From Diabetes to Wellbeing: A Global Dialogue on Holistic Health

Prevalence & Future Estimate

Global

- ✓ 537 million people had diabetes in 2021.[1]
- ✓ Number expected to rise to 643 million by 2030.[1]
- ✓ By 2050, over 1.31 billion people projected to have diabetes, mainly T2D.[2]
- ✓ Four of the top five countries with the highest diabetes prevalence are located in the Asia-Pacific region: China, India, Pakistan, and Indonesia.[3]

Rank	Country	No. of people with Diabetes (millions) [3]	
		2021	2045
1	China	140.9	174.4
2	India	74.2	124.9
3	Pakistan	33.0	62.2
4	USA	32.2	36.3
5	Indonesia	19.5	28.6

The Global Burden of Diabetes [4, 5]

- ✓ 537 million adults (10.5%) globally live with diabetes, projected to reach 783 million (12.2%) by 2045.
- ✓ 40 million adults remain undiagnosed, with 90% in low- and middle-income countries.
- ✓ 1.2 million children and adolescents have type 1 diabetes; over half (54%) are under age 15.
- ✓ Diabetes rates stabilized or declined since 2010 in over 80% of countries, mainly high-income regions.
- ✓ Type 1 diabetes faces the challenges of misdiagnosis, under diagnosis, high risk of complications, and premature mortality.
- ✓ The fourth leading cause of disability globally.
- ✓ The number of disability-adjusted life years (DALYs) caused by diabetes was 66.3 million globally in 2019.

Diabetes is now the leading cause of blindness, end-stage renal disease, and lower-extremity amputations.[6]

People with diabetes have rates of coronary heart disease and stroke that are two to five times those of persons without diabetes.[6]

Diabetes Risk Factors[4, 5]

- Increased BMI
- Family history of diabetes
- Sedentary lifestyle
- Hypertension
- Weight gain
- High cholesterol level
- Enlarged waist circumference
- Gestational diabetes

Symptomatology in diabetes[7]

- ✓ **Classical Symptoms:** Polydipsia (excessive thirst), polyuria (frequent urination), and polyphagia (increased hunger)
- ✓ **Severe Weight Loss:** A catabolic symptom indicating uncontrolled diabetes
- ✓ **Common Signs of Undetected Diabetes:**
- ✓ Fatigue, dry mouth, restlessness
- ✓ Repeated infections
- ✓ **Subtle Symptoms:**
- ✓ Mild or gradually developing symptoms may go unnoticed
- ✓ **Complications:**
    - **Microvascular:** Retinopathy, neuropathy, nephropathy
    - **Macrovascular:** Cardiovascular diseases, which can start years before diabetes symptoms appear
- ✓ **Early Detection is Crucial:** Most Type 2 Diabetes (T2D) patients are asymptomatic in early stages. Early diagnosis can prevent long-term complications.

Obesity and diabetes[8, 9]

- Obesity is a significant risk factor for the development and progression of type 2 diabetes (T2D) globally.
- Insulin resistance due to excessive fat, particularly visceral fat, is central in the pathogenesis of diabetes. This resistance impairs glucose uptake and metabolism in muscles, liver, and other tissues.
- Weight loss and lifestyle changes can improve insulin sensitivity, reducing the risk of T2D and improving glycemic control in obese individuals.
- Obesity and T2D share pathophysiological mechanisms, including inflammation and dysregulated lipid metabolism, which exacerbate each other.
- Global health implications of both obesity and T2D are severe, leading to increased morbidity and healthcare costs.

Impact of Physical activity in Diabetes[10]

Physical activity is essential in managing diabetes, supporting glucose control, and overall well-being.

- ✓ **Enhances Glucose Uptake**
    - Exercise increases glucose disposal and improves insulin action, supporting blood glucose regulation.

