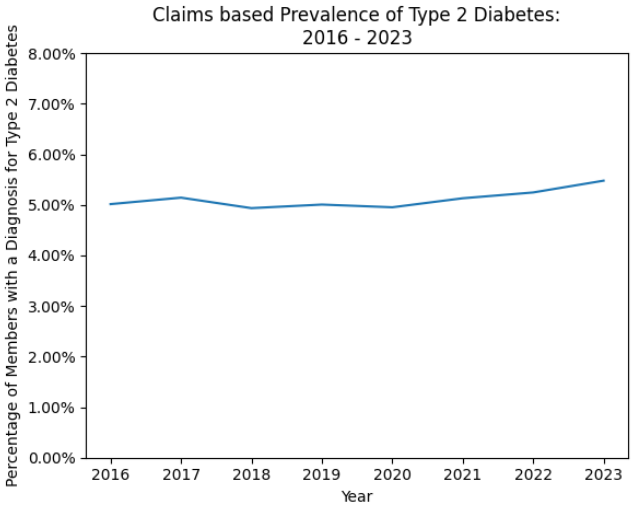
We identified the prevalence each year by determining the number of enrollees with at least one medical claim with a diagnosis code for T2DM during that year. Each year, about 5% of commercial members have a healthcare encounter resulting in a diagnosis for type 2 diabetes. There are several reasons that the figures below do not match CDC estimates. First, Figure 6 reflects the entire population, including those covered by Medicare, Medicaid, and other payers. Our analysis only includes individuals with commercial insurance coverage. Second, claims-based prevalence would not include enrollees who did not use the healthcare system or did not use their commercial insurance as the primary payer. The CDC estimates are data from the National Health and Nutrition Examination Survey and therefore would likely capture enrollees who did not use the healthcare system. Finally, provider documentation and billing practices may not submit all known diagnoses to the payer, especially if this information does not influence their payment rates.

Our figures support the CDC view that the prevalence of T2DM has increased over time. We estimate that the prevalence of T2DM has increased by an average of 1.3% each year between 2016 and 2023. We assume it will continue to increase at this rate for 2024.

FIGURE 7: CLAIMS-BASED PREVALENCE OF TYPE 2 DIABETES MELLITUS

Year	Prevalence	Change
2016	5.0%	
2017	5.1%	2.5%
2018	4.9%	-4.0%
2019	5.0%	1.4%
2020	5.0%	-1.1%
2021	5.1%	3.6%
2022	5.2%	2.2%
2023	5.5%	4.4%
Average		**1.3%**

FIGURE 8: CLAIMS-BASED PREVALANCE OF TYPE 2 DIABETES



Recognizing that the increasing prevalence of T2DM contributes to overall gross trends, we also estimated the trend per T2DM member in Figure 9. These figures represent the total gross trend, adjusted for the increasing prevalence of T2DM (1.3% annually). These trends would be more appropriate to use when studying a group of members with T2DM, rather than the entire commercial population.

FIGURE 9: TRENDS PER MEMBER WITH TYPE 2 DIABETES MELLITUS

Year	Total Gross Trend	Trend per T2DM Member[a]
2016 to 2017	15.2%	13.7%
2017 to 2018	5.8%	4.4%
2018 to 2019	10.8%	9.4%
2019 to 2020	11.1%	9.6%
2020 to 2021	12.7%	11.2%
2021 to 2022	19.9%	18.4%
2022 to 2023	34.0%	32.3%
2023 to 2024	23.7%	22.1%

(a) "Trend per T2DM Member" represents the anticipated gross trend for members with a T2DM diagnosis. It is the total trend adjusted for the estimated increase in the prevalence.

Methodology

As discussed above, we included nine medication classes in our analysis. Some of these classes represent groups of classes that appear in Medi-Span. The exact mapping from what we used in this study and how the drugs are represented in Medi-Span is shown in the table in Figure 10.

FIGURE 10: MAPPING DRUG CLASSES TO MEDI-SPAN

Used in This Study	Medi-Span Class
Anti-Obesity Agents (GLP-1 Receptor Agonists)	Anti-Obesity Agents
Biguanides	Biguanides
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	Dipeptidyl Peptidase-4 (DPP-4) Inhibitors
Incretin Mimetic Agents (GLP-1 Receptor Agonists)	Incretin Mimetic Agents (GLP-1 Receptor Agonists)
Insulin	Insulin
Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors	Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors
Sulfonylureas	Sulfonylureas
Other/Combinations	Diabetic Supplies Diagnostic Reagents Alpha-Glucosidase Inhibitors Antidiabetic – Amylin Analogs Antidiabetic Combinations Diabetic Other Dopamine Receptor Agonists – Antidiabetic Insulin Sensitizing Agents Antidiabetic Antibodies Meglitinide Analogues
Diabetic Supplies	Diabetic Supplies Diagnostic Reagents

To identify drugs for this study, we filtered drugs in Medi-Span based on their generic product identifier (GPI). We included drugs that met one of the following conditions:

- GPI2 = 27
- GPI4 = 9720
- GPI6 = 612520
- GPI6 = 612525
- GPI8 = 94100030

To provide a consistent unit of measurement, all scripts were converted to a 30-day equivalent supply.

