

Type 1 diabetes care and technology in Pediatrics

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For review

- Type 1 diabetes mellitus is an autoimmune disease with an unknown cause, and currently no cure
- The only treatment for Type 1 diabetes is insulin, either via injections or infusion via an insulin pump
- The only way to determine if insulin has been dosed correctly is via monitoring blood sugar on a regular basis (> 4 times/day)
- As average blood glucose increases, complications arise
- Severe complications can arise from either hypo- (too low) or hyperglycemia (elevated blood sugar)

For review

- From census.gov, there are approximately 958,000 persons < 18 years of age in Oklahoma as of July 1, 2018
- Prevalence of Type 1 diabetes is roughly 1/300
- By my estimate, at least 3,200 Oklahoma children with Type 1 diabetes
- The American Diabetes Association (ADA) updates their Standards of Care yearly, from evidence-based medicine, on all aspects of treatment (insulins, devices, monitoring, therapies, etc.)
- Devices discussed today are not specific endorsements

2019 ADA Standards of Care

Recommendation

13.1 Youth with type 1 diabetes and parents/caregivers (for patients aged <18 years) should receive culturally sensitive and developmentally appropriate individualized diabetes self-management education and support according to national standards at diagnosis and routinely thereafter. **B**

Recommendations

13.2 Individualized medical nutrition therapy is recommended for children and adolescents with type 1 diabetes as an essential component of the overall treatment plan. **A**

13.7 Patients should be educated on strategies to prevent hypoglycemia during exercise, after exercise, and overnight following exercise, which may include reducing prandial insulin dosing for the meal/snack preceding (and, if needed, following) exercise, increasing carbohydrate intake, eating bedtime snacks, using continuous glucose monitoring, and/or reducing basal insulin doses. **C**

13.8 Frequent glucose monitoring before, during, and after exercise, with or without use of continuous glucose monitoring, is important to prevent, detect, and treat hypoglycemia and hyperglycemia with exercise. **C**

2019 ADA Standards of Care

Recommendations

- 13.9** At diagnosis and during routine follow-up care, assess psychosocial issues and family stresses that could impact diabetes management and provide appropriate referrals to trained mental health professionals, preferably experienced in childhood diabetes. **E**
- 13.10** Mental health professionals should be considered integral members of the pediatric diabetes multidisciplinary team. **E**

Recommendations

- 13.17** The majority of children and adolescents with type 1 diabetes should be treated with intensive insulin regimens, either via multiple daily injections or continuous subcutaneous insulin infusion. **A**
- 13.18** All children and adolescents with type 1 diabetes should self-monitor glucose levels multiple times daily (up to 6–10 times/day), including premeal, prebedtime, and as needed for safety in specific situations such as exercise, driving, or the presence of symptoms of hypoglycemia. **B**

13.19 Continuous glucose monitoring should be considered in all children and adolescents with type 1 diabetes, whether using injections or continuous subcutaneous insulin infusion, as an additional tool to help improve glucose control. Benefits of continuous glucose monitoring correlate with adherence to ongoing use of the device. **B**

13.20 Automated insulin delivery systems appear to improve glycemic control and reduce hypoglycemia in children and

should be considered in children with type 1 diabetes. **B**

13.21 An A1C target of <7.5% (58 mmol/mol) should be considered in children and adolescents with type 1 diabetes but should be individualized based on the needs and situation of the patient and family. **E**

Insulin pumps

- Can assist with achieving targeted glycemic control regardless of age
- Reduces chronic complications



Personal CGM: Non-Adjunctive Approval

- 10-day wear
- Remote monitoring
- 14-day wear
- Lower cost
- No alarms without sensor scan*
- Remote monitoring
 - ❖ Dependent on user



Artificial Pancreas Systems (APS) Available

- ❑ **Predictive Low Suspend**
 - ❖ Using Dexcom G6 sensors



- ❑ **Hybrid Closed Loop**
or manual mode with suspend on low or suspend before low
 - ❖ Using Medtronic Guardian 3 sensors

