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Eating Disorders and Disordered Eating Behaviors In Patients with Diabetes

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Eating disorders and disordered eating behaviors are common in individuals with diabetes but are frequently under-recognized in clinical practice. Having diabetes increases the risk of developing an eating disorder, especially in people with type 1 diabetes (T1D). Estimates are that 20-40% of young women with T1D have an eating disorder and up to one-third of women with T1D withhold insulin for weight control.[1] People with type 2 diabetes mellitus (T2D) have also been found to have a higher level of disordered eating, with up to 26% having a binge-eating disorder.[2] Eating disorders in people with diabetes complicate glycemic control and weight management and are associated with increased morbidity and mortality.[3] Clinicians should incorporate routine screening for eating disorders and disordered eating in their patients with diabetes.

This newsletter will present the intricate relationship between eating behaviors and blood sugar control in patients with T1D and T2D, as well as screening and treatment options.

Disordered Eating and Eating Disorders

Eating disorders are a mental health condition affecting the relationship that an individual has with food and body image, which is more common in women than men.[2] Epidemiological studies suggest that people with diabetes have an increased risk of bulimia, anorexia, and binge eating disorders compared to nondiabetics.[2] People with T1D are more likely to be diagnosed with diabetes before the development of an eating disorder, while the reverse may be true for T2D, when the eating disorder (i.e., binge-eating) may contribute to the development of diabetes.[2]

Diabetes management itself may lead to a higher risk and leave patients more vulnerable to the development of an eating disorder. In patients with T1D the need to count carbohydrates, monitor weight, constant attention to food and the reality of insulin related weight gain creates a uniquely high-risk environment. The realization that insulin omission creates an effective and accessible method of weight control contributes to the problem. One study found that 36% of females intentionally omitted insulin for this purpose.[4] Avoidance of testing may accompany withholding insulin to avoid acknowledgement of high blood sugar. The results of withholding insulin leads to complications such as hyperglycemia, ketoacidosis, vascular complications and mortality in extreme cases.[5]

Disordered Eating and Altered Glucose Response

Metabolism disturbances have been identified in patients with disordered eating but commonly do not meet the traditional diagnosis for diabetes. Early-phase insulin hypersecretion often precedes pancreatic beta-cell decline.[6] Often these patients will have fasting glucoses of 80 mg/dL or less and fasting insulin levels ranging from 30-40 µU/mL suggesting insulin resistance (normal fasting insulin levels are 10 µU/mL or less). Evidence suggests that insulin resistance may be detectable 10-15 years prior to T2D diagnosis.[6] This represents an important opportunity for earlier intervention. Patients may not present with elevated hemoglobin A1c (HbA1c) but may have metabolic findings listed below for several years prior to a prediabetes diagnosis.[6]

Indicators of metabolic dysfunction:

- Elevated fasting insulin levels
- Glucose/insulin ratios less than 7 (suggesting insulin resistance)
- Homeostatic Model Assessment of Insulin Resistance (HOMA-IR) scores 1.9 or above[7]
- Abnormal Quantitative Insulin Sensitivity Check Index (QUICKI) with lower values indicating increased insulin resistance[8]
- Reactive hypoglycemia after a mixed-meal tolerance test at 30, 60 and 90 minutes. Blood sugar drop after 30 minutes due to exaggerated insulin response[9]
- Strong family history of T2D
- History of restrictive eating patterns

Key Points:

- Hyperinsulinemia and insulin resistance often precede elevations in fasting glucose or increases in HbA1c by **many years**
- A normal HbA1c does not exclude early metabolic dysfunction
- Reactive hypoglycemia, elevated fasting insulin or abnormal insulin sensitivity may indicate early warning signs long before prediabetes is diagnosed

Impact on Blood Sugar

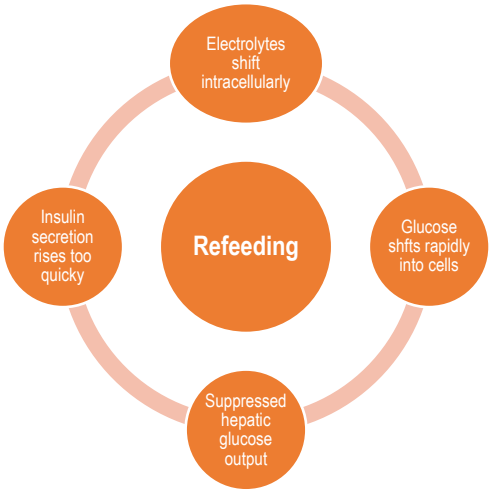
Patterns of metabolic instability associated with restrictive eating, binge-restrict cycles, insulin omission, and recurrent reactive hypoglycemia can contribute to glycemic variability, exaggerated insulin response, and progressive insulin resistance.[6,9] The metabolic response when food is consumed, as a result of the body compensating for calorie restriction or lack of insulin, are outlined in **Table 2.** This reactive hypoglycemia response may represent an early pre-diabetic metabolic phenotype in some patients.