Once we obtained this list of drugs, we were then able to calculate the allowed cost per 30-day script (unit cost) and the number of 30 day scripts per 1,000 member months (utilization). We used these values to calculate the year-over-year trends from 2016 to 2023.

For all classes other than insulins and GLP-1s and insulins:

To forecast the 2024 unit costs, we took an average of the year-over-year ratios of the unit cost for each drug class from 2016 to 2023 and applied this average ratio to the 2023 unit cost.

For the utilization forecast, we again applied the average of the 2016 to 2023 year-over-year ratios to the 2023 utilization value for each drug class.

For insulins:

As insulin exhibited an expected steep decline in unit cost at the start of 2024, we forecasted the 2024 insulin unit cost as the known unit cost for Q1 2024.

Due to the recent shift in insulin utilization, we used the 2022 to 2023 utilization ratio to forecast insulin utilization for 2024. We did not make any adjustments to our forecast for the discontinuation of Levemir. This implicitly assumes that Levemir utilization would be replaced by an insulin with a similar cost profile.

For GLP-1s:

To forecast the 2024 unit costs, we took an average of the year-over-year ratios of the unit cost for each drug class from 2016 to 2023 and applied this average ratio to the 2023 unit cost. This approach was used for all classes other than insulins.

For the two GLP-1 classes of drugs (Anti-Obesity Agents and Incretin Mimetic Agents), the 2016 to 2022 claims experience is not representative of recent trends, as the popularity of these medications has surged in recent years. We applied a utilization trend of 40% based on an examination of emerging 2024 experience for MyRxConsultant clients and general industry expectations.[10]

For the purpose of estimating claims-based prevalence for T2DM, enrollees were identified as having T2DM if they had an ICD-10 diagnosis code of E11 on any claim during that year, excluding services for diagnostic tests and labs using the range of procedure codes from 70000 to 89999.

Throughout the report we have provided certain estimates of unit costs and PMPM spend net of manufacturer rebates. We estimated manufacturer rebates based upon a review of information provided by SSR Health and our experience with commercial health plans.

Detailed tables

Figures 11 to 13 provide detailed information on PMPM costs, utilization, and unit costs. The values for 2024 are estimated. Figure 12, 30-Day Scripts per 1,000 Member Years, represents the number of prescriptions filled for 1,000 members over the course of an entire year.

[10] Anderson, B., Bayram, R., Dressler, A. et al. (July 2024). Commercial Drug Trends: 2024 Release. Milliman White Paper. Retrieved December 10, 2024, from https://www.milliman.com/-/media/milliman/pdfs/2024-articles/7-23-24_2024-commercial-drug-trend-study.ashx.

FIGURE 11: GROSS (ALLOWED) COSTS PER MEMBER PER MONTH

Drug Class	2016	2017	2018	2019	2020	2021	2022	2023	2024*
Anti-Obesity Agents (GLP-1 receptor agonists)	$0.06	$0.09	$0.12	$0.17	$0.18	$0.28	$0.66	$2.14	$3.03
Biguanides	$0.91	$0.68	$0.37	$0.28	$0.20	$0.19	$0.19	$0.18	$0.14
Diabetic Supplies	$0.80	$0.83	$0.69	$0.65	$0.73	$0.98	$1.37	$1.92	$2.20
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	$1.07	$1.24	$1.26	$1.25	$1.22	$1.13	$0.99	$0.81	$0.79
Incretin Mimetic Agents (GLP-1 receptor agonists)	$1.56	$2.20	$2.87	$3.91	$5.28	$7.08	$9.98	$15.93	$23.58
Insulin	$5.17	$5.74	$5.82	$6.00	$5.85	$5.56	$5.28	$4.90	$2.59
Other/Combinations	$1.04	$1.22	$1.35	$1.42	$1.48	$1.42	$1.40	$1.33	$1.38
Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors	$1.12	$1.49	$1.81	$2.16	$2.67	$3.21	$3.95	$4.72	$5.80
Sulfonylureas	$0.06	$0.07	$0.07	$0.06	$0.06	$0.06	$0.06	$0.05	$0.05
Total	**$11.78**	**$13.57**	**$14.35**	**$15.91**	**$17.67**	**$19.91**	**$23.88**	**$31.99**	**$39.55**
Net of Rebates (high rebate formulary)	$6.19	$6.77	$6.74	$7.22	$7.83	$8.76	$10.48	$13.97	$17.74
Net of Rebates (low rebate formulary)	$7.42	$8.26	$8.42	$9.14	$10.03	$11.28	$13.56	$18.19	$23.39