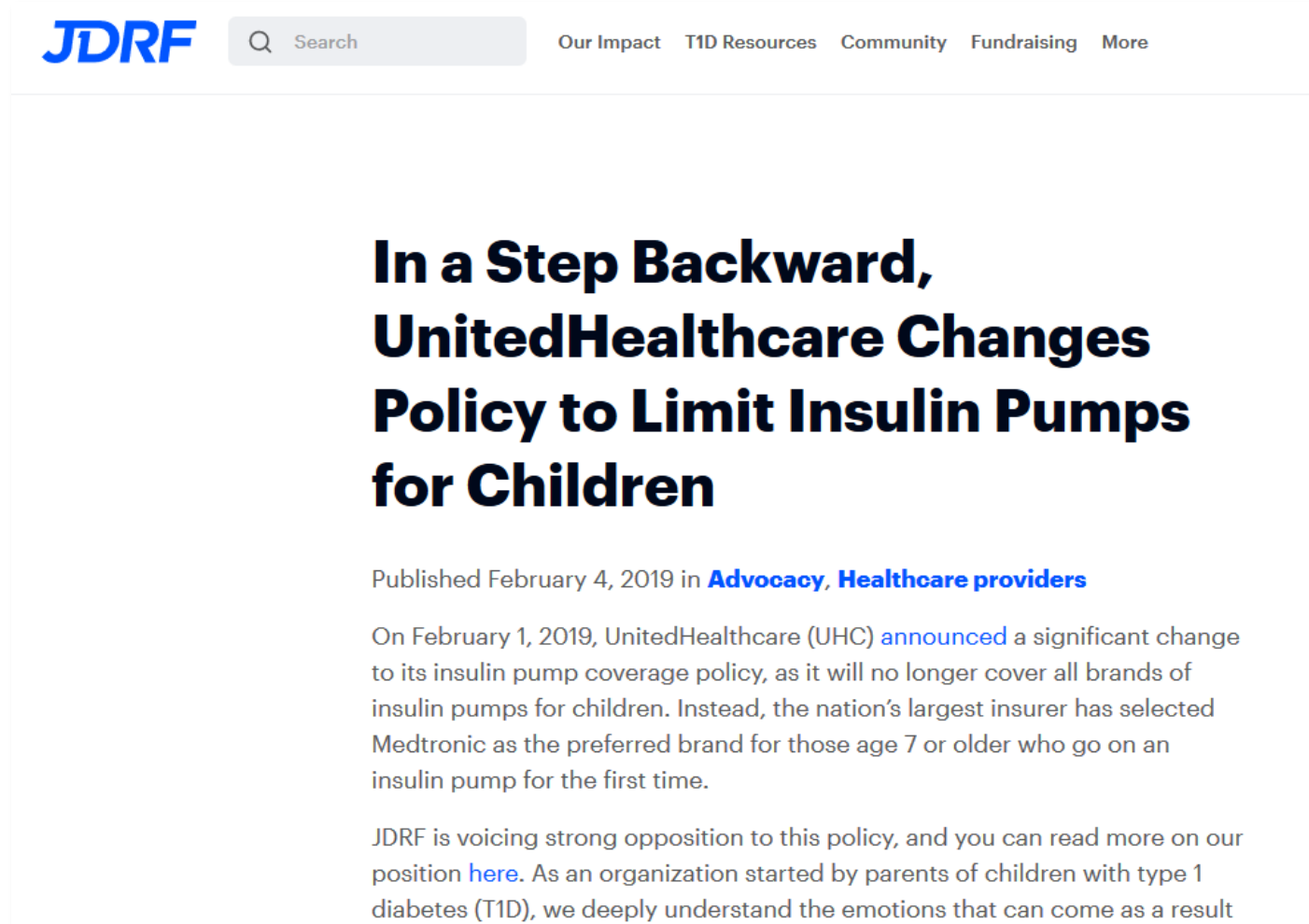


- ❑ **Other pump systems have recently been approved as well**

From the clinic

- **Routine blocks to care:**
 - **Lack of access to appropriate treatment options**
 - **Insulins**
 - **Psychological counseling**
 - **Ketone monitoring**
 - **Pumps and their accessories**
 - **Continuous Glucose Monitors**
- **Forced changes to care are out of physicians', patients', and family control**

Just one example of our concern



The image shows a screenshot of a JDRF blog post. At the top left is the JDRF logo. To its right is a search bar with a magnifying glass icon and the word 'Search'. Further right are navigation links: 'Our Impact', 'T1D Resources', 'Community', 'Fundraising', and 'More'. The main content area features a large, bold title: 'In a Step Backward, UnitedHealthcare Changes Policy to Limit Insulin Pumps for Children'. Below the title, it says 'Published February 4, 2019 in [Advocacy](#), [Healthcare providers](#)'. The first paragraph reads: 'On February 1, 2019, UnitedHealthcare (UHC) [announced](#) a significant change to its insulin pump coverage policy, as it will no longer cover all brands of insulin pumps for children. Instead, the nation's largest insurer has selected Medtronic as the preferred brand for those age 7 or older who go on an insulin pump for the first time.' The second paragraph reads: 'JDRF is voicing strong opposition to this policy, and you can read more on our position [here](#). As an organization started by parents of children with type 1 diabetes (T1D), we deeply understand the emotions that can come as a result'.