- ✓ **Muscle Contraction Benefits**
    - Triggers GLUT4 translocation and boosts blood flow, increasing glucose entry into muscles through insulin-dependent and independent pathways.
- ✓ **Sustained Impact**
    - Exercise can improve glucose homeostasis for up to 48 hours by consuming muscle glycogen and enhancing glucose entry into muscles.
- ✓ **Long-term Adaptations**
    - Regular exercise boosts GLUT4 levels, insulin receptor signaling, and muscle oxidative capacity, improving insulin sensitivity in type 2 diabetes.
- ✓ **Variable Effects**
    - Impact varies based on exercise type (aerobic vs. resistance), intensity, duration, and frequency.

Clinical Significance: Exercises in diabetes prevention[10, 11]

- **Warburton et al's systematic review of 20 cohort studies:**
    - All studies showed an inverse relationship between exercise and T2D incidence.
    - Exercise interventions led to a 42% average risk reduction.
- **Manson et al's Findings:**
    - Weekly vigorous exercise led to a 16% reduction in T2D risk.
- **Hu et al's Nurses' Health Study:**
    - 34% reduction in T2D incidence with one hour of daily brisk walking.

Physical activity is proven to be a significant preventive measure for T2D.

Exercise benefits on central obesity, BP, cholesterol and HbA1c [12, 13, 14]

- **Waist circumference: Regular aerobic exercise** results **in** modest **reductions in waist circumference and associated visceral adipose tissue** i.e. abd**ominal** obesity and results **in** favorable changes **in** body composition and reverses metabolic syndrome.
- **BP:** Physical activity, including **aerobic and resistance exercise**, can effectively **lower blood pressure (BP) by an average of 5 mmHg**. This reduction in systolic BP can lower coronary heart disease mortality by 9%, stroke mortality by 14%, and all-cause mortality by 7%.
- **Cholesterol:** A meta-analysis with 1,003 people with T2D demonstrated that **aerobic exercise training interventions lowered systolic blood pressure** (-5.6 mmHg), **diastolic blood pressure** (-5.5 mmHg), **triglyceride levels** (-0.3 mmol/l), and **total cholesterol** (-0.3 mmol/l).
- **HbA1c:** A meta-analysis of over 8500 patients with T2D found significant **reductions in HbA1c of -0.57%, following structured resistance training**, when compared with non-exercise control groups.

Types of Physical Activity for Diabetes Patients[11, 15]

- **Aerobic Exercise:** Activities like walking, jogging, and swimming boost heart health, improve insulin sensitivity, and help manage weight.
- **Resistance Training:** Involves using weights or resistance bands; increases muscle mass and strength, aiding in glucose uptake.
- **Flexibility & Balance:** Exercises such as yoga or stretching improve joint mobility and reduce the risk of falls, especially beneficial for older adults.

Type of Activity	Frequency	Intensity
Aerobic Exercise	3-7 days per week	Moderate to vigorous
Resistance Training	2-3 non-consecutive days per week	Moderate to vigorous
Flexibility/Balance	≥2-3 days per week	Light to moderate

Exercise and Diabetes Medications: Recommendations for Safety and Dosage Adjustments[11]

Type/class of medication	Exercise considerations	Safety/dose adjustments
Insulin	▪ Deficiency: hyperglycemia, ketoacidosis ▪ Excess: hypoglycemia during and after exercise	▪ Increase insulin dose pre- and post-exercise for insulin deficiency ▪ Decrease prandial and/or basal doses for excess insulin
Insulin secretagogues	Exercise-induced hypoglycemia	Decrease dose on exercise days to reduce hypoglycemia risk
Metformin	None	Generally safe; no dose adjustment for exercise
Thiazolidinediones	Fluid retention	Generally safe; no dose adjustment for exercise
Dipeptidyl peptidase 4 inhibitors	Slight risk of congestive heart failure with saxagliptin and alogliptin	Generally safe; no dose adjustment for exercise

Glucagon-like peptide 1 receptor agonists	May increase hypoglycemia risk when combined with insulin or sulfonylureas, but not when used alone.	Generally safe; no dose adjustment for exercise, but consider lowering insulin or sulfonylurea doses.
Sodium–glucose cotransporter 2 inhibitors	May increase hypoglycemia risk when combined with insulin or sulfonylureas, but not when used alone.	Generally safe; no dose adjustment for exercise

