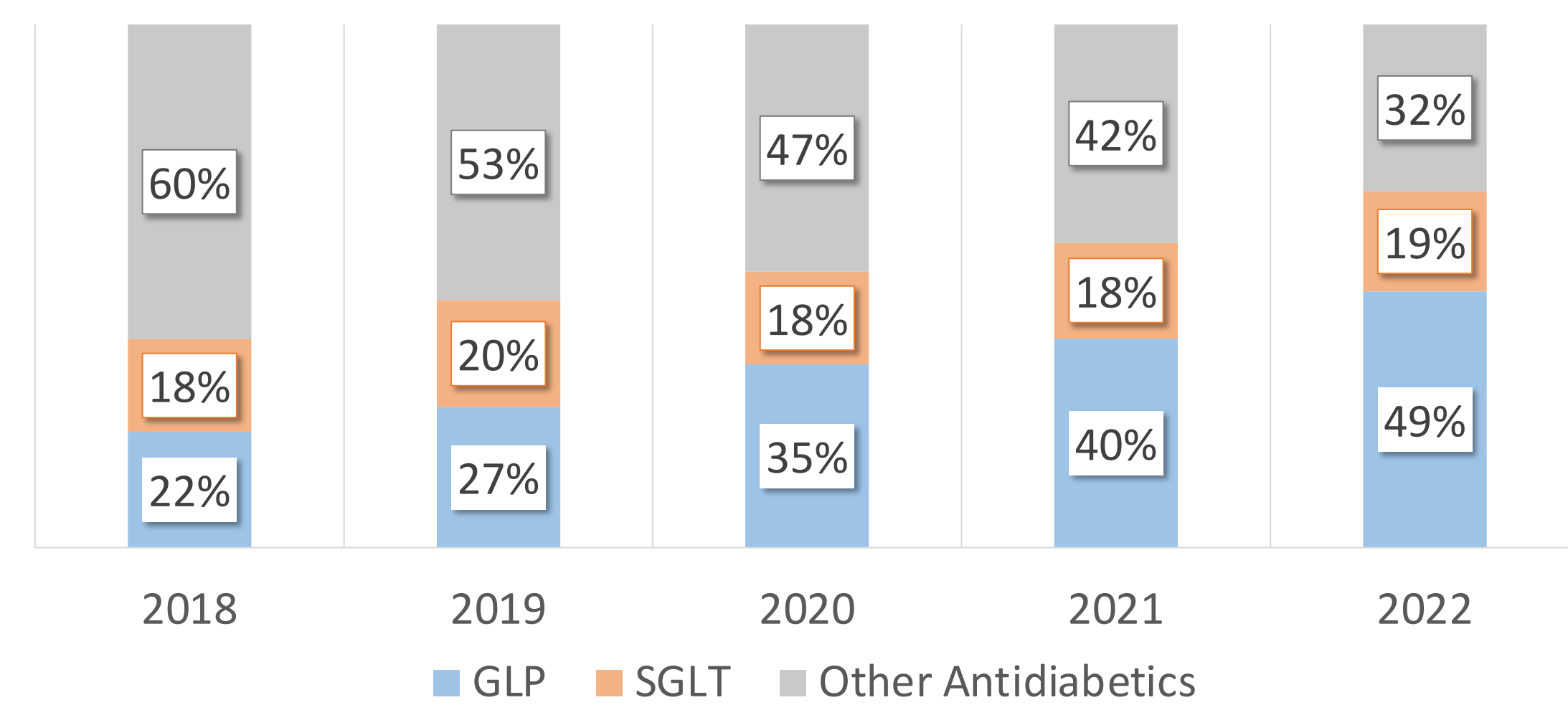# Comparison of clinical outcomes and healthcare utilization with newer diabetes medications in patients with type 2 diabetes

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BACKGROUND

- The healthcare cost associated with diabetes in the United States was $327 billion in 2017 and continues to increase. A large portion of medical costs associated with diabetes cost is treatment of diabetes-related complications.[1]
- Newer antidiabetic medications such as, Sodium-glucose cotransporter 2 (SGLT2) inhibitor and Glucagon-like peptide 1 (GLP-1) receptor agonist, have been shown to reduce risk of chronic kidney disease (CKD) progression, cardiovascular (CV) events, and heart failure (HF) hospitalizations.[2]
- The expanded indications of these novel antidiabetic medications had a dramatic impact on the cost and utilization as a recent study reported a 47.5% increase in PMPM of antidiabetic medications from 2014-2019, with SGLT2 and GLP-1 being the main contributors.[3]
- This is consistent with a commercial health plan in our accountable care organization (ACO) as shown below.

