Continuous glucose monitor (CGM) use with or without insulin pump use is associated with lower A1c in pediatric patients with type 1 diabetes (T1D)

Marisa Sobczak, MD, MPH; G. Todd Alonso, MD; Gregory P. Forlenza, MD

1. University of Colorado School of Medicine. University of Colorado Anschutz Medical Campus, Aurora, CO 2. Department of Pediatrics. University of Colorado Anschutz Medical Campus, Aurora, CO 3. Barbara Davis Center. University of Colorado Anschutz Medical Campus, Aurora, CO

BACKGROUND

• The recommended A1c goal is <7%. Fewer than 1 in 5 pediatric patients achieve this.
• Prolonged hyperglycemia leads to long-term microvascular and macrovascular complications.
• Continuous glucose monitoring (CGM), insulin pumps, and hybrid closed loop (HCL) systems are improving, being used more commonly in the pediatric population, and impact glycemic control.
• Few analyses have evaluated glycemic trends in US children following widespread rollout of these new technologies:
  • 2016: FDA approval of non-adjunctive use of Dexcom’s G5 CGM
  • 2017: First hybrid closed loop system approved (Medtronic 670G)
  • 2018: FDA approval of factory calibrated CGMs
  • 2020: Second closed loop system approved (Tandem Control-IQ)

OBJECTIVES

• To evaluate the use of pump, CGM, and HCL technology and their impact on glycemic control among pediatric patients with T1D.

METHODS

• Retrospective analysis of 4,003 patients from the Barbara Davis Center at the University of Colorado.
• Inclusion Criteria:
  • T1D
  • <22 years old
  • diabetes duration >3 months
  • available A1c, pump usage, and CGM data
  • A1c compared with ANCOVA (corrected for diabetes duration, race, and insurance)
  • P values corrected by the Bonferroni method

DATA & RESULTS

RESULTS - Mean A1c

- Pump/CGM group had lowest A1c in each age category.
- Patients without CGM: Pump/CGM users had similar A1c to MDI/BGM users across all age groups.
- Single tech users: MDI/CGM users had significantly lower A1c than pump/CGM users across all age groups.
- Pump/CGM users had a significantly lower A1c than MDI/CGM users across all age groups.

RESULTS - A1c by diabetes technology use and age group

RESULTS - A1c by hybrid closed loop (HCL) use among pump and CGM combined users

RESULTS - Among Pump/CGM patients:

• HCL users had significantly lower A1c compared to those without HCL (7.6 vs 8.3, p=0.001).

DISCUSSION

• One of the first large, real-world US cohorts of pediatric patients with T1D evaluating A1c trends in the current technology era.
• Disparities in technology use exist across insurance, race/ethnicity, and language.
• HCL users had A1c 0.7% lower than Pump/CGM without HCL.
• 10% more HCL users achieved A1c of <7% = a 54% relative increase.
• Differences in the small group of patients < 6 years of age (n=105) were not statistically significant, but the trend and magnitude were similar to the other groups.
• Greatest difference in A1c with addition of HCL to pump and CGM use was in patients 18 - < 22 years of age, where use of HCL more than doubled the likelihood of achieving A1c <7%.

CONCLUSIONS

• ~1/2 of patients are using both pump and CGM. Combined pump and CGM use is associated with the lowest A1c.
• CGM is associated with a lower A1c regardless of pump use.
• Pump use is only associated with lower A1c when used with a CGM.
• HCL users had 0.7% lower A1c than Pump/CGM users without HCL.

REFERENCES:


DISCLOSURES: Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.

Supported by the University of Colorado Diabetes Research Center Clinical Resources Core NHI. NEDK grant PI2-DK115073 and the National Institute of Diabetes and Digestive and Kidney Diseases, NIDDK grant STC/DXH05601-17.