

Modeling GLP-1 Adjudication: Quantifying Rejection Drivers Across Payer Types

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Abstract

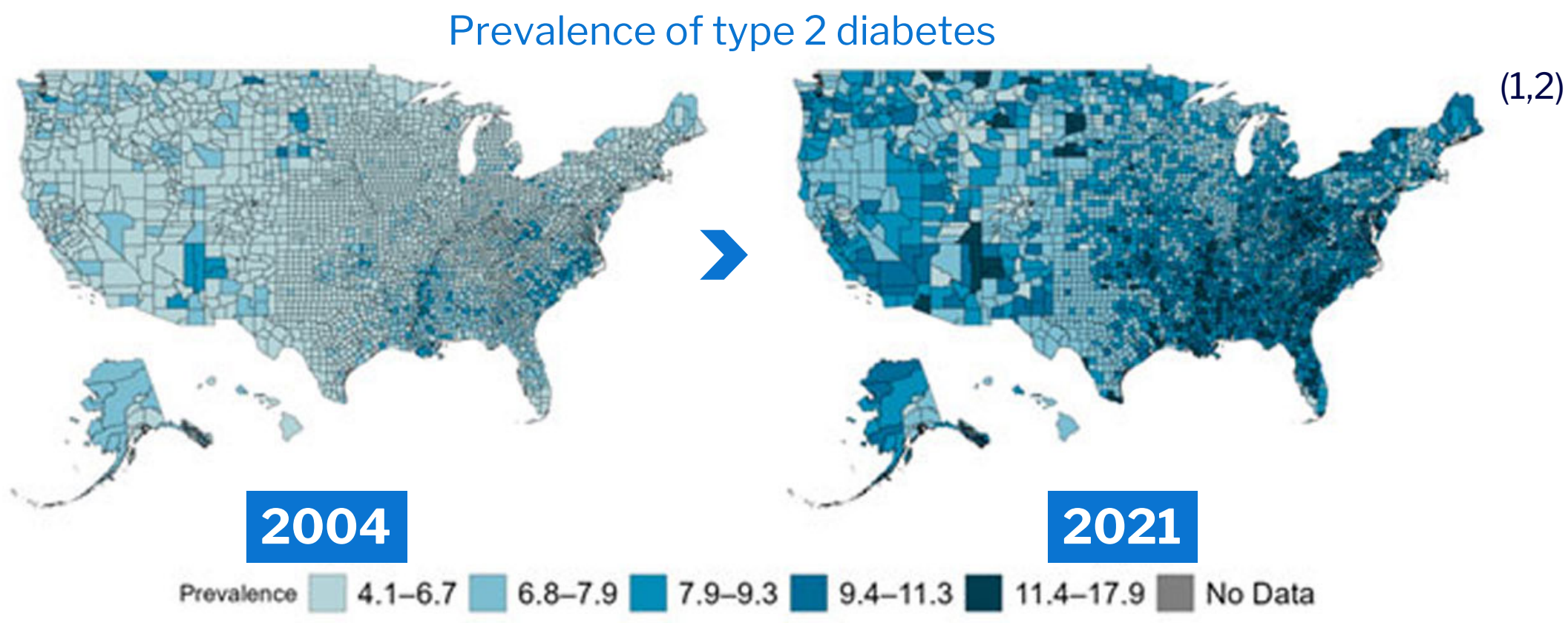
GLP-1 receptor agonists, originally approved for **type 2 Diabetes** (T2D), are now gaining broader indications across **obesity, cardiovascular risk, and other chronic conditions**. However, **payer coverage remains inconsistent & variable across payer types**. In this context, **understanding what drives claim approval or rejection** is critical for **informing HCP targeting, identifying patient access barriers, and responding to shifting payer dynamics**.

In this study, we used **McKesson Compile's Open Claims Patient ReadyData™** to develop separate predictive models for Medicare and Commercial populations, **predicting GLP-1 claim adjudication outcomes** (approved vs. rejected). We engineered **claim-level features** capturing **prescriber behavior, patient comorbidities, medication history, and treatment context**. Our objective was to **identify the most influential drivers of claim outcomes and test the null hypothesis** that the top 10 predictive features are not significantly different across payer types.

