# Navigating Diagnostic Challenges: A Case of Misdiagnosed Type 1 Diabetes in an Adult with Obesity and the Impact of Healthcare Fragmentation

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## Background

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by **hyperglycemia due to insulin deficiency or resistance**.

Differentiating Type 1 Diabetes Mellitus (T1DM) from Type 2 Diabetes Mellitus (T2DM) is essential for appropriate management, as treatment strategies differ significantly.

While T1DM is typically diagnosed in childhood, late-onset T1DM can mimic T2DM, especially in individuals with obesity. Studies show that up to **40% of adults with T1DM are initially misclassified as T2DM**, leading to delayed treatment, recurrent hospitalizations, and worsened outcomes.

This case highlights the challenges of diagnosing T1DM in an adult with obesity and the impact of healthcare fragmentation on delayed diagnosis and management.

## Purpose

This case aims to:

- Illustrate the diagnostic challenges in differentiating late-onset T1DM from T2DM
- Highlight how healthcare fragmentation and bias can contribute to misdiagnosis
- Emphasize the importance of autoantibody testing in patients with recurrent diabetic ketoacidosis (DKA)

## Case Overview

A **31-year-old** African American male with asthma, eczema, and **obesity (BMI 40)** was **diagnosed with T2DM at age 24** after presenting with polyuria, polydipsia, and fatigue. He was started on metformin but experienced severe side effects and later **developed DKA** with glucose readings in the 500s.

From 2018–2021, he was trialed on multiple non-insulin diabetes medications but continued to have poor glycemic control and was hospitalized twice more for DKA. In late 2021, despite persistent hyperglycemia (HbA1c 13%) and frequent ED visits, **autoantibody testing was delayed due to insurance issues, lab errors, and care transitions**.

In 2023, he tested positive for insulin autoantibodies (25 uU/ml), **confirming Type 1 Diabetes Mellitus**. With insulin monotherapy, his HbA1c improved to 8.5% by May 2022, but follow-up gaps and insulin shortages continued to impact stability.

## Case Timeline

**2017**
- **Age 24**: Diagnosed with **T2DM** at urgent care after polyuria, polydipsia, and fatigue
- Prescribed Metformin, but experiences severe GI side effects and **20 lb weight loss**
- **First DKA hospitalization** (glucose >500 mg/dL)

**2018–2021**
- Trialed on **Sitagliptin, Rybelsus**, and intermittent insulin, with **poor control**
- **Two more DKA hospitalizations** in 2021

**Late 2021**
- **Establishes continuity with PCP**
- **HbA1c 13%**

**Early 2022**
- **Another DKA hospitalization**
- Discharged on **Trulicity**, but develops **pancreatitis**
- PCP **discontinues Trulicity**, starts **insulin monotherapy**, and orders **autoantibody testing**

**May 2022**
- **HbA1c improves to 8.5%** on insulin
- **Autoantibody testing delayed** due to **insurance issues, lab errors, and PCP transition**

**Summer 2023**
- **T1DM confirmed** with **elevated insulin antibodies (25 uU/ml)**

**Current Status**
- **Improved glucose control** with insulin but **intermittent shortages persist**
- Case highlights **diagnostic bias & healthcare fragmentation**

## Discussion

### Challenges in Diagnosing Late-Onset Type 1 Diabetes

**Clinical Overlap with Type 2 Diabetes**
- Late-onset T1DM often mimics T2DM, particularly in overweight and obese individuals, leading to misclassification.
- Studies estimate that up to 40% of adults with T1DM are initially misdiagnosed as T2DM, delaying appropriate treatment and increasing complications.

**Diagnostic Bias & Delayed Testing**
- The patient's obesity (BMI 40) may have led clinicians to assume T2DM instead of considering T1DM.
- The absence of early autoantibody testing prolonged diagnostic uncertainty, leading to inappropriate pharmacologic treatment and multiple hospitalizations.

### Applying the AABBCC Methodology

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### Impact of Healthcare Fragmentation & Continuity of Care Issues

Healthcare fragmentation occurs when patients receive care from multiple providers without coordination, resulting in delays in diagnosis, treatment mismanagement, and unnecessary hospitalizations. In this case, several barriers within the healthcare system contributed to the patient's delayed diagnosis:

**1. Multiple Providers Without Continuity**
- The patient was diagnosed in urgent care but did not establish consistent primary care follow-up until years later.
- Transitions between multiple specialists, emergency departments, and hospitals resulted in critical information gaps regarding his diabetes history.

**2. Delays in Essential Testing & Insurance Barriers**
- Autoantibody testing was delayed for over six years, partly due to insurance authorization issues and provider transitions.
- Each hospitalization for DKA could have triggered early reconsideration of the diagnosis, yet testing was postponed.

**3. Miscommunication Between Healthcare Facilities**
- Lack of interfacility communication resulted in repeated misclassification and redundant treatment approaches.
- Emergency visits focused on acute stabilization, but no steps were taken toward comprehensive diagnostic workups.

**4. Gaps in Medication Management**
- The patient was prescribed multiple oral T2DM agents, each failing to control his blood glucose levels.
- Poor coordination between inpatient and outpatient care contributed to medication discontinuations, lack of follow-up, and persistent hyperglycemia.
- After being correctly diagnosed with T1DM, insulin shortages due to prescription gaps continued to affect his treatment.

**Comparison of Type 1 Diabetes (T1DM), Type 2 Diabetes (T2DM), and Latent Autoimmune Diabetes in Adults (LADA)**

| Feature | T1DM | T2DM | LADA |
|---|---|---|---|
| Age of Onset | Typically **<30**, but can occur at any age | Typically **>40**, but increasing in younger adults | Typically **>35** |
| Autoantibodies | **Present** (GAD65, IA-2, ZNT8, Insulin) | Absent | **Present** (GAD65, IA-2) |
| Insulin Dependence | Required from diagnosis | **Initially managed with oral agents**, may require insulin later | **Initially non-insulin dependent**, but progresses to insulin need |
| Onset Speed | **Rapid onset**, weeks to months | **Gradual onset**, years | **Slow progression**, months to years |
| Obesity Association | Not typically associated | Strong association with obesity | Possible association |
| High risk | High risk | Low risk initially | Moderate risk |
| Initial Treatment Approach | Insulin therapy required from onset | Lifestyle modifications, oral agents first | Oral agents initially, but insulin needed over time |

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