

# DIFFERENCES IN THE CLINICAL COURSE AND DIAGNOSIS OF TYPE ONE AND TYPE 2 DIABETES MELLITUS

Fayziyeva Nozima Gulomovna  
Zarmed University, Bukhara City

## Abstract

Diabetes mellitus is a chronic metabolic disorder classified into Type 1 and Type 2, each with distinct pathophysiological mechanisms, clinical courses, and diagnostic criteria. Type 1 diabetes (T1DM) is an autoimmune condition characterized by the destruction of pancreatic beta cells, leading to absolute insulin deficiency and a sudden onset of symptoms, often in childhood or adolescence. In contrast, Type 2 diabetes (T2DM) develops gradually due to insulin resistance and progressive beta-cell dysfunction, typically affecting adults and strongly associated with obesity and lifestyle factors. The clinical course of T1DM involves a high risk of diabetic ketoacidosis (DKA), while T2DM is often asymptomatic in its early stages but can lead to long-term complications such as cardiovascular disease. Diagnosis of both types relies on blood glucose measurements, but distinguishing features include the presence of autoantibodies and low C-peptide levels in T1DM, while T2DM is often characterized by elevated C-peptide and insulin levels in the early stages. Understanding these differences is crucial for accurate diagnosis, appropriate management, and effective prevention strategies.

**Keywords:** Type 1 diabetes, type 2 diabetes, insulin resistance, autoimmune diabetes, diabetic ketoacidosis, hyperosmolar hyperglycemic state, beta-cell dysfunction, c-peptide, glycemic control, metabolic disorder.

## INTRODUCTION

Diabetes mellitus encompasses a spectrum of metabolic disorders characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both [22].

The two predominant forms are Type 1 diabetes mellitus (T1DM) and Type 2 diabetes mellitus (T2DM), each exhibiting distinct etiologies, pathophysiological mechanisms, and clinical courses.

**Global Epidemiological Trends:** The incidence of diabetes is undergoing a concerning upward trajectory. Projections indicate that the number of adults living with diabetes will surge from 537 million in 2021 to 783 million by 2045 [23].

This escalation is particularly pronounced in low- and middle-income countries, which currently harbor three-quarters of the global diabetic population [23].

Alarmingly, over half of individuals with diabetes remain undiagnosed, underscoring the imperative for enhanced screening and awareness initiatives.





**Clinical Implications:** The burgeoning prevalence of both T1DM and T2DM portends significant clinical and public health challenges. Both forms are associated with an array of complications, including cardiovascular diseases, nephropathy, retinopathy, and neuropathy, which collectively contribute to increased morbidity and mortality [22].

The economic burden is equally substantial, with global health expenditures on diabetes estimated at USD 966 billion in 2021, reflecting a 316% increase over the past 15 years [23].

In light of these trends, a nuanced understanding of the differential clinical courses and diagnostic criteria of T1DM and T2DM is imperative for clinicians and healthcare policymakers. Such knowledge is foundational to devising targeted prevention strategies, optimizing therapeutic interventions, and ultimately mitigating the global impact of diabetes mellitus.

**Clinical Course.** The clinical course of Type 1 and Type 2 diabetes mellitus exhibits distinct patterns that reflect their underlying pathophysiology and progression.

**Type 1 Diabetes.** Type 1 diabetes is characterized by a sudden onset of symptoms, often occurring in childhood or adolescence, though it can also develop in adults. This autoimmune condition leads to the destruction of insulin-producing beta cells in the pancreas, resulting in little or no insulin production[1][2]. Symptoms typically appear rapidly within a few days to weeks and include excessive thirst, frequent urination, unexplained weight loss, and fatigue[10][11]. In severe cases, individuals may experience diabetic coma, which can present as a life-threatening condition marked by confusion, fruity-smelling breath, and difficulty breathing[11]. Management of Type 1 diabetes requires lifelong insulin therapy, along with education on glucose monitoring and self-care strategies- [4][2].

