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An Evaluation of Real-World Outcomes and Healthcare Costs Associated with Continuous Glucose Monitor (CGM) Use Among Patients with Non-Insulin-Treated Type 2 Diabetes Within a Medicaid Population

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INTRODUCTION

- In 2026, the Centers for Disease Control and Prevention reported that type 2 diabetes (T2D) affects an estimated 40.1 million adults in the United States, including approximately 10 million Medicaid patients.[1,2]
- Maintaining appropriate blood glucose (BG) levels is important for preventing long-term complications. Traditional capillary BG monitoring provides only single-point readings and limited insight into BG trends.[3]
- The American Diabetes Association considers CGMs standard of care for individuals with T2D using insulin, and its use has expanded to select, higher risk patients with non-insulin-treated T2D (NITT2D).[3,4]
- Although more commonly associated with insulin therapy, hypoglycemia remains a significant concern for patients with T2D treated with non-insulin agents, particularly insulin secretagogues.[3]
- Evidence evaluating the use of CGMs in patients with NITT2D remains limited, though available studies show potential improvements in hemoglobin A1c (HbA1c), time-in-range, and patient engagement; however, there is limited data particularly within the Medicaid population.[3]

OBJECTIVE

- To evaluate real-world outcomes and healthcare costs associated with CGM use in adult patients with NITT2D.

METHODS

- This retrospective, cohort study evaluated pharmacy and medical claims data for Massachusetts Medicaid (MassHealth) Fee-For-Service/Primary Care Clinician (FFS/PCC), Primary Care Accountable Care Organizations (ACO-B), Accountable Care Partnership Plans (ACPP), and Managed Care Organizations (MCO) patients with continuous coverage from May 1, 2024, to August 31, 2025 (study timeframe).
  - May 1, 2024 was selected to provide a six-month pre-policy baseline period to identify patients without prior insulin use before a November 12, 2024, CGM coverage expansion, which allowed patients with NITT2D to receive a CGM with documented problematic hypoglycemia.
- **Inclusion Criteria:**
  - Patients ≥18 years of age as of May 1, 2024, with ≥1 International Classification of Diseases, Tenth Revision (ICD-10) code for T2D over the study timeframe.
- **Exclusion Criteria:**
  - Patients with third party liability (TPL) plans.
  - Patients with ≥1 claim for an insulin product over the study timeframe.
- **Exposed Group:**
  - The exposed cohort included patients with persistent use of a CGM device, measured from the first paid CGM claim through the end of the study timeframe, where no single gap between fills exceeded 56 days.
  - CGM devices evaluated in the study included Dexcom® G6, Dexcom® G7, Freestyle® 14-day, Freestyle® Libre 2, Freestyle® Libre 2 Plus, Freestyle® Libre 3, and Freestyle® Libre 3 Plus devices.
- **Non-Exposed Group:**
  - The non-exposed cohort included patients without a CGM claim during the study timeframe and a history of ≥1 ICD-10 code for hypoglycemia, diabetic ketoacidosis (DKA), or hyperosmolar hyperglycemic state (HHS), or concomitant treatment with ≥2 antidiabetic drug classes. These criteria were selected to identify higher-risk NITT2D patients with prior acute glycemic events or greater disease severity, consistent with populations in which CGMs are commonly utilized.
- **Primary Outcomes:**
  - The incidence of diabetes-related acute care visits (i.e., emergency department [ED] visits and hospitalizations) and total diabetes-related healthcare costs (i.e., pharmacy claims for antidiabetic medications and CGM sensors and medical claims for diabetes-related acute care visits), from November 12, 2024 to August 31, 2025.
- **Secondary Outcomes:**
  - The distribution of diabetes-related acute care visits by cause (i.e., an ICD-10 code for hypoglycemia, DKA, or HHS within the first two billing positions), stratification by antidiabetic agents within the patient's treatment regimen, and adherence to CGM therapy.
- **Statistical Analysis**
  - Primary efficacy analyses compared incidence rate ratios (IRRs) of diabetes-related acute care visits between groups using a Poisson rate test. Incidence rates were calculated using total person-months of evaluation to account for differences in patient observation times. Secondary analyses stratifying the type of diabetes-related acute care event (i.e., hypoglycemia, HHS, DKA) were similarly evaluated and reported as IRRs.
  - Comparisons across antidiabetic therapies were performed using a Poisson regression to estimate IRRs with metformin as the reference medication given its widespread use as standard of care in T2D.
  - Gross healthcare costs were evaluated as per-member-per-month (PMPM) spending for pharmacy and medical claims and stratified by CGM use and occurrence of acute care events.
  - Adherence to CGM therapy was evaluated using proportion of days covered (PDC), from date of first paid CGM claim through the end of the study timeframe and reported as an average PDC.
  - Differences in baseline demographic and medication characteristics were evaluated using chi-square tests for categorical variables and t-tests for continuous variables.