Results show that **adjudication outcomes are driven by a consistent set of variables**—prescriber's historical GLP-1 claim volume, patient age, days of supply, T2D diagnosis, and prior GLP-1 usage—**across both Medicare and Commercial payers**. We **fail to reject the null hypothesis**, indicating that differences in coverage are shaped more by measurable clinical and behavioral patterns than payer-specific policies. SHAP value analysis reveals how these drivers tip the scale in real-world adjudication decisions, uncovering unexpected dynamics—such as higher rejection rates for patients with extensive prior GLP-1 use and conditional approvals for non-T2D patients with serious comorbidities. These insights offer a **data-driven foundation to guide pharma access strategies, support HCPs in navigating payer barriers, and inform future research on unmeasured drivers** such as geography, plan-level coverage nuance, and social determinants.

Introduction

Chronic conditions such as **type 2 diabetes** (T2D) and **obesity** place a growing strain on healthcare systems worldwide. In 2021, the CDC projected that more than **14% of all U.S. adults were affected by T2D**, with **85–90% of them also overweight or obese** (1,2). These trends are accelerating, with the **combined economic cost of obesity and diabetes** projected to exceed **10 trillion USD by 2030** (6,7).



GLP-1 receptor agonists, initially approved for T2D, now show **benefits in weight management, cardiovascular risk reduction** (8), and **emerging use in Alzheimer's** (9) and **NASH** (10). They are cost-effective considering **quality-adjusted life years (QALYs) gained** (13); Yet access lags clinical promise. Many payers limit coverage — especially for non-T2D patients — due to cost & other concerns. The result: **frequent denials, financial burden, and inequitable access**.

In this study, we examine **claim-level factors influencing the adjudication outcomes of GLP-1 prescriptions**, focusing on payer type (Commercial vs. Medicare), comorbidities, and prescribing context. **Our goal is to understand what drives claim acceptance or rejection**.

Methods and Materials

To identify the most influential **factors driving GLP-1 claim adjudication outcomes**, we developed separate **claim-rejection classification models** for **Commercial and Medicare** populations. We tested the **null hypothesis** that: **The top 10 features with the greatest proportional impact on claim adjudication outcomes are not significantly different between Medicare and Commercial payers**.

We used **McKesson Compile's Open Claims Patient ReadyData**, a longitudinal claims dataset capturing both medical and pharmacy events. The analysis focused on GLP-1 receptor agonists with an FDA approval as of **13th May 2022** for type 2 diabetes (Ozempic, Rybelsus, Mounjaro, Victoza, and Trulicity).

The final cohort consisted of **5.3 million claims across 1.87 million unique patients**

- 43% were male, 57% female
- 74% of claims were approved, 26% denied
- 39% were Medicare, 61% Commercial
- Rejection rate: Commercial (31%), Medicare (18%)

We created **features across the below domains** to predict claim denials:

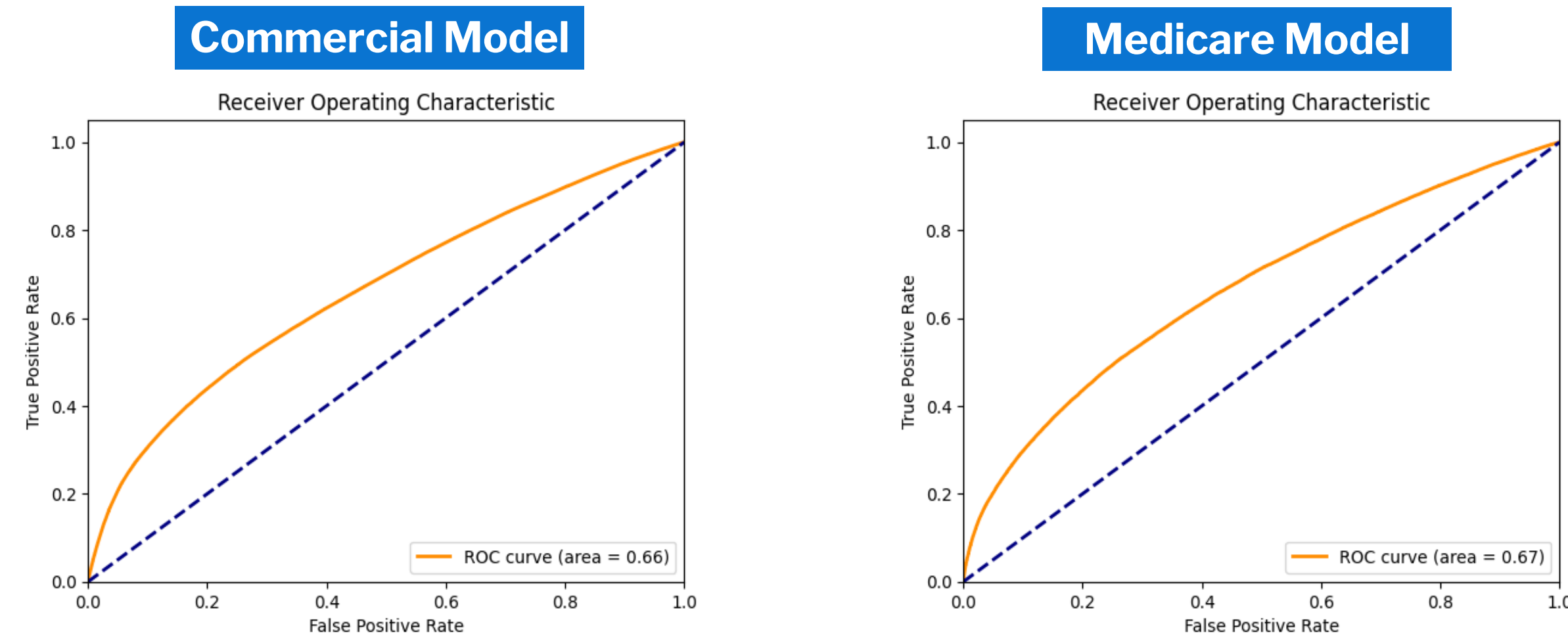
- Demographics:** Age, Sex, Race, etc.
- Clinical Comorbidities:** Binary flags for top 20+ chronic conditions including T2D, cardiovascular diseases (CVD), chronic kidney disease (CKD), Obesity, hypertension, etc.
- Medication & Treatment History:** Prior use of Metformin, SGLT2 inhibitors, GLP-1 use post-bariatric surgery, etc.
- Provider Attributes:** HCP Specialty (Endocrinology, Primary Care, Internal Medicine, etc.), GLP-1 claim volume, etc.
- and other features related to **Claim Behavior and Utilization Patterns**

References

1. Centers for Disease Control and Prevention. National Diabetes Statistics Report website.
2. Centers for Disease Control and Prevention. National Diabetes Statistics Report. US Department of Health and Human Services; 2024. www.cdc.gov/diabetes/php/data-research/index.html External link.
3. Okunogbe et al., "Economic Impacts of Overweight and Obesity," 2nd Edition with Estimates for 161 Countries. World Obesity Federation, 2022.
4. Lin, J., Thompson, T. J., Cheng, Y. J., Zhuo, X., Zhang, P., Gregg, E., & Rolka, D. B. (2018). Projection of the future diabetes burden in the United States through 2060. Population health metrics, 16, 1–9.
5. Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021
Kerr, Jessica A et al. The Lancet, Volume 405, Issue 10481, 785 – 81.
6. Bommer, C., Sagalova, V., Heesemann, E., Manne-Goehler, J., Atun, R., Börmighausen, T., ... & Vollmer, S. (2018). Global economic burden of diabetes in adults: projections from 2015 to 2030. Diabetes care, 41(5), 963-970.

Results & Insights

Model performances were evaluated using **AUC score, precision, recall and F-score**. As shown below, the ROC curves for each model indicate how well each the model distinguished between positive cases (**adjudication status: rejected**) and negative cases (**adjudication status: approved**)



"The score for the **Commercial model holds 0.66** while **Medicare holds at 0.67**. Both models are capable of distinguishing positive and negatives beyond chance and can reveal directional drivers of claim rejection"

The model's moderate predictive performance **quantifies** the inherent **variability and complexity in GLP-1 claim adjudication**, even among payers of the same type. Despite identifiable drivers of approval and rejection, **differences in payer-specific guidelines, coding practices, and regulatory requirements introduce substantial variance in GLP-1 adjudication**.