Table 2. Metabolic Responses in People with Disordered Eating[9]

Condition	Response
Starvation	Glucose production is primary concern
Refeeding	Glucose is stored immediately
Refeeding Hypoglycemia	Hyperinsulinemia + Suppressed hepatic glucose output + depleted glycogen
Reactive Hypoglycemia	Low blood sugar (<70 mg/dL) occurring 2-5 hours after a meal due to over-production of insulin

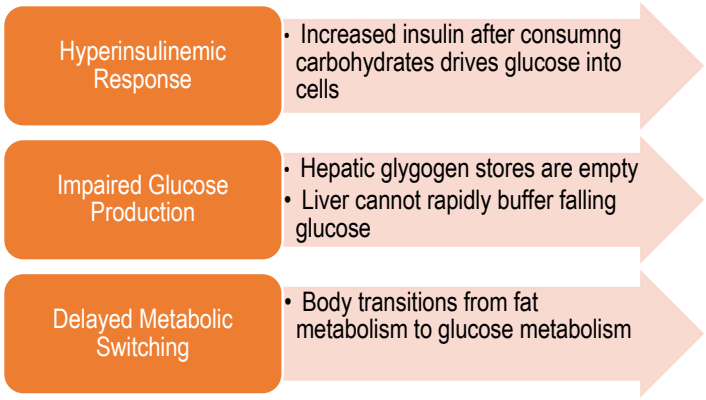
Normal glucose regulation can be disrupted in people with an eating disorder or disordered eating, causing stress to the pancreas contributing to insulin dysregulation.[9] During starvation the body responds by lowering insulin output, and increasing its level of glucagon and cortisol to maintain energy. Therefore, energy comes from fat oxidation, ketone production and gluconeogenesis. Introducing carbohydrates and other food back into the body affects the metabolism in an altered way (**Figure 1**).[5]

Figure 1. Metabolic Effects when Refeeding from a Starved State



Metabolic changes from adapting to prolonged starvation in anorexia can predispose patients to refeeding hypoglycemia.[9] During prolonged starvation hepatic glucose production becomes suppressed and glycogen stores are depleted. When carbohydrates are reintroduced, an exaggerated insulin response may occur, causing rapid peripheral glucose uptake before hepatic glucose production can adequately respond. This imbalance can lead to post-refeeding hypoglycemia.[9] In this scenario, when carbohydrates are consumed the body responds with an exaggerated rapid insulin release from the pancreas.[9] This can cause glucose to leave the bloodstream rapidly without the ability of hepatic glucose to respond accordingly due to suppressed glucose production by the liver in the starvation state.[9] Therefore, reduced production of hepatic glucose and increased peripheral uptake may cause hypoglycemia with reduced hypoglycemia awareness.[10] This can lead to cravings and urgent hunger.[9] Physiologic hunger signals triggered by reactive hypoglycemia may contribute to episodes of urgent or loss-of-control eating in some individuals. The physiology is described in **Figure 2.**

Figure 2. Mechanism of Reactive Hypoglycemia in Anorexia[9]



Elevated cortisol levels associated with disordered eating can promote increases in blood glucose, insulin resistance, and visceral fat accumulation - contributing to a lower basal metabolic rate. These metabolic changes may impair insulin sensitivity and results in glycemic variability over time, potentially leading to gradual increases in HbA1c.[7] Insulin resistance and compensatory hyperinsulinemia often precede elevations in fasting glucose or HbA1c by 5-15 years.[6]

Early metabolic changes may be present for many years before abnormalities appear in traditional glycemic screening measures. By the time impaired fasting glucose or prediabetes is identified, metabolic dysfunction may have already been present for over a decade.[6] Repeated insulin surges and glycemic variability associated with disordered eating may disrupt glucose regulation and can occur in patients across the weight spectrum, including those who are lean, normal-weight, or overweight.

It is also important to recognize that some patients with restrictive eating behaviors may meet behavioral criteria for eating disorders without developing the degree of weight loss typically associated with conditions such as anorexia nervosa. In the presence of metabolic dysregulation - including insulin

resistance, glycemic variability, or recurrent reactive hypoglycemia - expected weight trajectories may be altered.

As a result, restrictive eating disorders may be underrecognized in patients whose body weight does not fall into the ranges clinicians traditionally associate with anorexia nervosa.

Clinical indicators of metabolic dysregulation may include:

- Normal or slightly elevated fasting glucose levels
- Increased insulin levels
- Reactive hypoglycemia after meals
- Rising HbA1c over time

Early metabolic evaluation is warranted when patients present with any of the following:

- Postprandial fatigue (OR avoidance of meals because it makes them tired)
- Urgent hunger after meals
- Symptoms suggestive of reactive hypoglycemia
- Feelings of loss of control when eating higher carbohydrate foods

Risk factors for all types of disordered eating include being female and younger age.[5] People with diabetes and comorbid anxiety or depression have also demonstrated a higher risk of developing an eating disorder.[5]

Clinical Red Flags for Disordered Eating in Diabetes

- Recurrent diabetic ketoacidosis
- Unexplained rise in HbA1c
- Marked glycemic variability
- Insulin omission or dose manipulation
- Fear of weight gain associated with insulin use
- Postprandial "crashes" suggestive of reactive hypoglycemia
- Avoidance of glucose monitoring

