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An Evaluation of Hospitalizations and Healthcare Costs in Medicaid Patients with Insulin-Dependent Type 2 Diabetes Mellitus Monitored with Continuous Glucose Monitoring Devices versus Capillary Blood Glucose Monitoring

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BACKGROUND

- Continuous glucose monitors (CGM) are software-equipped devices that patients with diabetes use to monitor blood glucose levels.[1]
- The American Diabetes Association (ADA) recommends the use of CGM in those requiring multiple daily insulin injections, continuous insulin infusions, or basal insulin.[2]
- Clinical trials assessing the use of CGM in patients with insulin-dependent type 2 diabetes mellitus (T2DM) have shown reductions in hemoglobin A1c (HbA1c) levels, but not in the rates of hypoglycemia.[2]
- There are limited studies comparing T2DM-related healthcare utilization and costs in patients with Medicaid coverage who use capillary blood glucose (CBG) monitoring (i.e., finger-sticks) versus CGM.

OBJECTIVE

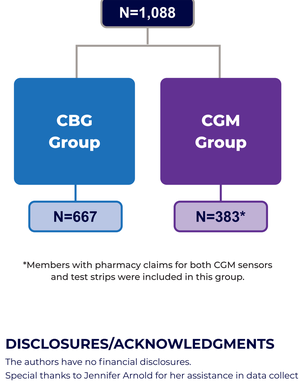
To compare the incidences and costs of diabetes-related emergency department (ED) visits, hospitalizations, and blood glucose monitoring-related supplies among adult members in a state Medicaid program with insulin-dependent T2DM who monitor glucose levels with CGM versus CBG testing

METHODS

- This retrospective evaluation includes Massachusetts Medicaid (MassHealth) members with demonstrated stability on insulin, and CGM or CBG supplies from July 1, 2021 to Dec. 31, 2021 (i.e., qualifying timeframe) and pharmacy and medical claims data from Jan. 1, 2022 to Dec. 31, 2022 (i.e., the investigation timeframe).
- Statistical comparisons between independent groups were conducted using Wilcoxon Rank-Sum tests for nonparametric data.
- **Inclusion Criteria:**
  - Members ≥18 years of age with a diagnosis of T2DM based on ICD-10 codes
  - Members with ≥1 paid pharmacy claim for any insulin product during the first three and last three months of the qualifying timeframe
  - Members with ≥1 paid pharmacy claim for CGM sensors, test strips, or both during the first three and last three months of the qualifying timeframe
  - Members with ≥1 paid pharmacy claim in each calendar year (CY) quarter during the investigation timeframe for any insulin and CGM sensor or test strips, or both (used as a surrogate of adherence)
- **Exclusion Criteria:**
  - Members with third-party liability (TPL) or any break in MassHealth coverage (defined as ≥45 days without coverage)
- **Primary Outcome:**
  - The frequency of acute diabetes-related hospitalizations and ED visits per member (e.g., diabetic ketoacidosis, hypoglycemia) determined by ICD-10 code billed in the first or second position
- **Secondary Outcome:**
  - Per member per year (PMPY) cost of care inclusive of acute diabetes-related hospitalizations, ED visits, and blood glucose monitoring-related pharmacy claims

RESULTS

Figure 1. Evaluation Group Allocation



*Members with pharmacy claims for both CGM sensors and test strips were included in this group.

Table 1. Number of Health Care Visits Per Member

	CBG (N=667)	CGM (N=383)	P-Value
Mean ED Visits Per Member	**0.12**	**0.24**	**0.006**
Median ED Visits Per Member	0	0	–
Range of ED Visits Per Member	0 to 18	0 to 10	–
Mean Hospitalizations Per Member	**0.02**	**0.04**	**0.295**
Median Hospitalizations Per Member	0	0	–
Range of Hospitalizations Per Member	0 to 1	0 to 3	–
Mean ED Visits and Hospitalizations Per Member	**0.14**	**0.28**	**0.004**