RESULTS

Table 1. Demographic and Medication Characteristics

Demographic			
Characteristics	CGM (N=357)	Non-CGM (N=19,641)	P-value
Average age, years (±SD)	50.3 (±11.4)	53.6 (±11.1)	<0.00011*
Male, n (%)	175 (49.02%)	9,433 (48.03%)	0.7099†
Medication			
	CGM (N=357)	Non-CGM (N=19,641)	P-value
Metformin, n (%)	199 (55.74%)	15,766 (80.27%)	<0.0001†
GLP-1 RA/GIP Agonists, n (%)	237 (66.39%)	10,780 (54.89%)	<0.0001†
SGLT2 Inhibitors, n (%)	119 (33.33%)	8,411 (42.82%)	<0.0001†
Insulin Secretagogues, n (%)	75 (21.01%)	5,238 (26.67%)	0.0164†

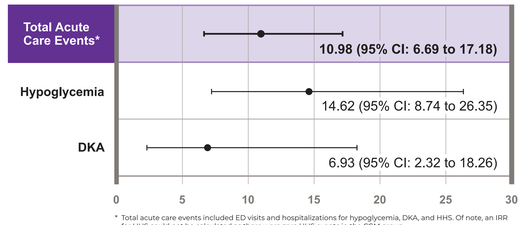
Abbreviations: GLP-1=glucagon-like peptide 1, GIP=gastric inhibitory peptide, SD=standard deviation, SGLT2=sodium-glucose cotransporter-2.
* P-value for continuous data derived from a two-sample t-test
† P-values for categorical variables derived from a Chi-square test

Table 2. Clinical Characteristics of the CGM Group vs. Non-CGM Group

Primary Endpoint				
Clinical Characteristics			CGM (N=357)	Non-CGM (N=19,641)
Diabetes-Related Acute Care Event		Events/100 person-months	0.95	0.09
		IRR	10.98; 95% CI: 6.69 to 17.18; P<0.0001	
Secondary Endpoints				
Clinical Characteristics			CGM (N=357)	Non-CGM (N=19,641)
Stratification by Event	DKA	Events/100 person-months	0.22	0.03
		IRR	6.93; 95% CI: 2.32 to 18.26; P=0.0009	
	HHS	Events/100 person-months	0	0.005
		IRR	Not estimable†	
	Hypoglycemia	Events/100 person-months	0.73	0.05
		IRR	14.62; 95% CI: 8.74 to 26.35; P<0.0001	
Stratification by Treatment‡ (IRR)	GLP-1/GIP Agonist (N=11,017)		0.97; 95% CI: 0.66 to 1.41; P=0.870	
	Insulin Secretagogue (N=5,313)		1.32; 95% CI: 0.84 to 2.02; P=0.211	
	SGLT2 Inhibitor (N=8,530)		1.05; 95% CI: 0.70 to 1.56; P=0.813	
CGM Adherence	Overall§ (PDC, %)		90.27%	
	With Events (PDC, %)		96.30%	
	Without Events (PDC, %)		88.09%	

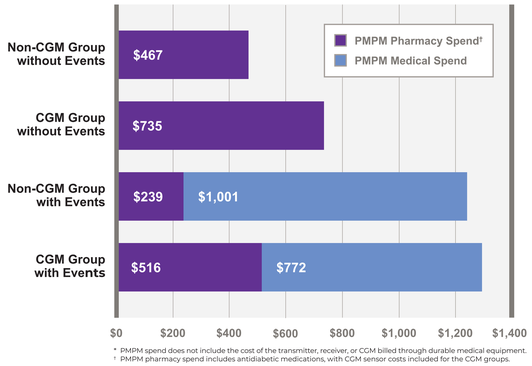
Abbreviations: CI=confidence interval, GLP-1=glucagon-like peptide 1, GIP=gastric inhibitory peptide, IRR=incidence rate ratio, PDC=proportion of days covered, SGLT2=sodium-glucose cotransporter-2.
* Total acute care events include ED visits and hospitalizations for hypoglycemia, DKA, and HHS.
† Not estimatable due to zero events in the CGM group.
‡ Metformin used as the reference category (IRR=1.0).
§ Overall cohort includes all patients receiving a CGM, regardless of acute care event status.