Thus, the model effectively captures the **evolving and heterogeneous adjudication landscape** rather than *failing to accurately predict all outcomes*.

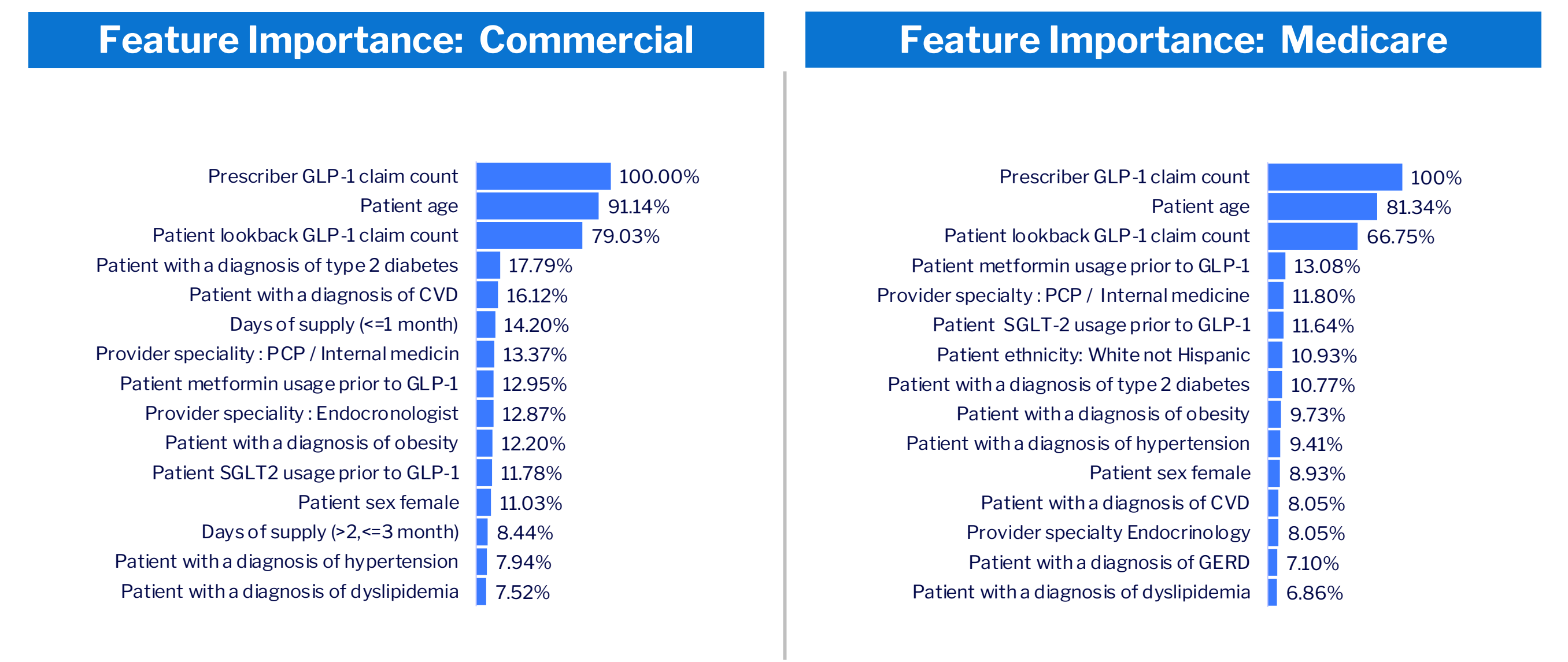
Key insights from the model highlight the most influential factors driving GLP-1 claim outcomes—and notably, these **drivers are largely consistent across payer types**. Despite expectations of policy-driven variability, both Medicare and Commercial models ranked **similar features at the top: prescriber's historical GLP-1 claim volume, patient age, GLP-1 days of supply, type-2 diabetes diagnosis, and patient's historical GLP-1 usage**.