FIGURE 12: 30-DAY SCRIPTS PER 1,000 MEMBER YEARS

Drug Class	2016	2017	2018	2019	2020	2021	2022	2023	2024*
Anti-Obesity Agents (GLP-1 receptor agonists)	1	1	1	2	2	3	7	22	31
Biguanides	267	288	286	299	318	326	342	346	359
Diabetic Supplies	105	111	99	95	101	113	125	141	147
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	36	40	37	36	33	30	25	20	18
Incretin Mimetic Agents (GLP-1 receptor agonists)	32	40	49	64	84	108	146	219	307
Insulin	134	142	139	143	148	144	141	134	128
Other/Combinations	61	66	64	64	64	62	60	55	54
Sodium-Glucose Cotransporter-2 (SGLT-2) Inhibitors	36	43	48	55	66	77	92	107	125
Sulfonylureas	93	97	91	90	89	87	84	77	75
Total	**764**	**826**	**815**	**847**	**906**	**949**	**1,021**	**1,120**	**1,244**

* Estimated.

FIGURE 13: GROSS (ALLOWED) COSTS PER 30-DAY SCRIPT

Drug Class	2016	2017	2018	2019	2020	2021	2022	2023	2024
Anti-Obesity Agents (GLP-1 Receptor Agonists)	$1,099	$1,102	$1,121	$1,137	$1,141	$1,155	$1,147	$1,172	$1,183
Biguanides	$41	$28	$16	$11	$8	$7	$7	$6	$5
Diabetic Supplies	$91	$90	$83	$82	$86	$104	$132	$164	$179
Dipeptidyl Peptidase-4 (DPP-4) Inhibitors	$353	$373	$406	$422	$437	$457	$475	$494	$518
Incretin Mimetic Agents (GLP-1 Receptor Agonists)	$592	$652	$701	$739	$758	$789	$822	$873	$923
Insulin	$464	$486	$501	$503	$476	$463	$448	$438	$243
Other/Combinations	$204	$224	$252	$266	$276	$277	$281	$290	$305
Sodium-Glucose Co-Transporter 2 (SGLT2) Inhibitors	$378	$417	$450	$468	$482	$500	$514	$529	$555
Sulfonylureas	$8	$9	$9	$8	$8	$9	$9	$8	$8

Note: The 2024 numbers are estimated. The recent cost increases of diabetic supplies are driven by high-cost supplies such as glucose monitoring devices.

Limitations and Caveats

Our analysis does not include medications fully reimbursed by drug coupons, paid by cash, or otherwise obtained outside of a commercial prescription drug benefit.

Our analysis does not consider changes to formularies that may impact trends. Our analysis does not consider the degree to which changes in payer mix and PBM contracting strategies may influence average wholesale price (AWP) discounts as we are relying upon reported gross costs in claims data.

Shortages for some medications occurred during our study period, which may result in an understatement of trends during some periods as well as potentially impacting future prescribing patterns. GLP-1s have experienced shortages since 2022, which are not fully resolved as of December 2024.[11] Certain brands of insulin have been in short supply multiple times since 2023.[12]

Milliman does not intend to benefit any third-party recipient of its work product, even if Milliman consents to the release of its work product to such third party. Differences between our projections and actual amounts depend on the extent to which future experience conforms to the assumptions made for this analysis. Actual experience is unlikely to conform exactly to the assumptions used in this analysis. Therefore, actual amounts will almost certainly differ from projected amounts. In performing this analysis, we relied on data and other information provided by the data sources discussed above. We have not audited or verified this data and other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete. We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be

[11] ASHP. Drug Shortages List: Current Drug Shortages Bulletins. Retrieved December 19, 2024, from https://www.ashp.org/drug-shortages/current-shortages/drug-shortages-list?page=CurrentShortages.
[12] Alltucker, K. (October 24, 2024). Diabetes patients worry about insulin shortages as Ozempic use skyrockets. USA Today. Retrieved December 11, 2024, from https://www.usatoday.com/story/news/health/2024/10/24/insulin-shortage-2024-diabetes-patients/75554041007/.

uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Milliman has developed certain models to estimate the values included in this report. The intent of the models was to estimate the costs of antidiabetic medications in 2024. We have reviewed the models, including their inputs, calculations, and outputs, for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice (ASOP).

The models rely on data and information as input to the models. We have relied upon certain data and information provided discussed above for this purpose and accepted it without audit. To the extent that the data and information provided is not accurate, or is not complete, the values provided in this report may likewise be inaccurate or incomplete. Milliman's data and information reliance includes:

- Enrollment data provided by various sources
- Medical claims data provided by various sources
- Pharmacy claims data provided by various sources
- Medi-Span Master Drug Database (MDDB) 2.5
- Classes of antidiabetic drugs and bioequivalent GLP-1s identified by Virta
- Information from SSR Health on estimated manufacturer rebates

The models, including all input, calculations, and output, may not be appropriate for any other purpose.

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. John Rogers and Barb Dewey are members of the American Academy of Actuaries, and meet the qualification standards for performing the analyses in this report.

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