1. Early T1D identification, disease monitoring, transition to intensive therapy

1. Executive Summary (Implementation-Focused)
This case describes early identification, monitoring, and treatment for an 8-year-old female who progressed from presymptomatic Stage 2 T1D to clinical Stage 3 T1D over three years. She tested positive for multiple islet AAB during a routine visit through the ASK program. She was made aware of ASK at the endocrinology office where her sister goes for T1D care. Dysglycemia detected on CGM qualified her for an enhanced surveillance pathway that included periodic CGM use, OGTT and HbA1c testing, and anticipatory education.

This case offers practical insights for clinicians and health systems seeking to integrate T1D screening and DMT for presymptomatic patients. Key strategies included proactive CGM surveillance, staged education aligned with disease progression, and flexible insulin initiation, aiming to reduce the risk of DKA and improve family readiness.

2. Clinical and Implementation Context
The Barbara Davis Center Pediatric Clinic (BDC) at the University of Colorado serves over 4,000 children, adolescents, and young adults with T1D in Colorado and surrounding states. A center with robust clinical research infrastructure, this case was identified through ASK, a population-based screening program for islet cell and celiac autoimmunity. Her care was embedded within existing workflows for patients with T1D, including diabetes education from diabetes educators and dietitians, support from social workers, early diabetes technology introduction, and frequent contact with team members as diabetes progressed.

Implementation emphasized feasibility and family-centeredness. Education was staged to match clinical needs. Psychosocial screening prompted ongoing mental health support to normalize grief and uncertainty.

3. Case Description: From Identification to Treatment
At age eight years, she was found to have multiple positive islet AAB and celiac serology through a screening program at a routine clinical visit. Further testing indicated impaired glycemia with HbA1c 5.6% and CGM readings showing mean glucose 114 mg/dL, and 15% of time >140 mg/dL, consistent with Stage 2 T1D. She began structured surveillance with bimonthly CGM wear, OGTT every 6 months, and staged education.

In the two years following identification, CGM metrics remained near-normal. Social work addressed parental anxiety and grief with mindfulness and coping strategies, while nutrition counseling emphasized balanced meals, avoidance of liquid carbohydrates, and progressive carbohydrate counting skills.

During this period, her family called our after-hours service when a gastrointestinal illness led to poor oral intake, glucose ranging from 60-70 mg/dL, and serum beta hydroxybutyrate

reaching 1.0 mmol/L. She was referred to the emergency department and received antiemetic therapy without insulin or intravenous fluids.

Three years following identification, she began having sustained glucose peaks > 200 mg/dL, and OGTT corroborated progression to Stage 3 T1D. HbA1c rose to 6.1%. The team initiated insulin with as-needed rapid-acting insulin doses of 0.5 units for sustained glucose >200 mg/dL, with clear instructions for ketone testing and escalation. CGM use was transitioned from episodic to continuous wear.

Three months after initiating the correction dose regimen, glycemia continued to worsen, and glargine insulin was initiated at 1 unit daily.
HbA1c had risen to 7.3%, CGM mean was 197 mg/dL with 49% time in range 70-180 mg/dL. She and family then attended new onset diabetes education through structured Day 1 and Day 2 classes and began a basal-bolus regimen with glargine insulin 4 units once daily and rapid acting insulin doses at each mealtime (0.5 units per 20 g of carbohydrate; 0.5 units per 75 mg/dL over 150 mg/dL). Two months later, she initiated insulin pump therapy with an automated insulin delivery (AID) system.

4. Outcomes and Follow-Up

This patient avoided DKA throughout her course. Glycemic variability and hyperglycemia increased. With low-dose basal insulin and occasional glucose correction doses, she maintained high time in target range, but HA1c rose above 7% relatively soon after initiating a basal-bolus regimen. She underwent endoscopy and biopsy for evaluation of celiac disease, which was negative. Later, tTG IgA titers were negative, and she remained asymptomatic for celiac disease. Overall, monitoring and staged education enabled a smooth transition to intensive therapy.

5. Implementation Insights and Lessons Learned

Population-based screening for presymptomatic T1D effectively identifies children outside traditional pathways. Early identification enabled CGM-guided surveillance and anticipatory education long before symptomatic presentation.

Care of presymptomatic T1D is easily adaptable to existing workflows, with staged diabetes education, early adoption of diabetes technology, and routine follow-up. Continuity was established with members of the multidisciplinary care team.

The approach taken with this family facilitated family-centered care, identifying and addressing challenges that could potentially complicate her care. We addressed the emotional burden of the impending Stage 3 T1D diagnosis and provided diabetes education to help the family build skills and confidence. Communicating clear thresholds for when to contact the team between visits was vital, as the evolution of hyperglycemia is unpredictable and can be quickly exacerbated by intercurrent illnesses.

Aligning communication between the screening team (research) and the clinical team (disease monitoring and insulin initiation) was an important challenge to address. The slow progression of hyperglycemia led to a family perception that intensive diabetes management initiation could be delayed by several weeks, and the team had to balance the benefits of initiating sooner versus waiting several weeks for both parents to be available for several hours of diabetes education.

Early-stage T1D identification and monitoring can be integrated into routine diabetes practice with minimal redesign. Success depends on interdisciplinary teamwork, standardized protocols, and family-centered adaptability.

6. Key Takeaways for Clinical Implementation

1. Screen to identify T1D early. Identifying T1D prior to development of symptoms dramatically reduces the risk of diabetic ketoacidosis, allows more flexible timing and cadence of diabetes education, and may improve patient outcomes.
2. Proactive monitoring requires standardized touchpoints. CGM is very useful for understanding glucose trends over long periods during normal life activities and may help families identify what behaviors preserve or may worsen hyperglycemia before starting insulin.
3. Standardized workflows are vital. These include the cadence of glucose review and follow up visits, as well as when to offer each necessary educational topic. Families must understand clear guidelines for when to contact the clinic between visits, such as worsening hyperglycemia, ketosis, and symptoms of hyperglycemia.
4. Family centeredness is key. Patients will have variable disease progression, educational needs, and psychosocial barriers.