T1D Exchange Clinic Registry

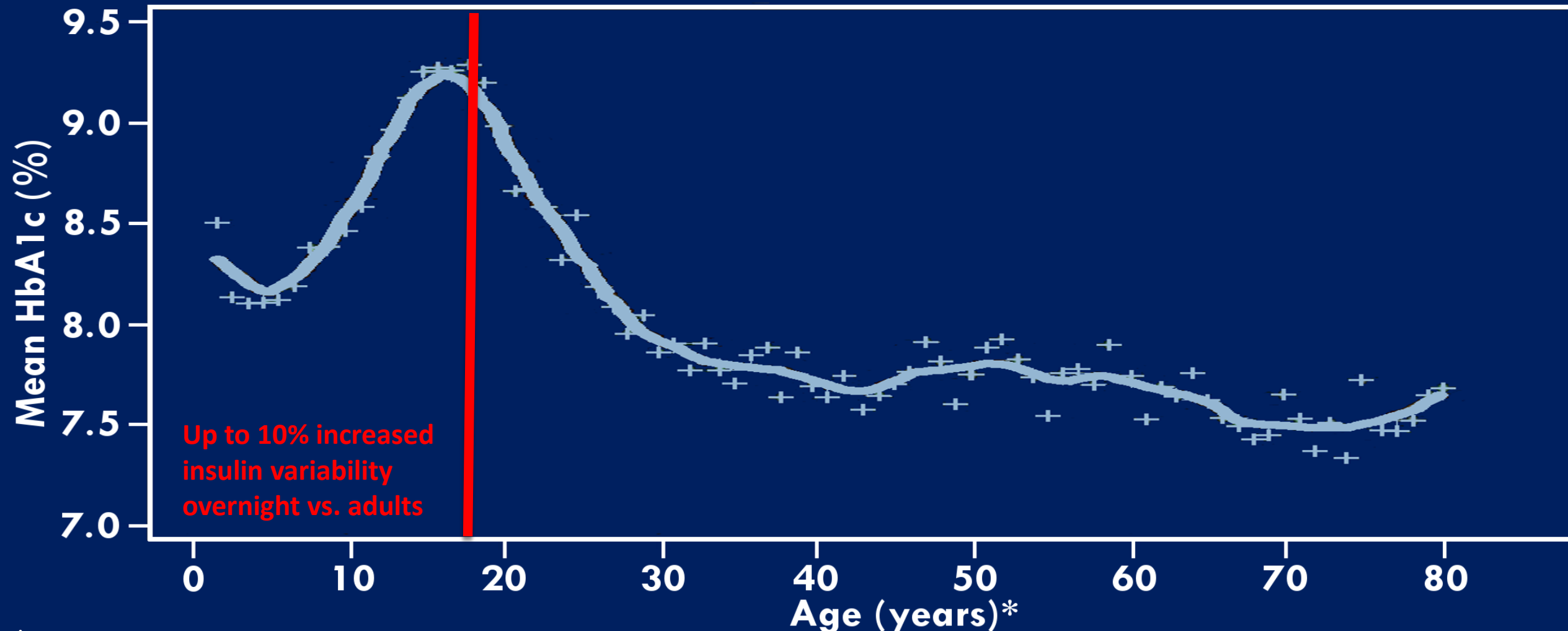
A Snapshot of Type 1 Diabetes
in the United States

