Comparison of Glucose Management Indicator Derived From 14 Days Versus 90 Days of Continuous Glucose Monitor Data in a Diverse Pediatric Population with Type 1 Diabetes

BACKGROUND:

- The glucose management indicator (GMI) uses CGM sensor glucose (SG) values to estimate the hemoglobin A1c (HbA1c), the current gold standard for assessing longer-term glycemic control.[1]
- In clinical care, 14 days of CGM data are routinely used for analyzing glycemic management due to the convenience of collecting and interpreting this amount of data, previously shown to possibly be a sufficient representation of glycemic control.[2]
- Discrepancy between GMI and HbA1c is well-known to exist and is common. Consensus in the literature is that ≥0.5% difference is clinically relevant.
- This analysis compared GMI derived from the past 14 days (GMI_{14}) vs. 90 days (GMI_{90}) of CGM data to determine the level of discrepancy between these two metrics.

METHODS

- Inclusion: Youth with type 1 diabetes (T1D) using Dexcom G6 CGM and seen in-person at the Texas Children's Hospital Diabetes Center from 1/1/22 to 11/30/22, with at least 70% wear time for both the 14-day and 90-day periods immediately preceding the visit.
- Clinical and demographic data collected: 14- and 90-day CGM metrics, HbA1c, duration of diabetes, self-reported race/ethnicity (Non-Hispanic White (NHW), Hispanic (H), and Non-Hispanic Black (NHB)), BMI %ile, age, sex, and insurance status.
- The difference in 14 vs. 90-day GMI (ΔGMI) was calculated as $|GMI_{14} - GMI_{90}|$. A difference of ≥0.5% was considered clinically significant.
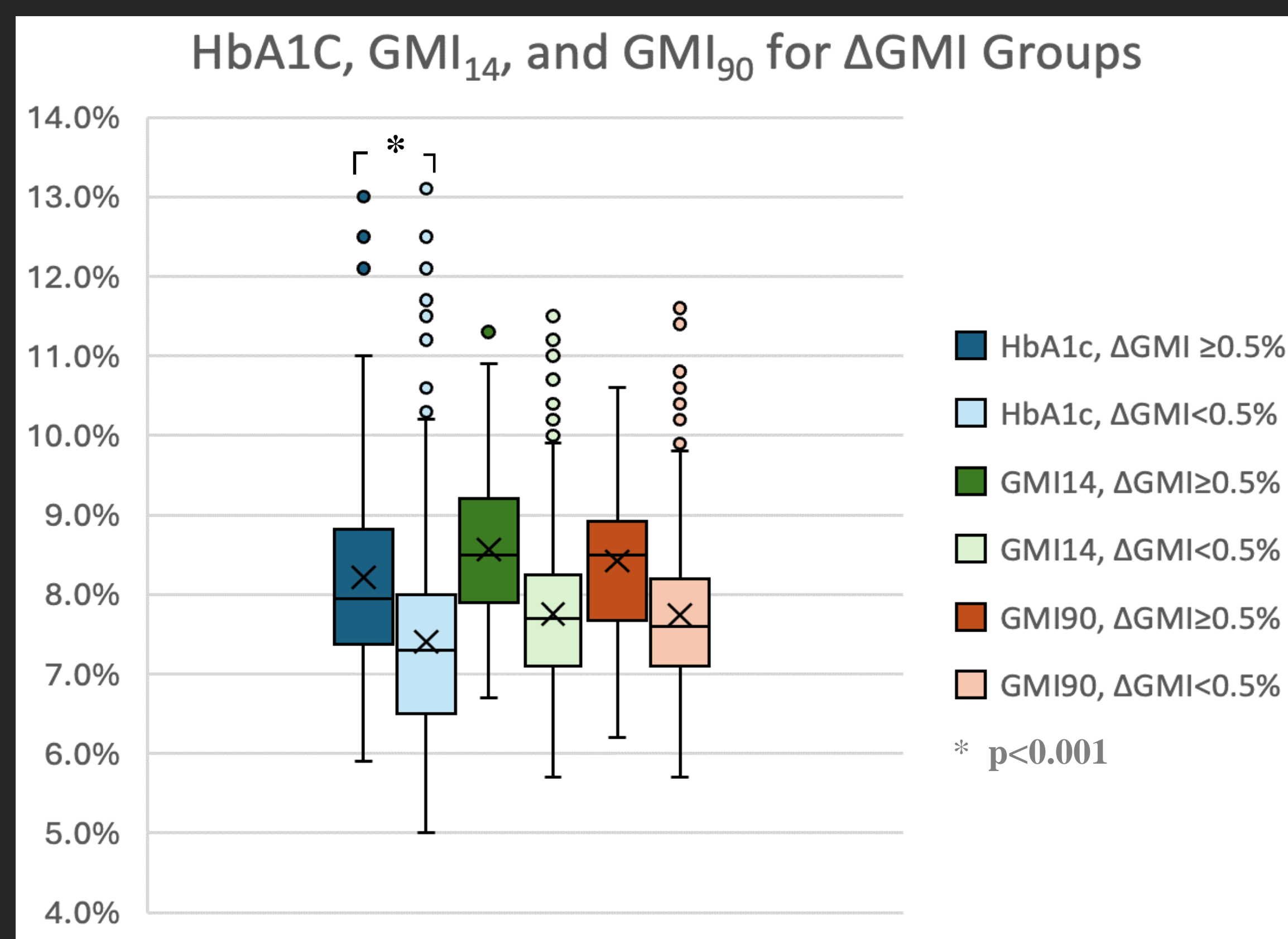- Continuous variables compared using Student's T-test.

