EDITORIAL FROM THE EDITOR-IN-CHIEF

Diabetes in 2025: A Public Health Imperative for Prevention, Management, and Innovation

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Diabetes mellitus is a global public health crisis, with the International Diabetes Federation (IDF) estimating 537 million adults affected in 2021, projected to reach 783 million by 2045 *(IDF, 2021)*. This editorial synthesizes recent evidence (2021–2025) on diabetes types, their impacts on health and organs, prevention strategies, treatments, potential cures, and the role of physical fitness, urging public health administrators to address systemic inequities and scale innovative solutions.

Diabetes encompasses Type 1 (T1D), Type 2 (T2D), and gestational diabetes mellitus (GDM). T1D, an autoimmune condition, results from pancreatic β-cell destruction, requiring lifelong insulin therapy (Katsarou et al., 2021). T2D, comprising over 90% of cases, is driven by insulin resistance, often linked to obesity and sedentary lifestyles (Wu *et al.,* 2022). GDM, characterized by hyperglycemia during pregnancy, increases risks for maternal and fetal complications, resolving post-delivery but elevating T2D risk (Nakshine *et al*., 2023). Chronic hyperglycemia damages blood vessels, nerves, and organs, leading to cardiovascular disease, retinopathy, nephropathy, neuropathy, and emerging links to liver cirrhosis and immune dysfunction (GBD 2021 Diabetes Collaborators, 2023). Social determinants of health (SDOH), such as poverty and limited healthcare access, exacerbate outcomes, disproportionately impacting marginalized communities (Hill-Briggs *et al.,* 2021).

T2D prevention hinges on lifestyle modification. The World Health Organization (WHO) advocates healthy diets, regular physical activity, and weight management to delay or prevent T2D onset (WHO, 2024). The CDC's National Diabetes Prevention Program (National DPP) reduces T2D risk by over 50% in high-risk individuals through structured lifestyle interventions (CDC, 2024). Recent studies emphasize culturally tailored programs and addressing SDOH, like food insecurity, to enhance efficacy (Haw *et al*., 2023). For GDM, group-based physical activity interventions at healthcare facilities significantly lower incidence (Takele *et al*., 2024). Yet, global prevention efforts lag due to inadequate scaling and funding, necessitating innovative delivery models like app-based coaching (Benham *et al*., 2023).

While no cure exists, diabetes management has advanced. T1D patients benefit from automated insulin delivery systems, such as closed loop "artificial pancreas" technologies, improving glycemic control (Boughton & Hovorka, 2021). T2D treatments include metformin, SGLT2 inhibitors, and GLP-1 receptor agonists like tirzepatide, which also reduce cardiovascular risks (Kalyani, 2021; Billings *et al*., 2025). Personalized glycemic targets, informed by artificial intelligence, minimize hypoglycemia and enhance quality of life (Reed, 2025). However, high costs and unequal access, particularly in low- and middle-income countries (LMICs), limit impact, with 80% of diabetes cases occurring in LMICs (Chan *et al*., 2020).

Cure research targets β-cell restoration. Gene therapy, such as targeting the NLRP3 inflammasome, shows promise in reducing inflammation and preserving β-cell function in T2D models (Sugandh *et al*., 2023). Stem cell therapy for T1D, using pancreatic tissue to regenerate β-cells, faces scalability hurdles but holds potential (Zhang *et al*., 2020). Inceptor, a novel insulin inhibitory receptor, is a druggable target for β-cell protection, potentially enabling diabetes remission (Ansarullah *et al*., 2021). These approaches require sustained investment and equitable clinical trial access to become viable.

Physical activity is critical for prevention and management. Recent studies confirm that resistance training and high-intensity interval training improve glycemic control and reduce complications in T1D and T2D (Chang *et al*., 2025; Riddell *et al*., 2021). The FinnDiane project highlights physical activity's role in lowering mortality in T1D (Tikkanen-Dolenc *et al*., 2022). Digital platforms, like My Diabetes My Way, enhance adherence by integrating real-time data into care (Wilkie *et al*., 2023). Barriers, including time constraints and hypoglycemia fears, necessitate personalized exercise plans and education (Miketinas *et al*., 2021).

Diabetes's escalating burden demands urgent action. Public health administrators must scale prevention through community partnerships and technology, ensure equitable access to advanced therapies, and fund cure research. Physical fitness, integral to prevention and management, requires integration into routine care. Critically, addressing SDOH and cost-driven disparities is paramount to reducing diabetes's global toll. The time for transformative policy is now.

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