A Helmsley Charitable Trust Initiative

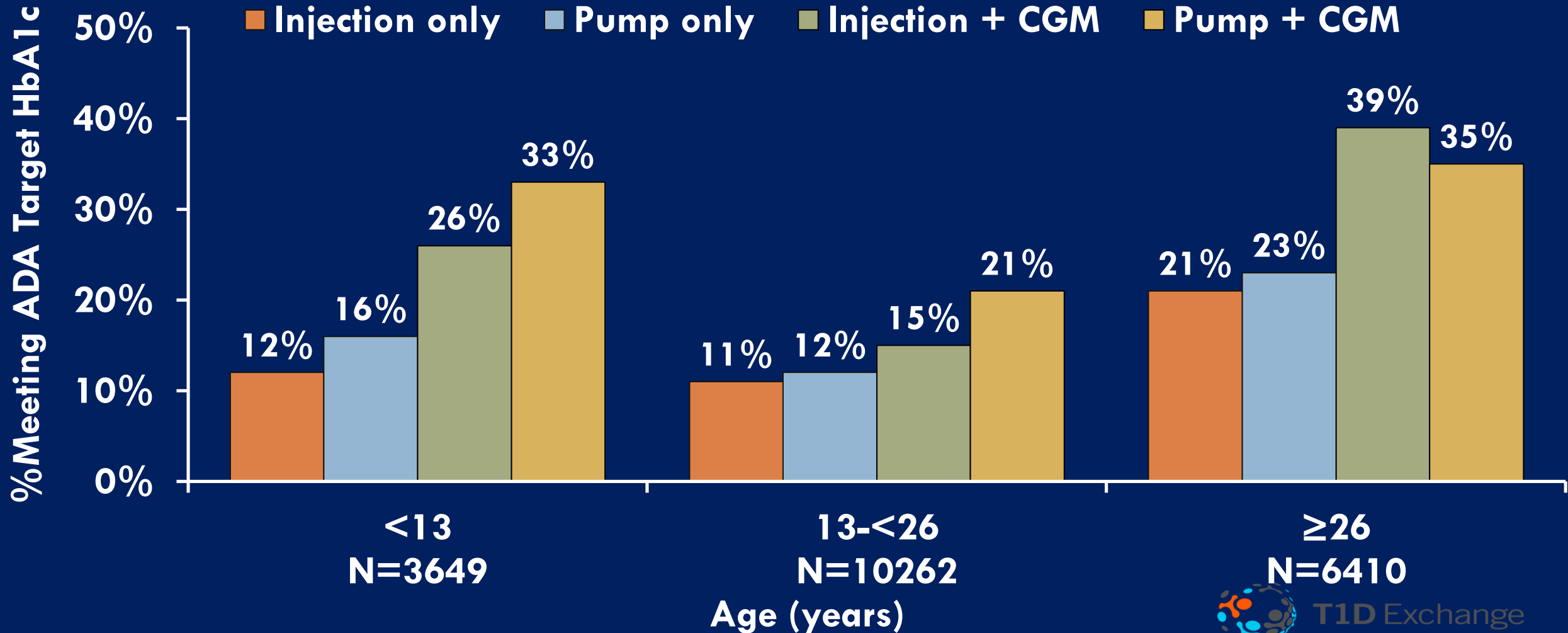


T1D Exchange

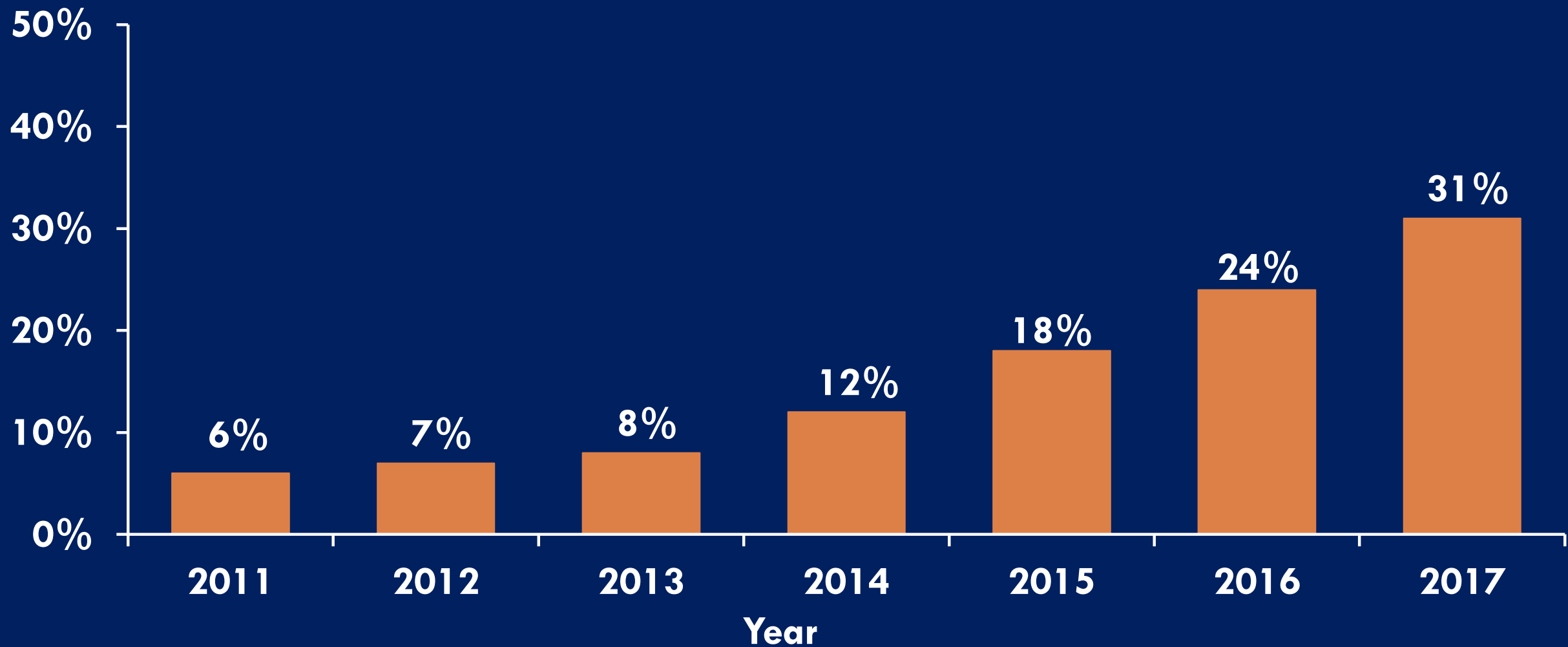
Average Current HbA1c by Age (1/1/16 – 3/31/18, n=22,697)