RESULTS

- 635 youth met eligibility criteria, 86 (13.5%) had a clinically significant difference between GMI_{14} and GMI_{90}.
- In the same cohort, 55.9% had a clinically significant difference between GMI_{14} and HbA1c.
- Within the differing race/ethnicity groups, H, NHB, and NHW, there was a $|GMI_{14} - GMI_{90}|$ ≥0.5% in 13.9%, 15.6%, and 13.1%, respectively.
- Youth with a clinically significant difference between GMIs had a higher HbA1c (8.2 ± 1.3% vs. 7.4 ± 1.2%, P<0.001) but similar BMI %ile (74 ± 26.1% vs. 69.1 ± 25.6%, P = 0.10) as compared to those without a clinically significant difference.

% Population with GMI₁₄ and GMI₉₀ Discrepancy

■ Total ΔGMI < .5   ■ Total ΔGMI ≥ .5
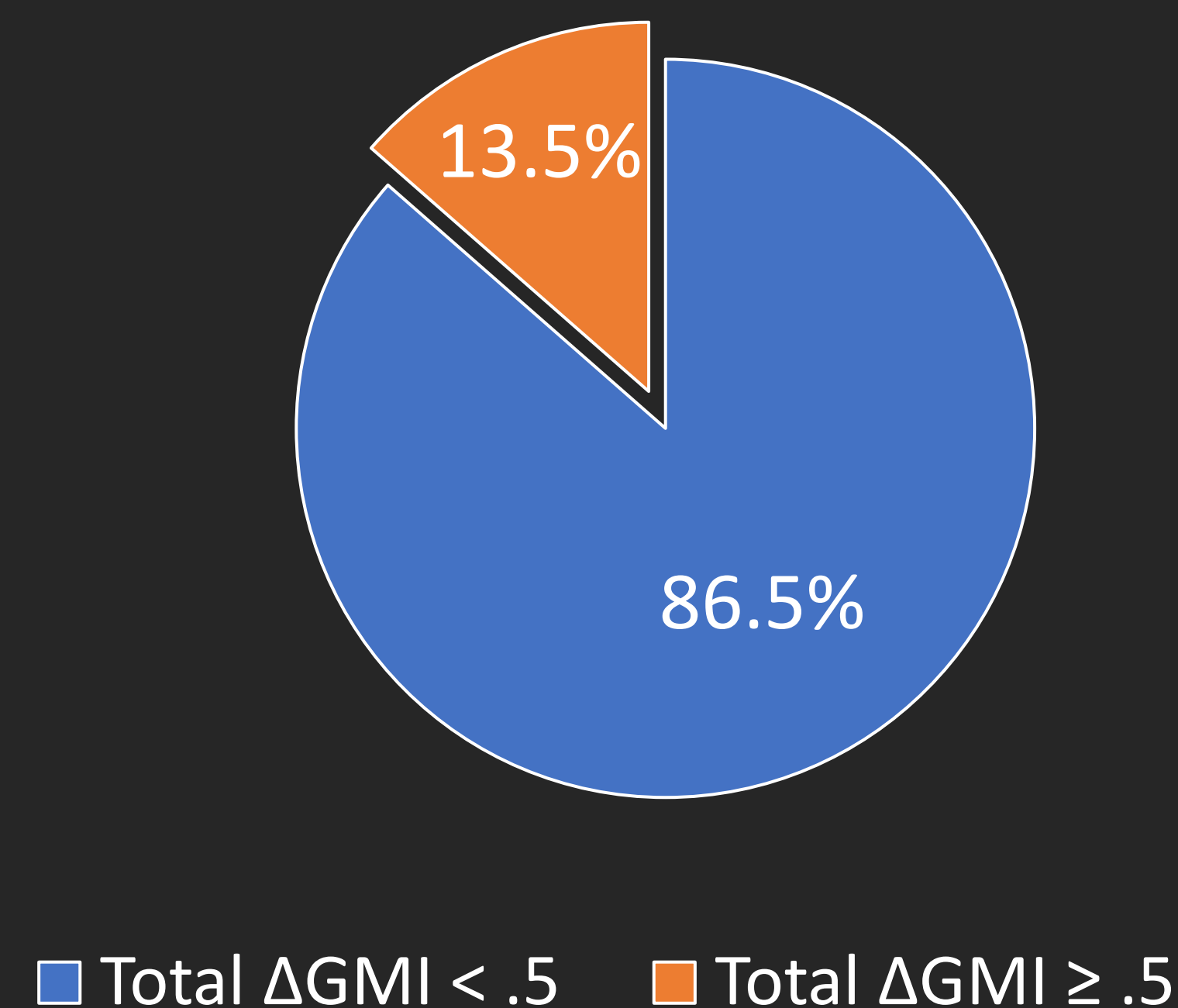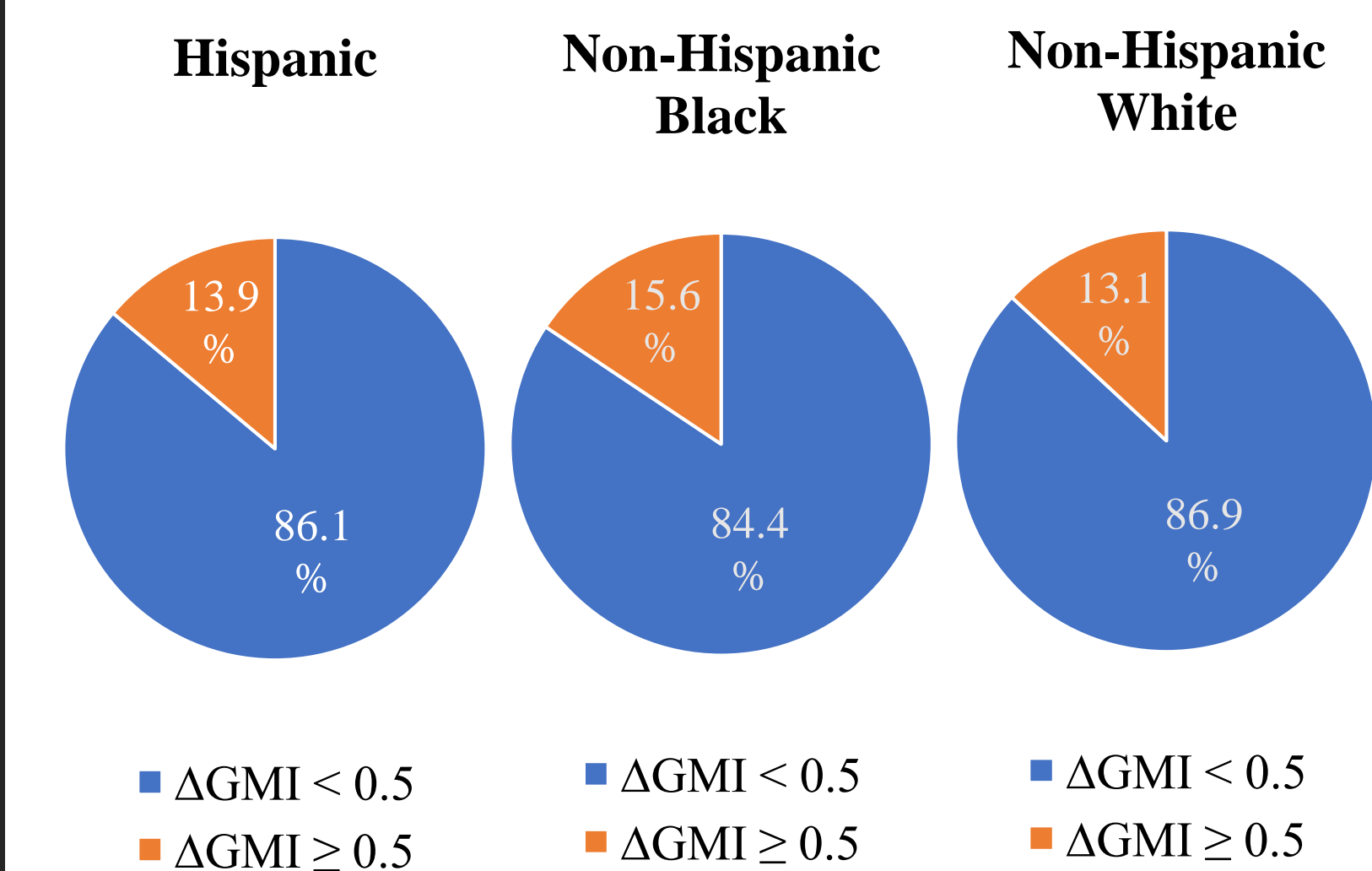
A clinically significant difference (≥0.5%) between 14-day GMI and 90-day GMI was found in 13.5% of youth with T1D. In this same cohort, the prevalence of clinically significant difference between 14-day GMI and HbA1c was 55.9%.