Integrated approach for optimal diabetes management[12, 13, 14]

- **Ease of Measurement**: Blood pressure, cholesterol, and waist circumference are straightforward to measure with standard tools, providing stable readings that can be tracked over time.
- **Dynamic Nature of Glucose Fluctuations**: Blood glucose levels fluctuate significantly throughout the day, especially around meals, exercise, and stress, making them more challenging to monitor consistently.
- **Need for Frequent Monitoring**: Unlike BP or cholesterol, glucose requires frequent checks to capture its variations and understand overall glycemic control.
- **Impact of Meal Composition and Timing**: Glucose levels are highly sensitive to meal composition, specifically carbohydrate content, making it essential to track changes in postprandial glucose levels to avoid hidden spikes.
- **Advanced Monitoring Tools**: Continuous glucose monitors (CGMs) and paired-meal self-monitoring (SMBG) are effective tools for tracking glucose fluctuations, providing a comprehensive view of glucose dynamics that BP and cholesterol measurements do not require.

Case Scenario: Elevated HbA1c with Normal FBS & PPBS

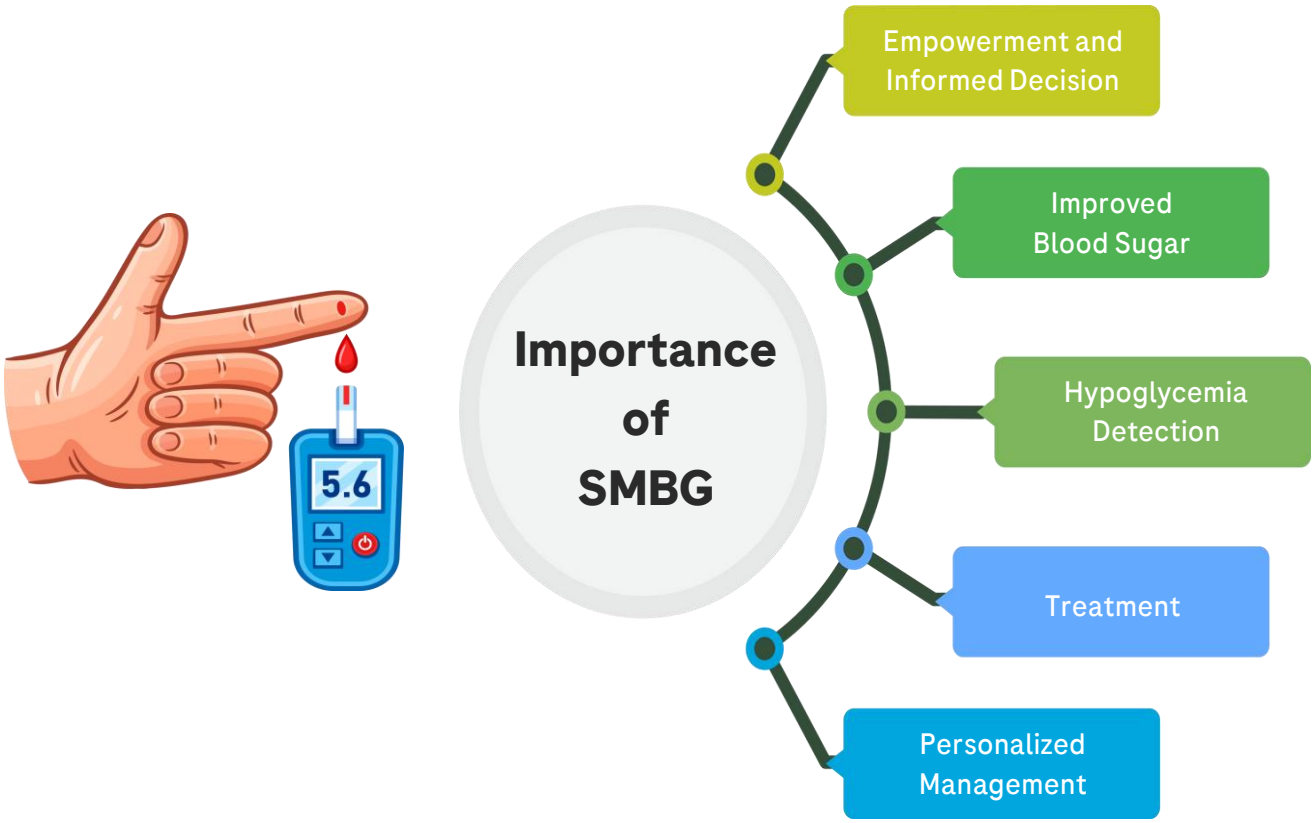
- **Patient**: 48-year-old male, overweight, no diabetes symptoms.
- **Lab Results**:
  - **FBS**: 120 mg/dL
  - **PPBS**: 168 mg/dL
  - **HbA1c**: 8.9 %
- **Structured SMBG Findings**:
  - Normal glucose during the day
  - Elevated glucose at bedtime (250 to 280 mg/dL)
- **Cause**: Late-night high-carb snacking leading to nocturnal hyperglycemia
- **Conclusion**: Normal FBS/PPBS may miss spikes; structured SMBG essential for detecting hidden hyperglycemia.

