

Type 1 Diabetes: Where Does the Family Doc Fit in?

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Dr. Beben earned undergraduate degrees in molecular biology and Spanish language and literature at Tulane University, New Orleans, Louisiana. She earned her medical degree at the University of Connecticut School of Medicine, Farmington, and completed a family medicine residency at the AnMed Health Family Medicine Residency Program in Anderson, South Carolina. After graduation, she fulfilled her National Health Service Corps (NHSC) obligation in rural El Dorado Springs, Missouri, practicing full-spectrum family medicine. She and her family returned to South Carolina, where she practiced for seven years and became an instructor of family medicine for the AnMed program. Recently, Dr. Beben joined the Oconee Family Medicine Residency Program to serve as associate program director.

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Learning Objectives

1. Differentiate T1D from other causes of diabetes based upon the clinical presentation of the patient and laboratory studies
2. Evaluate current T1D therapeutics and emerging advances for efficacy, safety, adherence, and cost.
3. Develop collaborative care plans that foster therapeutic and dietary adherence, glucose monitoring, and clear physician-patient communication.
4. Establish care transition plans for adolescent patients as they approach young adulthood.

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Audience Engagement System



FMX

Case Presentation

- It's February and EB is a 6 yo male who presents to your office for increased urination.
- His mother reports he started bringing a water bottle to school and he's been getting up a few times at night to urinate for the past couple weeks.
- His POC glucose is HI and his A1C is 10.4%



Poll Question #1

Which of the following is a risk factor for EB to have developed Type 1 diabetes?

- A. Born at 36 weeks
- B. Birth weight was AGA
- C. Family history of Type 2 diabetes
- D. Recent birthday party at all-you-can-eat pizza place

Pathogenesis

Genetic Predisposition

- GAD65
- IA-2
- Anti-insulin
- ZnT8

Environmental factors

- Viral infection
- Immunizations
- LGA
- Prematurity

[Lönnrot M, Lynch KF, Elding Larsson H, et al. Respiratory infections are temporally associated with initiation of type 1 diabetes autoimmunity: the TEDDY study. Diabetologia 2017; 60:1931.](#)

Presentation

Classic Ps:

- Polyuria
- Polydipsia
- Polyphagia

Ketoacidosis

Positive screening test



Evaluation

- Fasting glu \geq 126 mg/dL (7 mmol/L) on more than one occasion
- Random glu \geq 200 mg/dL (11.1 mmol/L) with sx's of hyperglycemia
- A1C \geq 6.5 percent
- Glu \geq 200 mg/dL (11.1 mmol/L) measured two hours after a glucose load of 1.75 g/kg (maximum dose of 75 g) in an oral glucose tolerance test (OGTT)

[American Diabetes Association. 2. Classification and Diagnosis of Diabetes. Diabetes Care 2017; 40:S11.](#)

Type 1 or Type 2?

Characteristic	Type 1	Type 2
Body Habitus	Recent weight loss	Higher incidence of obesity
Age	Childhood	After puberty
Insulin resistance	No	Yes
Family history	Possible	Common
Autoantibodies	Yes	No
Ketosis	Common	Rare (5-10%)
Clinical presentation	Rapid	Insidious

The Zebras

- Exocrinopathies: CF, chronic pancreatitis, hemochromatosis
- Drug-induced: glucocorticoids, cyclosporine, tacrolimus
- Other endocrinopathies: Cushing's disease, glucagon-secreting tumors, pheochromocytoma
- Monogenic diabetes (aka MODY)
- Neonatal diabetes

Poll Question #2

EB's three siblings have been tested for the autoantibodies and two have tested positive. What is their lifetime risk of developing symptomatic Type 1 diabetes?

- A. 6-10%
- B. 20-30%
- C. 50%
- D. 75-80%
- E. 100%

Stages of Type 1

Stage	Antibodies	Glucose testing	Symptoms
Stage 1	2+ positive	Normal	None
Stage 2	2+ positive	Abnormal	None
Stage 3	2+ positive	Abnormal	Present

[Ziegler AG, Rewers M, Simell O, et al. Seroconversion to multiple islet autoantibodies and risk of progression to diabetes in children. JAMA 2013;309:2473–2479](#)

[Couper JJ, Haller MJ, Greenbaum CJ, et al. ISPAD Clinical Practice Consensus Guidelines 2018: Stages of type 1 diabetes in children and adolescents. Pediatr Diabetes 2018; 19 Suppl 27:20.](#)

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Poll Question #3

What is the target A1C for EB at the time of diagnosis (6 years old)?