**Type 2 Diabetes.** In contrast, Type 2 diabetes usually develops more gradually and is commonly associated with lifestyle factors such as obesity and physical inactivity. It typically manifests later in life but can occur at any age. The progression of Type 2 diabetes often begins with insulin resistance, where the body's cells fail to respond effectively to insulin, leading to an increase in blood glucose levels. Over time, pancreatic beta cells may also experience a decline in insulin production, complicating the condition[1][2][3]. Symptoms of Type 2 diabetes can be subtle and may go unnoticed until significant hyperglycemia occurs, which may only be detected through routine blood tests[3][11]. Unlike Type 1 diabetes, Type 2 may be managed through lifestyle changes, oral medications, or insulin therapy when necessary[2][3].

**Obesity.** Excess body fat, particularly around the abdomen, is a leading risk factor for Type 2 diabetes. Adipose tissue can interfere with the body's ability to utilize insulin effectively, thereby contributing to insulin resistance[1][2].

**Sedentary Lifestyle.** A lack of regular physical activity exacerbates the risk of Type 2 diabetes, as it can lead to weight gain and further contribute to insulin resistance[1][2][3].

**Family History.** A genetic predisposition to Type 2 diabetes increases risk, particularly among individuals with close relatives diagnosed with the condition[1][2].

**Ethnic Background.** Certain ethnic groups, including African Americans, Hispanics, Native Americans, and Asian Americans, have a higher prevalence of Type 2 diabetes, indicating a complex interplay of genetic and environmental factors[1][2].





**Dietary Habits.** Dietary choices, including eating speed, meal frequency, and the tendency to skip breakfast, have been linked to an increased risk of Type 2 diabetes. Observational studies suggest that rapid eating can lead to obesity and a higher likelihood of developing the condition[12][13].

**Other Lifestyle Factors.** Modern lifestyle habits, such as poor sleep patterns, inadequate sun exposure, and night shifts, may disrupt circadian rhythms and are associated with the pathophysiology of Type 2 diabetes, leading to increased insulin resistance and higher blood sugar levels[12]. Addressing these risk factors through lifestyle modifications is crucial, as studies indicate that improvements in diet and physical activity can significantly lower the incidence of Type 2 diabetes[12].

**Comparative Outcomes.** Both types of diabetes necessitate ongoing management to prevent complications, including cardiovascular disease and microvascular damage. Regular monitoring of glycemic control and risk factors, such as blood pressure and lipid levels, is crucial in both conditions[14][1]. However, the management strategies differ significantly due to the distinct pathophysiological processes involved in each type of diabetes[2][3]. Understanding these differences is essential for patients, caregivers, and healthcare providers to optimize treatment and improve quality of life[1][2].

**Diagnostic Criteria.** The diagnosis of diabetes mellitus has evolved, with current recommendations favoring the use of the terms "type 1" and "type 2" rather than the older classifications of "IDDM" and "NIDDM." [6] The diagnostic criteria have been simplified to primarily rely on abnormal fasting plasma glucose levels, with a threshold of 126 mg/dL (7.0 mmol/L) or higher indicating diabetes.[6][15] Additionally, two-hour postprandial plasma glucose readings of 200 mg/dL (11.1 mmol/L) or higher after a 75 g glucose load, or two casual glucose readings of 200 mg/dL or more, may also be used for diagnosis.[6]

**Diagnostic Tests.** Several tests are recommended for diagnosing type 1 diabetes.

**Glycated Hemoglobin (A1C) Test:** This blood test reflects the average blood sugar levels over the past two to three months. An A1C level of 6.5% or higher on two separate tests confirms diabetes.[5]

**Fasting Blood Sugar Test:** A blood sample is taken after an overnight fast. Levels between 100 and 125 mg/dL indicate prediabetes, while levels of 126 mg/dL or higher confirm diabetes.[15]

**Autoantibody Tests:** These tests detect specific autoantibodies associated with type 1 diabetes, such as Glutamic Acid Decarboxylase (GAD) antibodies, Islet Cell Antibodies (ICAs), and Insulinoma-Associated Antibodies (IAAs). The presence of these autoantibodies supports a diagnosis of type 1 diabetes and indicates an autoimmune etiology.[5]

**Urine Test:** The presence of ketones in the urine, which are byproducts of fat metabolism, can suggest type 1 diabetes, particularly in the context of hyperglycemia.[5]

**Screening Recommendations.** Screening for diabetes is advised to begin at age 45 and should occur every three years in those without risk factors. For individuals with risk factors, screening should start earlier and be repeated more frequently.[6] This proactive approach is crucial as it is estimated that only about half of individuals with diabetes are currently diagnosed.[6]