Diabetes Medication PMPM share by Diabetes Class and Year

OBJECTIVE

- To compare the clinical outcomes and healthcare resource utilization of SGLT2 inhibitors, GLP-1 agonists and other oral antidiabetic medications (oADMs) in patients with type 2 diabetes (T2D).

METHODS

Data Source: Medical and Pharmacy Claims of a commercial health plan linked to electronical health record (EHR) for laboratory data

Inclusion Criteria	
Age	• ≥ 18 years
Health Plan Enrollment	• Continuous enrollment 12 months pre-index and 12 months post index date
Medication history	• ≥ 2 prescription claims for index medication within 6 months of index date
Disease history/ Lab values	• T2D • HbA1c lab results ≤ 12 months pre-index and ≥ 3 months post-index date

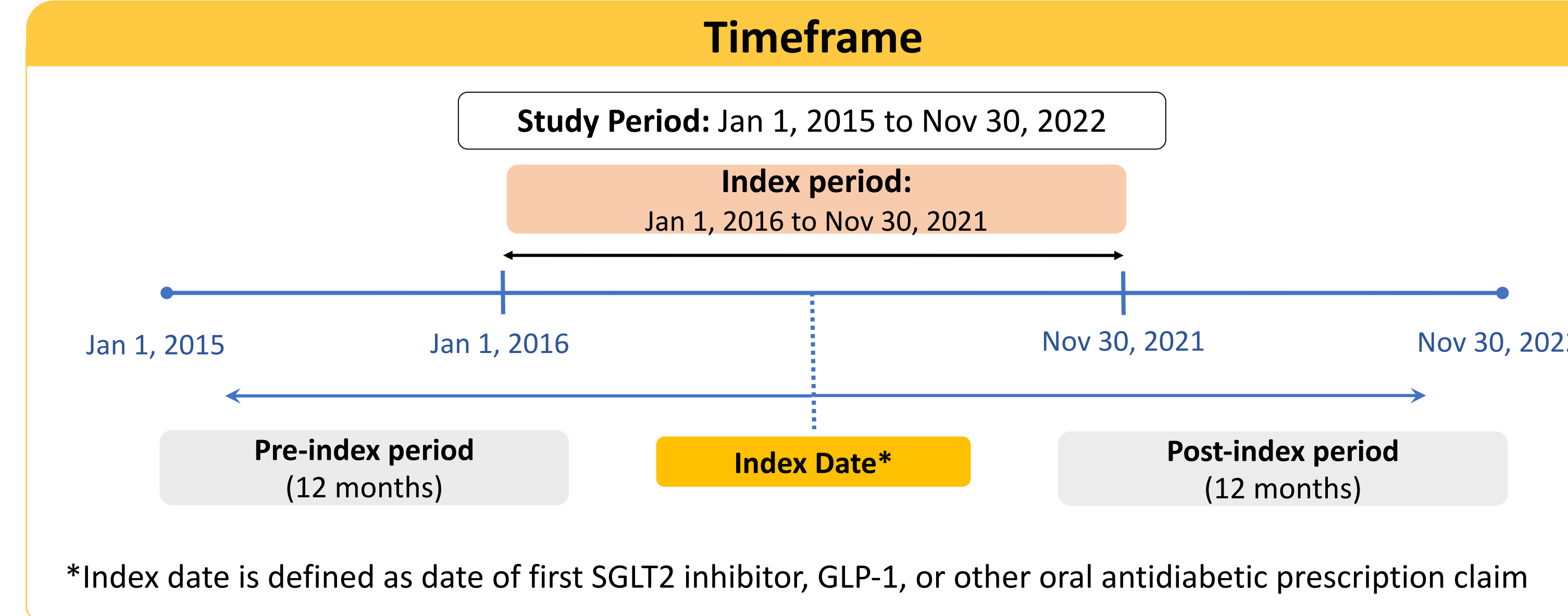| Exclusion Criteria	
Medication history	• ≥ 1 prescription claim for both SGLT2 inhibitor and GLP-1 agonist during the study period • Any prescription claim within the same class in the previous 6 months
Disease history	• Type 1 Diabetes (T1D) • Gestational diabetes

Primary Outcome:
- Difference in HbA1c change post initiation of index medication
- Association of medication type on occurrence of all-cause hospitalizations and emergency department (ED) visits after initiation

Timeframe

*Index date is defined as date of first SGLT2 inhibitor, GLP-1, or other oral antidiabetic prescription claim