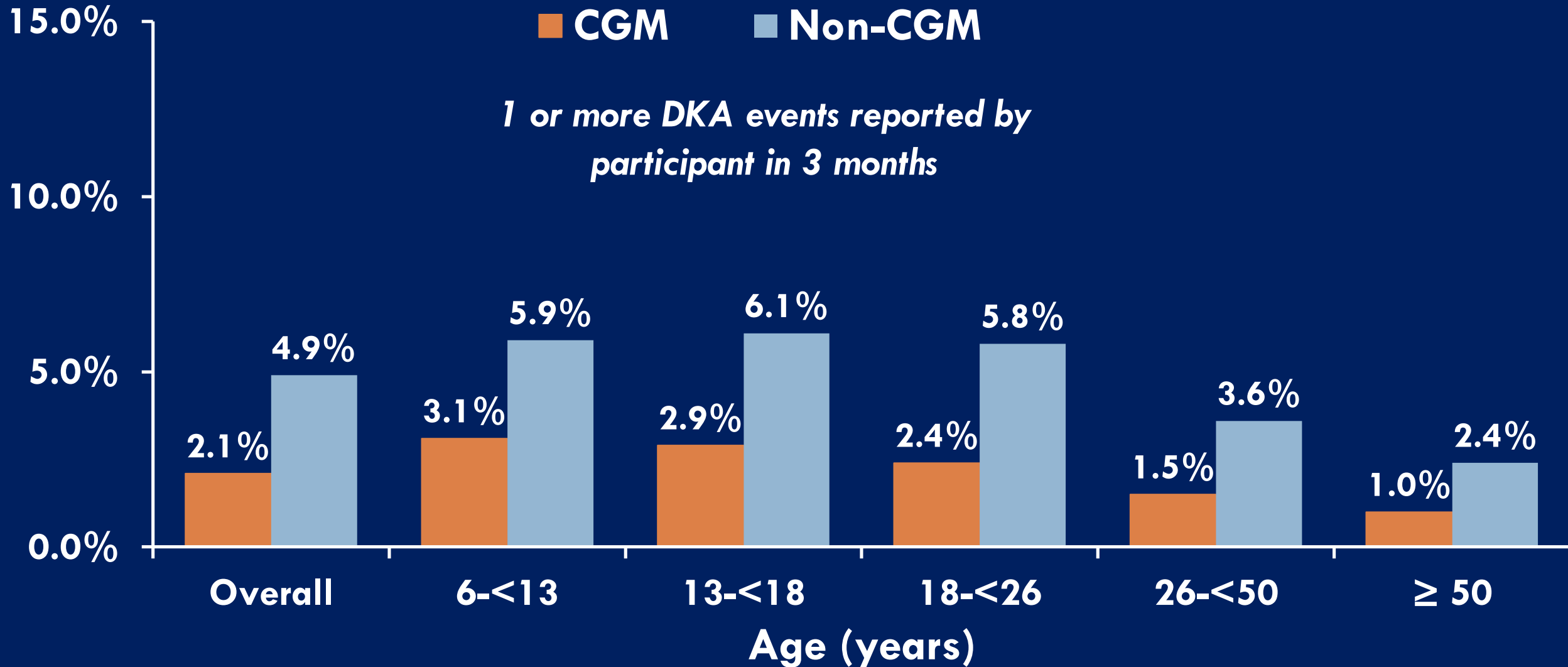
% Meeting HbA1c ADA Target by CGM Status and Insulin Delivery Method



