

# **Clear predictors of changing insulin requirements and A1C in youth with type 1 diabetes**

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Lori Laffel, M.D., MPH, Chief of the Pediatric, Adolescent and Young Adult Section and the Section on Clinical, Behavioral and Outcomes Research at Joslin Diabetes Center, and Professor of Pediatrics at Harvard Medical School. Credit: John Soares

Managing type 1 diabetes during the first two decades of life is challenging. Insulin requirements change along with the stages of life — childhood, puberty, young adulthood, and beyond. But a 20-year longitudinal study conducted by researchers from Joslin Diabetes Center and Harvard Medical School identifies clear predictors of rising A1C levels in young persons, as well as ways to improve glycemic control in this population. The study has been published online by *Diabetic Medicine*.

Poor [glycemic control](#) and deteriorating A1C levels are common in children and adolescents with type 1 [diabetes](#), says study senior author Lori Laffel, MD, MPH, Chief of the Pediatric, Adolescent and Young Adult Section and the Section on Clinical, Behavioral and Outcomes Research at Joslin Diabetes Center. "Fewer than one in five children and adolescents with type 1 diabetes achieves target A1C levels."

For this study, researchers evaluated two trajectories — insulin doses and A1C levels — over time in 635 young persons (ages 7 to 24) with type 1 diabetes. Insulin dose data and A1C data were collected over a 20-year period. Researchers assessed insulin dose and glycemic control by sex, insulin regimen (pump versus injection therapy), and weight status (normal versus overweight/obese). The clinical factors associated with glycemic changes over time were also identified.

Researchers discovered that during late adolescence and young adulthood (ages 16 to 24), A1C levels were higher in females than males. Additionally, insulin doses were higher in females than in males at younger ages, between ages 8 and 13, but doses were higher in males than females between ages 16 and 21.

"We need to attend to the glycemic deterioration that emerges in the second half of the teen years and early 20s, especially among female patients," says Dr. Laffel. "The study confirms the notion that we may need to give more insulin to females during the periods when A1C levels are rising, or address other aspects of diabetes care, such as diet and exercise in efforts to improve A1C levels."

The study also showed that insulin pump users compared with injection treated patients required lower insulin doses and had lower A1C levels over time. "Insulin delivered by a pump may control glycemia in a more effective manner, with a lower insulin dose. Alternatively, persons using an insulin pump may find it easier to attend to their diabetes self-care in a timely manner, leading to better glycemic control with lower insulin doses," says Dr. Laffel.

Finally, there was no difference in A1C levels between overweight/obese and normal weight patients. However, overweight and obese youth were taking higher insulin doses between ages 8 and 13. "These findings suggest that the insulin resistance, which generally occurs in association with pubertal growth and development, may develop at younger ages when youth are overweight or obesity. Clinicians can be more proactive in adjusting insulin doses in order to prevent A1C deterioration for these youth," says Dr. Laffel.

Unique to this study is the rigorously collected data in large number of patients, which allowed researchers to look at these trajectories across many developmental stages. This new research highlights how clinicians

can optimize glycemic control across childhood, adolescence, and young adulthood.

"We want to use these research observations along with currently available advanced diabetes technologies to improve glucose control and optimize health outcomes for our young patients," says Dr. Laffel. "The results of this study give further evidence of the need to be more aggressive in increasing [insulin](#) doses in a timely manner to combat that rise in A1C levels seen during childhood and adolescence."

**More information:** Predictors of Changing Insulin Dose Requirements and Glycemic Control in Children, Adolescents, and Young Adults with Type 1 Diabetes. *Diabetic Medicine*. June 5, 2018 [online]

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