Statistical analysis:
- Descriptive statistics was used for all continuous (mean and standard deviation) and categorical (percentages) baseline variables
- Comparisons was performed using either Chi-square for categorial variables and ANOVA for continuous variables
- Multivariate logistic regression was used to examine the association of medication type on ED visit and hospitalization controlling for the following covariates: Age, gender, race, number of diabetes medications at baseline, prior insulin use, Diabetes Complications Severity Index (DCSI) score, prior ED visit, prior hospitalization visit

RESULTS

Table 1: Baseline Characteristics

Baseline Characteristics	GLP-1 (N=85)	SGLT2 (N=79)	oADM (N=105)	P-value
Age, mean (SD)	50.16 (9.79)	52.89 (7.50)	50.87 (9.64)	0.1418
Female, n (%)	53 (62.35)	34 (43.04)	64 (60.95)	0.0200*
Race/ethnicity, n (%)				0.3700
White	40 (47.06)	33 (41.77)	42 (40.00)	
Black	12 (14.12)	14 (17.72)	22 (20.95)	
Hispanic	27 (31.76)	25 (31.65)	25 (23.81)	
Other	6 (7.06)	7 (8.86)	16 (15.24)	
Number of antidiabetic medications, mean (SD)	1.67 (0.89)	1.82 (0.96)	0.17 (0.45)	<.001*
Antidiabetic medications, n (%)				
Biguanide	63 (74.12)	57 (72.15)	6 (5.71)	<.001*
Sulfonylureas	24 (28.24)	26 (32.91)	1 (0.95)	<.001*
DPP4 inhibitors	7 (8.24)	13 (16.46)	0 (0.00)	0.0001*
TZD	5 (5.88)	8 (10.13)	0 (0.00)	0.0057*
Oral combination products	11 (12.94)	17 (21.52)	1 (0.95)	<.001*
Insulin	32 (37.65)	23 (29.11)	9 (8.57)	<.001*
DCSI, mean (SD)	0.99 (1.23)	0.72 (1.21)	0.54 (1.14)	0.0385*
HbA1c, mean (SD)	8.56 (1.67)	8.55 (1.90)	8.53 (2.36)	0.9964

Table 2: HbA1c change

Outcome	GLP-1	SGLT2	oADM	P-value
HbA1c pre (%)	8.56	8.55	8.53	0.9964
HbA1c post (%)	7.46	8.00	7.33	0.0178*
Difference	-1.09	-0.55	-1.21	0.0498*

Post hoc analysis reveled a significant difference in HbA1c reduction between oADM and SGLT-2

Table 3: Logistic regression – ED visit

	Reference	Odds Ratio	95% Confidence Limit	P-value
Medication type				
oADM	SGLT2	0.495	0.180-1.357	0.1718
GLP-1	SGLT2	0.441	0.195-0.994	0.0483*
ED visit pre-index				
Yes	No	3.698	1.732-7.899	0.0007*

Medication type and prior ED visit are significant predictors of ED visit after initiation of the index medication

Table 4: Logistic regression – Hospitalizations

	Reference	Odds Ratio	95% Confidence Limit	P-value
Medication type				
oADM	SGLT2	0.882	0.160-4.869	0.8851
GLP-1	SGLT2	0.491	0.114-2.119	0.3406
DCSI score				
DCSI	-	1.527	1.065-2.189	0.0214*

DCSI score is a significant predictor of hospitalizations after initiation of the index medication

CONCLUSIONS

- Patients in the oADM group have less 'other' antidiabetic medications at baseline and have a lower DCSI score, suggesting that this patient group may be newly diagnosed T2D patients.
- oADMs had the greatest change in HbA1c levels (-1.21), however this decrease was not significant when compared to GLP-1 (-1.09).
- The odds of presenting to the ED is 56% lower for patients on GLP-1 compared to those on SGLT2 (95% CI=0.195-0.994).
- Although not significant, patients starting on GLP-1 and oADMs had a lower odds of being hospitalized than SGLT-2.
- Other predictors of ED visit and hospitalizations included previous ED visit and DCSI score
  - The odds of presenting to the ED is 3.7 times higher in patients with a prior ED visit compared to patients without a prior ED visit (95% CI=1.732-7.899).
  - For each additional increase in DCSI score, the odds of being hospitalized increased by 53% (95% CI=1.065-2.189).
- Overall, patients on GLP-1 had lower ED (significant) and hospitalizations (NS) compared to SLGT2 and oADMs

LIMITATIONS

- Claims study was subject to inaccurate or missing data, and incomplete coding of diagnosis
- Linking claims data to EHR to collect HbA1c values reduced sample size
- A commercial health plan population, may not be generalizable to other payer types or to a population outside this health plan

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DISCLOSURES