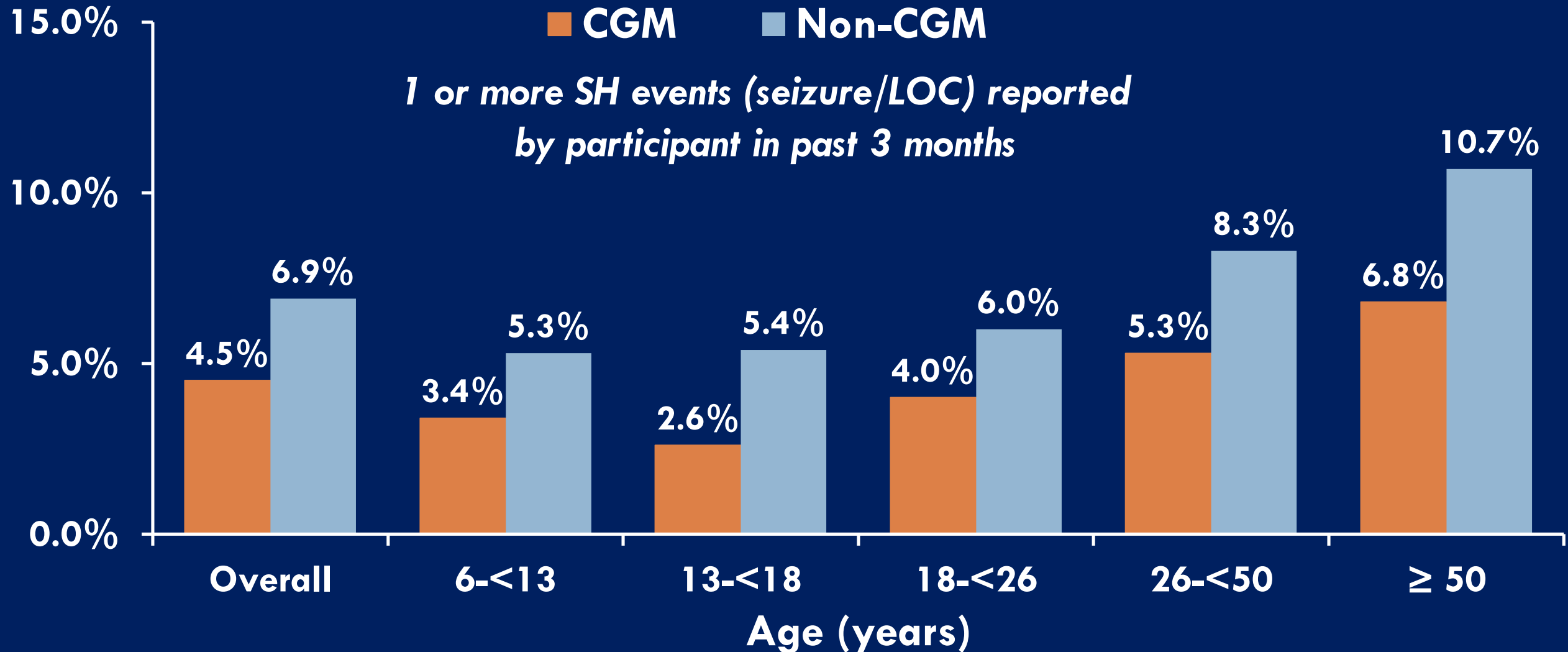
CGM Use by Year, nationwide



Occurrence of DKA by CGM Use Status



Occurrence of Severe Hypoglycemia by CGM Use Status



My conclusions

- **CGM's and pumps improve the lives of children with diabetes**
- **Children should not be limited in their access to care**
- **Life changes should not result in treatment changes**
- **Individualized care should be determined ultimately by the patient, their family, and their treatment team, based on the best evidence available**