These shared **signals** suggest that **adjudication outcomes are shaped more by clinical and behavioral patterns** than by payer-specific nuances. The concentration of influence among a few common factors reinforces the idea that **claim approval or rejection hinges on a core set of signals**. The insights that follow unpack these drivers in greater detail:

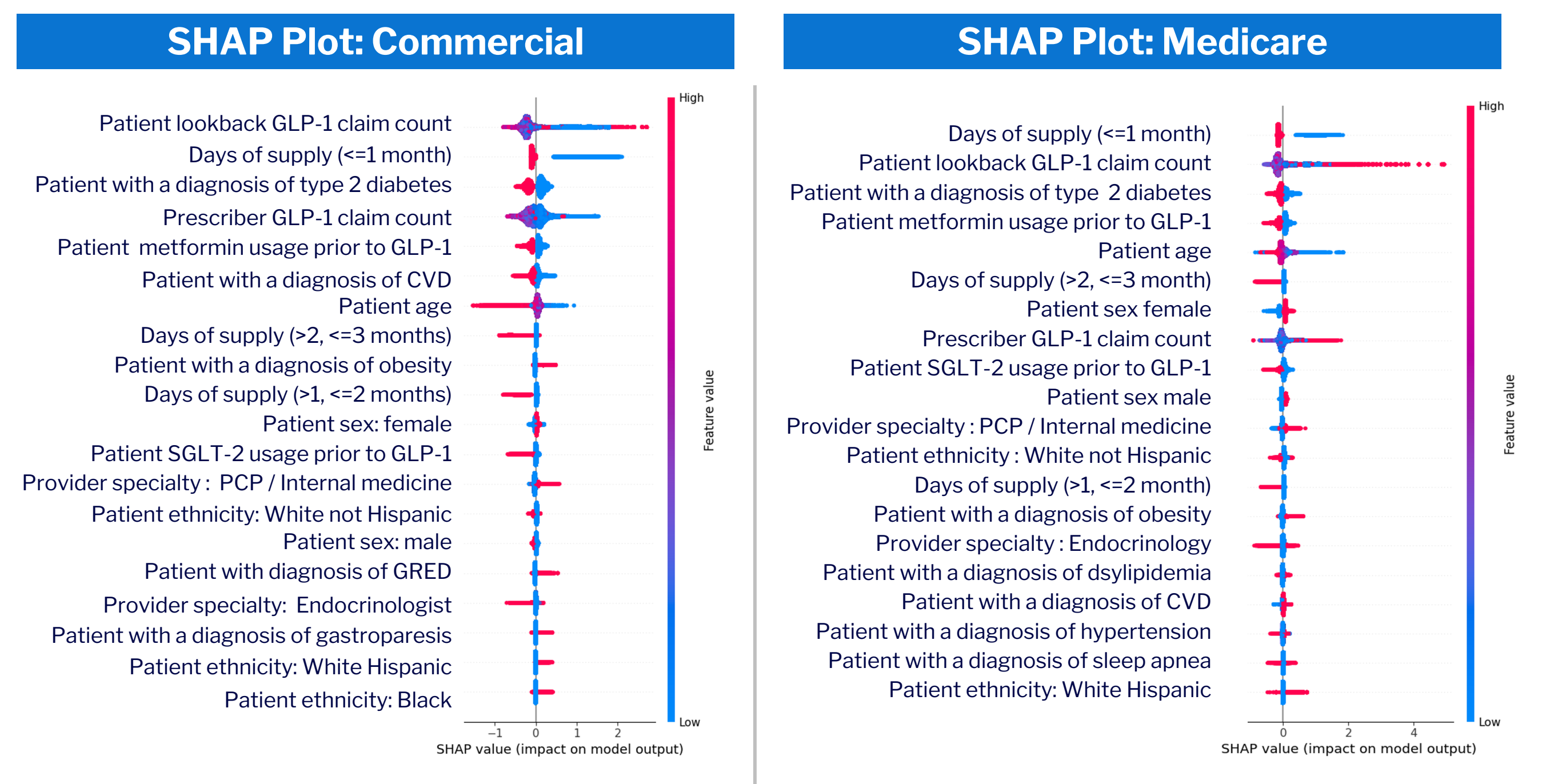
- Use of **step therapy drugs** like metformin or SGLT2 inhibitors, **reduces the likelihood of rejection**
- Patients with higher number of GLP-1 claims in the lookback are more likely to be rejected in Medicare** than in Commercial
- Older patients are less likely to get rejected** than younger patients
- Non-type-2 diabetes patients with serious comorbidities** like cardiovascular diseases have **lower rejection chances**
- GLP-1 claims exceeding a 30-day supply are more likely to be rejected**
- Providers with lower number of GLP-1 claims in the lookback are more likely to be rejected in Commercial** than in Medicare
- Endocrinologists' prescriptions are less likely to get rejected** than those from other specialties like PCPs or internists