**Importance of Accurate Diagnosis.** Correctly diagnosing type 1 diabetes is vital, as it typically requires insulin therapy and careful management of blood glucose levels to prevent complications such as diabetic ketoacidosis (DKA). In contrast, type 2 diabetes may often be managed through



lifestyle changes and oral antihyperglycemic agents. An accurate diagnosis not only ensures appropriate treatment but also helps in understanding the disease's progression and potential complications.[7]

### Differences in the clinical course and diagnosis of type 1 and type 2 diabetes mellitus

#### Clinical Course Differences:

| Feature                | Type 1 Diabetes Mellitus (T1DM)                                                                      | Type 2 Diabetes Mellitus (T2DM)                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Onset                  | Sudden, often in childhood or adolescence                                                            | Gradual, usually in adults but increasing in children                                                |
| Cause                  | Autoimmune destruction of pancreatic beta cells                                                      | Insulin resistance and beta cell dysfunction                                                         |
| Insulin Dependence     | Always requires insulin therapy                                                                      | Initially managed with lifestyle changes and oral medications; insulin may be needed later           |
| Symptoms               | Rapid onset of polyuria, polydipsia, weight loss, fatigue, and sometimes diabetic ketoacidosis (DKA) | Often asymptomatic in early stages; may present with polyuria, polydipsia, fatigue, or complications |
| Ketosis Risk           | High, with frequent DKA episodes                                                                     | Low, but can develop hyperosmolar hyperglycemic state (HHS)                                          |
| Obesity Association    | Not typically associated                                                                             | Strongly associated with obesity and metabolic syndrome                                              |
| Genetic Predisposition | Moderate, linked to autoimmune markers (HLA genes)                                                   | Stronger genetic component but polygenic inheritance                                                 |

#### Diagnosis Differences:

| Test                                             | Type 1 Diabetes                        | Type 2 Diabetes                                    |
|--------------------------------------------------|----------------------------------------|----------------------------------------------------|
| Fasting Plasma Glucose (FPG)                     | ≥126 mg/dL (7.0 mmol/L)                | ≥126 mg/dL (7.0 mmol/L)                            |
| Random Plasma Glucose                            | ≥200 mg/dL (11.1 mmol/L) with symptoms | ≥200 mg/dL (11.1 mmol/L) with symptoms             |
| Oral Glucose Tolerance Test (OGTT, 2-hour value) | ≥200 mg/dL (11.1 mmol/L)               | ≥200 mg/dL (11.1 mmol/L)                           |
| Hemoglobin A1c (HbA1c)                           | ≥6.5% (48 mmol/mol)                    | ≥6.5% (48 mmol/mol)                                |
| C-Peptide Levels                                 | Low or absent                          | Normal or high                                     |
| Autoantibodies (GAD, IA-2, ZnT8, ICA, IAA)       | Present in most cases                  | Absent                                             |
| Insulin Levels                                   | Low to absent                          | Normal to high in early stages, low in late stages |



### Treatment and Management

**Type 1 Diabetes Management.** All patients with Type 1 diabetes require insulin therapy to manage their condition. The primary goal is to mimic the natural pattern of insulin secretion found in individuals without diabetes. This is typically achieved through a basal-bolus insulin regimen, which involves administering a longer-acting insulin to provide baseline coverage, coupled with a rapid-acting insulin before meals to control postprandial glucose levels[4]. In some cases, patients may use continuous subcutaneous insulin infusion via a pump to maintain more stable glucose levels[4].

Patients can monitor their glucose levels using home monitoring methods, such as fingerstick blood glucose tests or continuous glucose monitoring (CGM) systems. Regular monitoring helps patients adjust their dietary intake and insulin dosing accordingly, with many needing to check their glucose levels multiple times daily to ensure optimal management[4][1]. Hemoglobin A1C levels are typically assessed every three months, or every six months for those with consistently good control, to evaluate overall diabetes management[4].

**Type 2 Diabetes Management** In managing Type 2 diabetes, treatment options often start with lifestyle modifications, including diet and exercise, and may involve pharmacotherapy when necessary. Metformin is commonly the first-line medication prescribed due to its cost-effectiveness and favorable safety profile. Following metformin, glucagon-like peptide-1 (GLP-1) receptor agonists serve as an effective second-line therapy and may also be utilized in conjunction with insulin[4][9]. For patients with obesity, GLP-1 receptor agonists or tirzepatide (a dual GIP and GLP-1 receptor agonist) can provide weight-lowering benefits[4].