- A. 6.5%
- B. 7.0%
- C. 7.5%
- D. 8.0%
- E. No goal

Therapeutics

- Goal A1C is < 7.5% in all age groups
- Mainstay of therapy
 - Insulin
 - Insulin
 - Insulin
- Injection vs pump



Emerging Advances

- Insulin-sparing medications
 - Safety and efficacy not established yet
- Medications to prevent or reverse beta-cell decay
 - In active clinical trials
- Closed-loop insulin pumps
 - Hybrid closed-loop is approved and on the market
- Other routes of insulin administration
 - Afrezza—inhaled insulin, one puff = 4 units, must be used with long-acting insulin in T1D

Monitoring

- Glycemic control is only as successful as the level of monitoring of blood sugar
 - Finger sticks
 - Continuous glucose monitors
 - (Therapy dogs)
- Ketone measurement
 - Urine
 - Blood



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Poll Question #4

As EB enters third grade (8 years old) he tells his parents he wants to start checking his blood sugar in the classroom rather than go to the nurse's office before lunch. Which of the following do you need to consider before advocating on his behalf?

- A. His current height and weight
- B. His cognitive ability
- C. His lunchtime insulin:carb ratio
- D. When recess takes place

Treatment Plans

Trickier in kids for several reasons:

- Size
- Unpredictable diet
- Unpredictable activity
- Inability to communicate symptoms
- Cognitive ability
- Emotional maturity

The Care Team

- Endocrinologist
- Nurse educator
- Dietician
- Mental health counselor
- Family doctor
- School nurse



The Challenges

- Surviving mode vs thriving mode
- Balancing glycemic control with risk of hypoglycemia
- Establishing goals that the patient and family can achieve
- Don't ignore parents and siblings
- Advocate for the child at school/daycare
- Maintaining normal growth, development and emotional maturity
- Emotional/mental health
- Not letting routine primary care lapse

Poll Question #5

Which of the following is a benefit to providing team-based care to children with Type 1 diabetes?

- A. Reduced number of hospitalizations
- B. Reduced number of ED visit
- C. Improved adherence to the treatment plan
- D. Improved glycemic control
- E. All of the above

The Benefits

- Reduces number of ED visits
- Reduces number of hospitalizations
- Improves adherence to the management plan
- Improves glycemic control

[Beck JK, Logan KJ, Hamm RM, et al. Reimbursement for pediatric diabetes intensive case management: a model for chronic diseases? Pediatrics 2004; 113:e47.](#)

[Ellis DA, Frey MA, Naar-King S, et al. Use of multisystemic therapy to improve regimen adherence among adolescents with type 1 diabetes in chronic poor metabolic control: a randomized controlled trial. Diabetes Care 2005; 28:1604.](#)

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Transition Plan

- Allow more independence at managing disease
- Learn from mistakes in a supportive environment
- Social risk assessment: driving, alcohol, tobacco, contraception, eating disorders, depression/anxiety
- Know what post-high school plans are
- Insurance coverage issues
- Prepare for adult endocrinologist

[de Beaufort C, Jarosz-Chobot P, Frank M, et al. Transition from pediatric to adult diabetes care: smooth or slippery? *Pediatr Diabetes* 2010; 11:24.](#)

Practice Recommendations

- Develop an algorithm to correctly identify children at risk for developing diabetes as well as how to correctly diagnose Type 1 diabetes
- Gain familiarity with updates in treatment targets and therapeutics for kids with Type 1 diabetes
- Identify team members to help children and adolescents with Type 1 diabetes transition to age-appropriate independence



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Questions



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- [Mayer-Davis EJ, Kahkoska AR, Jefferies C, et al. ISPAD Clinical Practice Consensus Guidelines 2018: Definition, epidemiology, and classification of diabetes in children and adolescents. Pediatr Diabetes 2018; 19 Suppl 27:7.](#)