Screening Tools can be used to assist in diagnosing disordered eating. They are listed in **Figure 3**.[3,5]

Figure 3. Screening Tools

- Diabetes Eating Problems Survey-Revised (DEPS-R): 16-item survey used in adults and adolescents with T1D with a cut-off score of 20 or higher identifying those at risk for an EDO
- Screen for Early Eating Disorder Signs (SEEDS) tool: Can be used in T1D and T2D and thought to be more predictive than other screening tools
- Modified SCOFF (Sick, Control, One, Fat and Food) (mSCOFF): 5-item questionnaire that can be used with as a first-step screening tool in patients with T1D (includes questions related to insulin use). Scores of 2 or more suggestive of disordered eating.

Because eating disorders and metabolic dysregulation often develop in parallel, screening for disordered eating behaviors may also provide an early window into emerging metabolic instability.

Clinical approach to screening conversations

Using neutral and non-judgmental language when screening for disordered eating behaviors can improve patient disclosure. Rather than asking direct yes/no questions about behaviors (e.g., "Do you skip insulin to lose weight?"), clinicians may normalize the behavior and ask whether the experience occurs for the patient. For example: "Some people with diabetes notice that concerns about food, weight, or blood sugar control can influence how they eat or how they use insulin. Has anything like that ever happened to you? If it has, what tends to be going on around that time?" This approach may reduce stigma and encourage patients to speak more openly about behaviors that might otherwise go unreported.

Management

Early identification, intervention and support are important in the treatment of disordered eating behaviors in people with diabetes. A multidisciplinary approach including psychotherapy, glucose management, nutritional counseling, and diabetes education is often required.[2] The emotional distress associated with disordered eating may need treatment with cognitive-behavioral therapy and/or medication.[2,11]

Some patients may consume fewer calories than expected while struggling to achieve a desired weight due to underlying metabolic dysregulation. This pattern may be misinterpreted as excessive caloric intake, leading to frustration and inappropriate treatment adjustments. In patients with a history of disordered eating, therapies that modify postprandial glucose dynamics (e.g., acarbose, miglitol, or metformin) have been used to address symptoms such as postprandial fatigue or early hunger.

Medication strategies for individuals with reactive hypoglycemia include drugs such as acarbose, miglitol, metformin, or glucagon-like peptide-1 (GLP-1) receptor agonists. Metformin has also been shown to prevent diabetes by 31% when compared to placebo in individuals at high risk.[12] Careful clinical assessment is important, however, as reactive hypoglycemia related to exaggerated postprandial insulin secretion may require targeted management of the insulin response rather than empiric treatment with insulin-sensitizing agents alone.

Population Health Considerations

Early identification of metabolic dysregulation in patients with disordered eating may represent an important opportunity for prevention and reduction in health care costs. Because diagnostic thresholds for diabetes identify disease relatively late in the biological progression of metabolic dysfunction, earlier recognition of insulin dysregulation and disordered

eating behaviors may allow intervention at a stage when metabolic changes remain more reversible.

The estimate of long-term clinical and economic burden of diabetes is substantial with national estimates exceeding $327 billion annually in direct medical costs and lost productivity.[13] Preventing costly complications such as cardiovascular disease, neuropathy, nephropathy, and retinopathy has demonstrated a reduction in healthcare expenditures. Early intervention for prevention or delay is crucial.

Provider Pearls

In patients with a history of an eating disorder or suspected disordered eating, with or without diabetes, it is important to encourage open conversations about eating behaviors during routine visits. Normalizing these conversations may improve disclosure of eating-related behaviors that patients might otherwise feel reluctant to discuss. Asking how often a patient weighs themselves and how being weighed during medical appointments affects them can help identify signs of eating-related distress.[11] Excessive or compulsive exercising is a common symptom of an eating disorder as well.

Patients with a history of eating disorders may experience anxiety related to weight measurements in clinical settings. In these situations, offering blinded weight assessments and avoiding the inclusion of weight or BMI on the after-visit summary may help reduce distress and improve engagement in care. If a patient is identified as having an urgent and/or severe eating disorder, referral for specialized management may be necessary (**Figure 4**).

Figure 4. Referral Information

National Alliance for Eating Disorders: Inpatient treatment centers and outpatient practitioners

https://www.findedhelp.com

Eating Disorder Outpatient Services: State availability

https://www.aedweb.org/expert-directory

Conclusion

Eating disorders and disordered eating behaviors occur in individuals with T1D and T2D and may be reinforced by glucose-management practices required for diabetes care. As our understanding of metabolic disease progression continues to evolve, it is becoming increasingly clear that some of the earliest physiological signals of dysregulated glucose metabolism may appear well before traditional diagnostic thresholds are reached.

Routine screening for disordered eating behaviors in patients with diabetes may therefore represent an important opportunity to identify both emerging eating disorders and early metabolic dysregulation before traditional glycemic markers become abnormal. Appropriate counseling and targeted medical therapy, when indicated, are important components of care for individuals with eating disorders and disordered eating behaviors.

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