Furthermore, it is essential for patients to receive education regarding diabetes management, including self-monitoring of glucose, diet, exercise, and the potential need for medication adjustments based on blood glucose levels[4][16]. The American Diabetes Association (ADA) emphasizes the importance of addressing social determinants of health and health equity in diabetes care, particularly for vulnerable populations[16].

In recent years, diabetes management has shifted towards a more individualized approach that considers existing risks for cardiovascular events and chronic conditions, ensuring that treatment is tailored to the patient's specific needs[9]. Key elements of management also include the use of renin-angiotensin-aldosterone system blockers and statins to prevent complications associated with diabetes[4].

**Monitoring and Adjustment.** Monitoring glucose levels is a critical aspect of managing both Type 1 and Type 2 diabetes. Patients may utilize fingerstick glucose monitors or CGM systems, which provide real-time data and allow for adjustments in insulin dosing as needed[4].

Advanced systems, such as automated insulin delivery (AID) systems, offer further support by integrating insulin pumps with CGM for optimal glucose control[4].

Patient education, including guidance on dietary choices and physical activity, remains central to the management of diabetes, with some individuals with Type 2 diabetes being able to maintain blood glucose levels through lifestyle changes alone, potentially avoiding or reducing medication use[4][1].





### **Implications for Patients and Healthcare Providers**

Diabetes management has evolved significantly, highlighting the importance of personalized care and a multidisciplinary approach in treating both Type 1 and Type 2 diabetes mellitus. As outlined by experts, current practices shift from a strict focus on glycemic control to an individualized assessment that incorporates a patient's unique risks for complications, such as cardiovascular events and kidney failure[9]. This change emphasizes the need for healthcare providers to adopt a more tailored treatment strategy that considers each patient's specific characteristics, preferences, and social determinants of health[8].

### **Personalized Diabetes Care**

For healthcare providers, implementing personalized care protocols is crucial. The American Association of Clinical Endocrinology (AACE) has released comprehensive algorithms that assist in navigating treatment decisions. These algorithms not only consider glycemic control but also incorporate factors such as medication access and costs, which are vital for achieving health equity[9]. The 2023 AACE algorithm emphasizes lifestyle modifications and the management of comorbidities, including obesity and cardiovascular risk, reinforcing the importance of a holistic approach to diabetes management.

### **Education and Support**

Education plays a pivotal role in diabetes management. Formal diabetes education programs, often conducted by diabetes nurses and nutrition specialists, have been shown to enhance outcomes for patients, particularly for those with Type 1 diabetes who may need to adjust their insulin doses based on dietary intake and blood glucose levels[4]. Empowering patients with knowledge about their condition, treatment options, and self-management strategies is essential for effective care. Healthcare teams should ensure that education is continuous and reinforced at every visit to promote better health outcomes[17].

### **Addressing Health Inequities**

Healthcare providers must also be aware of the disparities in diabetes care that affect vulnerable communities. The American Diabetes Association (ADA) stresses the need to address health inequities in the management of diabetes, particularly for communities disproportionately impacted by the disease [8]. By understanding and mitigating these disparities, healthcare teams can design and deliver care that meets the needs of all patients, ensuring equitable access to resources and support.

### **Role of Interdisciplinary Teams**

Effective diabetes management often requires a multidisciplinary team approach. Patients benefit from the involvement of various specialists, including endocrinologists, dietitians, diabetes educators, and mental health professionals, to provide comprehensive care that addresses all aspects of the disease [18]. This collaborative approach allows for better monitoring of patient progress and helps in tailoring interventions that can significantly improve quality of life and reduce complications [19].





### Cited Studies and Literature

A systematic review was conducted to explore the impact of meal frequency on glycemic control in individuals with type 2 diabetes. Following the PRISMA guidelines, a comprehensive search of multiple databases—including PubMed, Embase, Web of Science, Cochrane Library, and Google Scholar—was performed until July 10th, 2023. This review included studies published over the last decade that examined interventions related to meal frequency in type 2 diabetes patients [12][20].