Figure 2. Percentage of Members with ED Visits

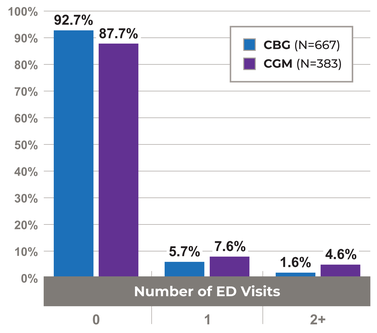
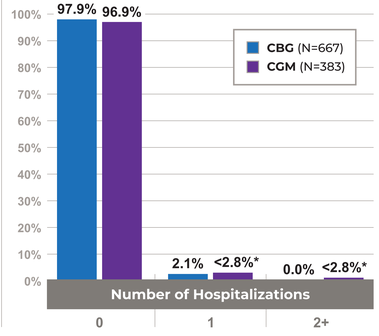
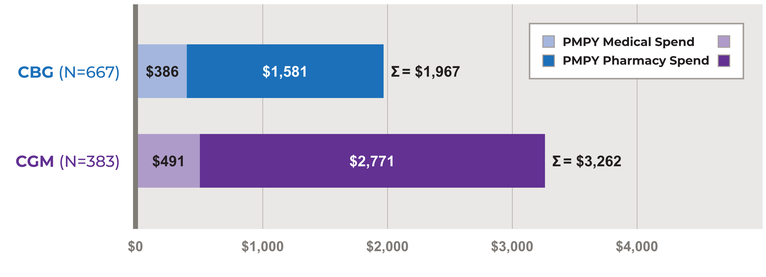


Figure 3. Percentage of Members with Hospitalizations



*Percentages that indicate a numeric value <11 have been masked to protect confidentiality.

Figure 4. Per Member Per Year Spend for Pharmacy Claims and Medical Claims



DISCLOSURES/ACKNOWLEDGMENTS

The authors have no financial disclosures.
Special thanks to Jennifer Arnold for her assistance in data collection.

DISCUSSION

- There were more health care visits per member observed in the CGM group compared to the CBG group, which may indicate that members experiencing more difficulty controlling their diabetes as evidenced by utilization of CGM, are more likely to require acute medical attention (Table 1). There was a statistically significant difference observed in the number of ED visits per member between the CGM and CBG groups; however, the difference in the number of hospitalizations per member was not statistically significant (Table 1).
- The median number of ED visits and hospitalizations for members in both the CGM and CBG groups was 0, and both groups had similar proportions of members with ED visits (Table 1 and Figure 2). Members in the CBG group did not have any recurrent hospitalizations as compared to members in the CGM group (Figure 3).
- The cost of care PMPY was higher in the CGM group compared to the CBG group, which suggests that members using CGM may be of higher acuity and require additional interventions and medical attention compared to members using CBG alone. While the PMPY pharmacy spend made up a significant proportion of the total PMPY spend differential for members using CGM compared to CBG, members using CGM still had a higher medical spend than members using CBG by $105 PMPY (Figure 4). This may suggest that the use of CGM does not result in cost savings when evaluating a clinically representative group of members who are appropriately prescribed CGM.

LIMITATIONS

- Groups were allocated regardless of baseline disease severity. Given that CGM may be used to help with blood glucose control in patients with elevated HbA1c, this may have led to a higher proportion of patients with uncontrolled diabetes in the CGM group. MassHealth currently requires members who have a diagnosis of diabetes mellitus to be uncontrolled (e.g., HbA1c≥7%, frequent hypoglycemia, history of ED visits or hospitalizations related to ketoacidosis or hypoglycemia) before they can be authorized for CGM. This may have potentially impacted the primary and secondary endpoints, as patients with uncontrolled diabetes may require more medical visits and have higher associated costs at baseline. Therefore, the results may be reflective of the respective patient populations rather than the impact of CGM use.
- The CGM group included members who used CGM and CBG monitoring techniques concomitantly. This was intended to reflect clinical practice, but may have impacted the total cost of care as pharmacy claims for CBG supplies were included in total cost of care calculations.
- Due to the nature of a claims-based analysis (e.g., days supply, frequency of testing), there was an inability to assess the true adherence of members using insulin, CGM, or CBG testing supplies.

CONCLUSIONS

- Members with T2DM who monitor blood glucose levels with CGM had higher associated overall health plan expenditures on a PMPY basis compared to members on CBG alone, as indicated by the difference in total PMPY spend of $1,295.
- Future evaluations should be conducted stratifying baseline disease severity to determine the more precise clinical and financial implications of CGM devices from a health plan perspective.

REFERENCES

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[2] El Sayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, et al. Diabetes Technology: Standards of Care in Diabetes-2023. Diabetes Care. 2023 Jan 1;46(Suppl 1):S111-S127. doi: 10.2337/dc23-S007. PMID: 36507635.

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