HbA1C, GMI₁₄, and GMI₉₀ for ΔGMI Groups

■ HbA1c, ΔGMI ≥0.5%
■ HbA1c, ΔGMI<0.5%
■ GMI14, ΔGMI≥0.5%
■ GMI14, ΔGMI<0.5%
■ GMI90, ΔGMI≥0.5%
■ GMI90, ΔGMI<0.5%

* p<0.001

Population Variables	$|GMI_{14} - GMI_{90}|$ < 0.5%.	$|GMI_{14} - GMI_{90}|$ ≥0.5%.
N (% Population)	549 (86.5%)	86 (13.5%)
Average BMI (%)	69.1 ± 25.6%	74.0 ± 26.1%
Average HbA1c (%)	7.4 ± 1.2%	8.2 ± 1.3%
% White Hispanic/ Latino	23.7	24.4
% Non-Hispanic Black/ African American	9.8	11.6
% Non-Hispanic White/ Caucasian	66.5	64.0

Table 1: Demographic and clinical characteristics of study population. Continuous variables presented as mean ± SD

Hispanic   **Non-Hispanic Black**   **Non-Hispanic White**

■ ΔGMI < 0.5   ■ ΔGMI < 0.5   ■ ΔGMI < 0.5
■ ΔGMI ≥ 0.5   ■ ΔGMI ≥ 0.5   ■ ΔGMI ≥ 0.5

Figure 1: Proportion of Population with clinically significant GMI discrepancy in different racial/ethnic groups

CONCLUSION

- A difference of ≥0.5% between 14-day and 90-day GMI exists in 13.5% of large, diverse, pediatric cohort. This is much lower than the prevalence of significant difference between GMI_{14} and HbA1c.
- Difference found to be associated with a higher average HbA1c, but not associated with BMI.
- Further study is needed to characterize the impact of race/ethnicity on GMI discrepancies as well as assess how to interpret GMI_{14}, GMI_{90}, and HbA1c in clinical settings where such a discrepancy exists.

REFERENCES

1. Bergenstal RM, Beck RW, Close KL, et al. Glucose Management Indicator (GMI): A New Term for Estimating A1C From Continuous Glucose Monitoring. Diabetes Care. 2018;41(11):2275-2280.
2. Riddlesworth TD, Beck RW, Gal RL, et al. Optimal Sampling Duration for Continuous Glucose Monitoring to Determine Long-Term Glycemic Control. Diabetes Technol Ther. 2018;20(4):314-316.

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