While both **Medicare and Commercial models identified similar top features** — including prescriber's historical GLP-1 prescription volume, patient age, GLP-1 days of supply, type-2 diabetes diagnosis, and patient's historical GLP-1 usage — the **relative importance of these features** varied depending on the **lens of measurement**.

The model's **feature importance scores**, based on weights or information gain in decision tree splits, placed **prescriber historic GLP-1 claim volume as the top driver of adjudication outcomes**, followed by patient age and patient's historical GLP-1 usage. This structure reveals how the model learns decision paths — prioritizing variables that consistently reduce classification error across trees. In this view, the **experience of the prescriber** (as captured by their **GLP-1 claims volume in lookback period**) plays a central role in shaping **whether a claim gets approved or denied**, reflecting perhaps a **systemic payer preference toward more experienced or guideline-aligned providers**.



However, when we examine the **SHAP values, a different picture emerges**. The top contributors to real-world claim outcomes were patient's historical GLP-1 usage, days of supply, and presence of a type 2 diabetes (T2D) diagnosis. This suggests that, in **adjudication decisions, payer scrutiny is more reactive to patient behavior and clinical context than provider experience**.



Examining both **model feature importance and SHAP values** offers a more complete understanding of **access dynamics**. While model feature importance highlights which variables the model structurally relies on — such as prescriber behavior and patient age — SHAP values reveal which signals tip the scale toward approval or rejection in real-world decisions, like prior GLP-1 exposure or presence of a T2D diagnosis.

The **top predictive features** influencing GLP-1 claim adjudication outcomes—such as prescriber's historical GLP-1 claim volume, patient age, days of supply, T2D diagnosis, and prior GLP-1 usage—**were largely consistent between Medicare and Commercial models**. Therefore, **we fail to reject the null hypothesis: the most influential features are not significantly different between Medicare and Commercial payers**.

Conclusions

This study highlights the **evolving and unstandardized landscape of GLP-1 claim adjudication** across Medicare and Commercial payers. Key model insights show that the most influential factors driving claim outcomes—such as prescriber history, patient age, days of supply, T2D diagnosis, and prior GLP-1 use—are largely consistent across payer types. This suggests **adjudication outcomes are shaped more by clinical and behavioral patterns than by payer-specific policies**, with a **core set of signals driving approvals and rejections**. The **models' performance reflects real-world inconsistency in payer decisions** rather than **limitations in predictive power**. By capturing this **variability**, the models offer a **realistic view of the challenges** providers and payers face in **managing GLP-1 access across a fragmented system**.

Importantly, we **fail to reject the null hypothesis**: the top predictive features influencing claim outcomes are not significantly different between payers. This reinforces that **measurable behaviors and clinical indicators outweigh payer-specific logic**. Combining model feature importance with SHAP value analysis offers a more complete understanding of adjudication dynamics—where feature importance highlights structural drivers and SHAP values reveal what tips the scale in real-world decisions. Unexpected findings—like higher rejection rates among heavy GLP-1 users or approvals for non-T2D patients with serious comorbidities—underscore both **payer caution and flexibility**.

Future research can explore **unmeasured drivers**—such as **geography, plan-level nuances, prescriber-specific tendencies, etc.**, that may further explain variability in adjudication. Understanding these dimensions can help pharma **refine access strategy, tailor HCP engagement, and better support patient continuity of care**.