The study selection process involved initially identifying 1015 potentially relevant articles, from which 389 were excluded for being duplicates or failing to meet the inclusion criteria. After screening 626 abstracts, 77 articles were retrieved for full-text review, resulting in 13 studies that met the specified criteria, including 11 randomized trials and 2 non-randomized trials[12].

Key eligibility criteria for the studies included observational studies, randomized controlled trials, or cross-sectional designs; inclusion of male and/or female participants aged 19 years and older diagnosed with type 2 diabetes; and reporting changes in glycemic index or anthropometric measures. Studies were excluded if they were review articles, case reports, or if they involved patients with type 1 diabetes or at risk for type 2 diabetes[12].

The major outcomes evaluated in these studies focused on glycemic control, with attention to factors such as meal frequency, time-restricted feeding, breakfast skipping, bedtime snacking, and chrononutrition practices. These findings highlight the significance of dietary patterns in the management of type 2 diabetes [12][14].

Furthermore, the American Diabetes Association's Standards of Care provide annual updates that are based on systematic reviews and the latest clinical evidence, covering diagnostic criteria and treatment strategies for both type 1 and type 2 diabetes. These guidelines emphasize comprehensive diabetes management, which includes

medication management, lifestyle interventions, and monitoring of cardiovascular risk factors [8][21].

**Summary.** Differences in the clinical course and diagnosis of Type 1 and Type 2 diabetes mellitus represent a critical aspect of understanding these prevalent conditions that affect millions worldwide. Type 1 diabetes is an autoimmune disorder primarily diagnosed in childhood or adolescence, characterized by the destruction of insulin-producing beta cells in the pancreas, leading to an absolute insulin deficiency [1][2]. In contrast, Type 2 diabetes typically develops later in life, often as a consequence of insulin resistance related to lifestyle factors such as obesity and sedentary behavior [3][1]. These divergent paths of onset and progression significantly influence clinical management and patient outcomes.

The distinction between Type 1 and Type 2 diabetes is particularly notable in their respective management strategies. Patients with Type 1 diabetes require lifelong insulin therapy to manage blood glucose levels and prevent life-threatening complications such as diabetic ketoacidosis [4][5]. Conversely, Type 2 diabetes may be managed through lifestyle changes, oral medications, and, in some cases, insulin therapy, underscoring the condition's often reversible nature in its early stages [3][4]. The clinical course of each type also entails different risks for complications, necessitating ongoing monitoring and tailored treatment approaches [1][2].

Diagnosis of diabetes has evolved over time, with updated criteria emphasizing the importance of





accurate classification as Type 1 or Type 2, especially given the differing treatment requirements [6]. Diagnostic methods include fasting plasma glucose tests, glycated hemoglobin (A1C) levels, and the presence of autoantibodies, which help differentiate Type 1 from Type 2 diabetes, thus ensuring appropriate management strategies are implemented [6][5]. The potential for misdiagnosis remains a concern, as the implications for patient care are significant, particularly in managing the risk of acute and chronic complications associated with each type of diabetes [7].

Understanding the clinical differences and diagnostic criteria between Type 1 and Type 2 diabetes is essential for healthcare providers, patients, and caregivers to optimize treatment and improve health outcomes. As healthcare continues to evolve,

there is a growing emphasis on personalized care that addresses individual risk factors, treatment preferences, and social determinants of health, further complicating the landscape of diabetes management.[8][9]