Figure 1. Incidence Rate Ratios of Diabetes-Related Acute Care Events: CGM vs. Non-CGM



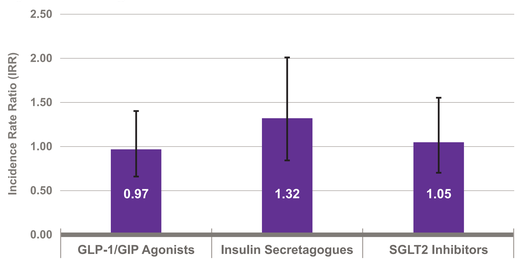
* Total acute care events included ED visits and hospitalizations for hypoglycemia, DKA, and HHS. Of note, an IRR for HHS could not be calculated as there were zero HHS events in the CGM group.

Figure 2. Per-Member-Per-Month (PMPM) Spend for Pharmacy and Medical Claims*



* PMPM spend does not include the cost of the transmitter, receiver, or CGM billed through durable medical equipment.
† PMPM pharmacy spend includes antidiabetic medications, with CGM sensor costs included for the CGM groups.

Figure 3. Incidence Rate Ratios of Diabetes-Related Acute Care Events by Treatment Agent*



Abbreviations: GIP=gastric inhibitory peptide, GLP-1=glucagon-like peptide 1, SGLT2=sodium-glucose co-transporter 2.
* Metformin used as the reference category (IRR=1.0) and medication categories were not mutually exclusive.

DISCLOSURES/ACKNOWLEDGMENTS

The authors have no financial disclosures.

DISCUSSION

- In this real-world analysis, CGM use was associated with a significantly higher incidence of diabetes-related acute care events compared with non-CGM users, driven primarily by hypoglycemia-related visits (Table 2).
- The higher hypoglycemia IRR among CGM users likely reflects differences in baseline risk and care-seeking behavior. CGM eligibility required prescriber-documented problematic hypoglycemia, and patients with recurrent hypoglycemia may be more likely to receive a CGM and be more vigilant in monitoring symptoms and seeking medical attention when events occur.
- A statistically significant increase in DKA-related acute care events was observed among CGM users, while no significant difference was seen for HHS (Table 2). However, these events were infrequent overall and may reflect greater baseline disease severity among CGM users.
- Baseline medication use differed between groups. CGM users were more likely to receive glucagon-like peptide-1 (GLP-1)/gastric inhibitory peptide (GIP) agonists and less likely to utilize metformin, sodium-glucose cotransporter-2 (SGLT2) inhibitors, or insulin secretagogues (Table 1). This may reflect updated guideline recommendations for GLP-1/GIP agonists as first-line therapy and greater adoption of these agents among younger or newly diagnosed patients.[4]
- Insulin secretagogues demonstrated a higher numerical IRR for diabetes-related acute care events compared to GLP-1/GIP agonists and SGLT2 inhibitors; however, these differences were not statistically significant (Table 2). This is consistent with the known higher risk of adverse drug events associated with insulin secretagogues.
- Among patients experiencing an acute care event, medical spending was higher in the non-CGM group, suggesting delayed recognition and more severe presentations that may require more intensive overall care (Figure 2).
- Adherence to CGM was generally high for the evaluation timeframe, supporting that the increased incidence rates of diabetes-related acute care events are unlikely due to poor adherence to device use (Table 2).

LIMITATIONS

- Due to the nature of a claims-based analysis, true adherence to CGM technology could not be assessed. Additionally, reliance on claims data for outcome identification may have led to underestimation or misclassification of acute care events.
- The study was unable to confirm whether patients were actively using a CGM device at the time of acute care event, nor verify their antidiabetic regimen and adherence at the time of event.
- The non-CGM cohort included patients with concomitant use of ≥2 antidiabetic therapies; however, selecting for more intensive regimens (e.g., ≥3 therapies) may have more accurately captured individuals with greater disease severity. As a result, the non-CGM group likely encompassed patients with differing levels of diabetes control and hypoglycemia risk, which may have contributed to residual confounding in the observed outcomes.
- Baseline acute care events prior to CGM initiation were not assessed, limiting the ability to evaluate changes in event rates within the CGM group after device initiation.
- Cost comparisons excluded outpatient diabetes-related care, potentially underestimating the total economic burden associated with diabetes management.

CONCLUSIONS

This claims-based analysis found that CGM users, despite relatively high rates of adherence, experienced higher rates of diabetes-related acute care events and overall healthcare costs compared with non-CGM users. These findings likely reflect differences in baseline hypoglycemia risk and a greater likelihood of presenting for medical evaluation, rather than a direct effect of CGM use. While overall healthcare costs were higher among CGM users, event-related medical costs were higher in non-CGM users, suggesting more severe presentations and highlighting the value of earlier detection and management with CGM devices.

FUTURE STUDIES

- Future studies should incorporate clinical measures (e.g., HbA1c, time-in-range) to better evaluate diabetes severity and control and more accurately determine the effectiveness of CGM devices.
- Risk-adjusted analyses may help clarify which patient subgroups derive the greatest clinical and economic benefit from CGM use.

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