Glycemic Control in Relation to Technology Use in a Single-Center Cohort of Children with Type 1 Diabetes

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Background: Technology for patients with type 1 diabetes (T1D), including continuous glucose monitoring (CGM), insulin pumps, and hybrid closed-loop (HCL) systems, is improving, being used more commonly in the pediatric population, and impacts glycemic control.

Materials and Methods: We evaluated the use of these technologies and their impact on glycemic control among patients with T1D who were seen at the Barbara Davis Center (n = 4003) between January 2018 and December 2020, <22 years old, with diabetes duration >3 months. Data were analyzed by age group and technology-use group defined as multiple daily injection with blood glucose meter (MDI/BGM), pump with BGM (pump/BGM), MDI with CGM (MDI/CGM), and pump with CGM (pump/CGM). Glycemic control was compared using analysis of covariance (ANCOVA) and controlling for diabetes duration, race, and insurance.

Results: Among 4003 patients, 20% used MDI/BGM (mean hemoglobin A1c [HbA1c] = 10.0%); 14.4% used pump/BGM (mean HbA1c = 10.0%); 15.4% used MDI/CGM (mean HbA1c = 8.6%); and 49.8% used pump/CGM (mean HbA1c = 8.1%). Compared with MDI/BGM patients, MDI/CGM and pump/CGM users had a lower HbA1c and were more likely to reach an HbA1c <7.0% (all $P < 0.0001$). Among pump/CGM users, 35% used HCL technology (mean HbA1c = 7.6%) and had a lower HbA1c and were more likely to reach an HbA1c <7% than non-HCL users ($P < 0.001$).

Conclusions: CGM use was associated with a lower HbA1c in both MDI and pump users. Pump use was only associated with a lower HbA1c if used with CGM. HCL was associated with the lowest HbA1c. Spanish language and minority race/ethnicity were associated with lower rates of pump and CGM use, highlighting the need to reduce disparities.