## References

1. MyGlu. (n.d.). Key differences between type 1 and type 2 diabetes: A comprehensive guide. MyGlu. Retrieved March 22, 2025, from <https://www.myglu.org/diabetes-overview-basics/differences-between-type-1-and-type-2-diabetes>
2. Ballard, K. D. (2020, May 7). Type 1 vs. Type 2 diabetes: Difference, symptoms, and more. Healthline. <https://www.healthline.com/health/difference-between-type-1-and-type-2-diabetes>
3. Poulson, B. (2023, October 5). Type 1 vs. type 2 diabetes: What are the differences? Verywell Health. Medically reviewed by Weiss, D., M.D. Retrieved from <https://www.verywellhealth.com>
4. Taylor, R. B., & Gatta, F. (2024, June 18). Types of diabetes mellitus. WebMD. Medically reviewed by Sheikh, Z., M.D. Retrieved from <https://www.webmd.com/diabetes/types-of-diabetes-mellitus>
5. Brutsaert, E. F. (2023, October). Diabetes mellitus (DM). Merck Manual. Retrieved from <https://www.merckmanuals.com>.
6. Oberg, E. (n.d.). Type 1 diabetes diet. MedicineNet. Retrieved March 22, 2025, [https://www.medicinenet.com/type\\_1\\_diabetes\\_diet/article.htm](https://www.medicinenet.com/type_1_diabetes_diet/article.htm)
7. Academy of Nutrition and Dietetics. (n.d.). Diabetes: Type 1 and 2. Evidence Analysis Library. Retrieved March 22, 2025, from <https://www.andeal.org/topic.cfm?menu=5305>
8. American Diabetes Association. (1997). Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*, 20(7), 1183–1197. <https://pubmed.ncbi.nlm.nih.gov/9203460/>
9. Mayo Clinic Staff. (2020, January 16). Type 1 diabetes: Diagnosis and treatment. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/type-1-diabetes/diagnosis-treatment/drc-20353017>
10. Anoohya, P. V. (2025, February 14). Diagnostic tests for type 1 diabetes - An insight. iCliniq. Medically reviewed by Bhavsar, K. Retrieved March 22, 2025, from <https://www.icliniq.com/articles/diabetes-health/diagnostic-tests-for-type-1-diabetes>





11. Poulson, B. (2023, September 20). Type 1 vs. type 2 diabetes: Different insulin effects. Verywell Health. Medically reviewed by Lee, D.-E., M.D. Retrieved from <https://www.verywellhealth.com>
12. Jenkins, D. J. A., Wolever, T. M. S., Taylor, R. H., Barker, H., Fielden, H., Baldwin, J. M., ... & Goff, D. V. (1989). Glycemic index of foods: a physiological basis for carbohydrate exchange. *The American Journal of Clinical Nutrition*, 34(3), 362–366. <https://doi.org/10.1093/ajcn/34.3.362>
13. Mekary, R. A., Giovannucci, E., Cahill, L., Willett, W. C., van Dam, R. M., & Hu, F. B. (2012). Eating patterns and type 2 diabetes risk in men: breakfast omission, eating frequency, and snacking. *The American Journal of Clinical Nutrition*, 95(5), 1182–1189. <https://doi.org/10.3945/ajcn.111.028209>
14. American Association of Clinical Endocrinology. (2023). AACE comprehensive type 2 diabetes management algorithm 2023. <https://pro.aace.com/disease-state-resources/diabetes/clinical-practice-guidelines-treatment-algorithms/aace>
15. American Diabetes Association. (2023). Standards of medical care in diabetes—2023. *Diabetes Care*, 46(Supplement\_1), S1–S12. <https://doi.org/10.2337/dc23-Sint>
16. American Diabetes Association. (2022, December 12). American Diabetes Association releases 2023 Standards of Care in diabetes to guide prevention, diagnosis, and treatment for people living with diabetes. Retrieved from <https://www.diabetes.org>
17. American Diabetes Association. (2020). Type 1 diabetes management. <https://www.diabetes.org/diabetes/type-1/management>
18. Ferry, R. Jr. (n.d.). Diabetes mellitus (Type 1 and Type 2). eMedicineHealth. Medically edited by Stöppler, M. C., M.D. Retrieved March 22, 2025,
19. Lockett, E. (2021, August 11). What are the stages of diabetes? Healthline. Medically reviewed by Griffith, M. L., M.D. Retrieved from <https://www.healthline.com/health/diabetes/stages-of-diabetes>
20. Lipsombe L, Booth G, Butalia S, Dasgupta K, et al. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada: Pharmacologic Glycemic Management of Type 2 Diabetes in Adults. *Can J Diabetes* 2018;42(Suppl 1):S88-S103.
21. American Diabetes Association Professional Practice Committee; Summary of Revisions: Standards of Care in Diabetes—2024. *Diabetes Care* 1 January 2024; 47 (Supplement\_1): S5–S10. <https://doi.org/10.2337/dc24-SREV>
22. World Health Organization. (2024, November 14). Diabetes. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/diabetes>
23. International Diabetes Federation. (n.d.). Diabetes Atlas. Retrieved March 22, 2025, from <https://diabetesatlas.org/>.