- **Action**: Lifestyle modification & targeted SMBG led to improved control (HbA1c reduced to 6.2%).

SMBG is an essential component of the modern diabetes treatment[16]

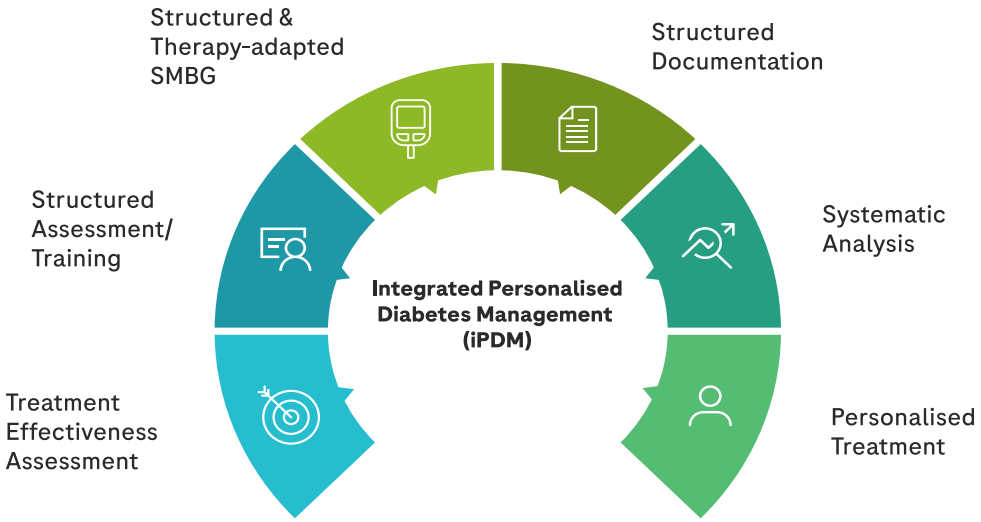
- It is the simplest and possibly most practical tool to assess efficacy and safety of glycemic control.
- SMBG complements HbA1c testing as it can:
  - Differentiate the fasting, pre-prandial, and post-prandial hyperglycemic level
  - Detect the glycemic excursions
  - Recognize and contribute in monitoring resolution of hypoglycemia, and
  - Provide immediate feedback to patients about the effects of food choices, activity, and medication on glycemic control

The International Diabetes Federation (IDF) and American Diabetes Association (ADA) recommend SMBG as an integral component of effective T2DM management



iPDM: A 6-step process, supporting HCPs and patients in their joint decision-making process [17]

iPDM is a concept that structures the treatment process, facilitates communication between HCPs & patients and integrates digital tools that visualize and analyze data.

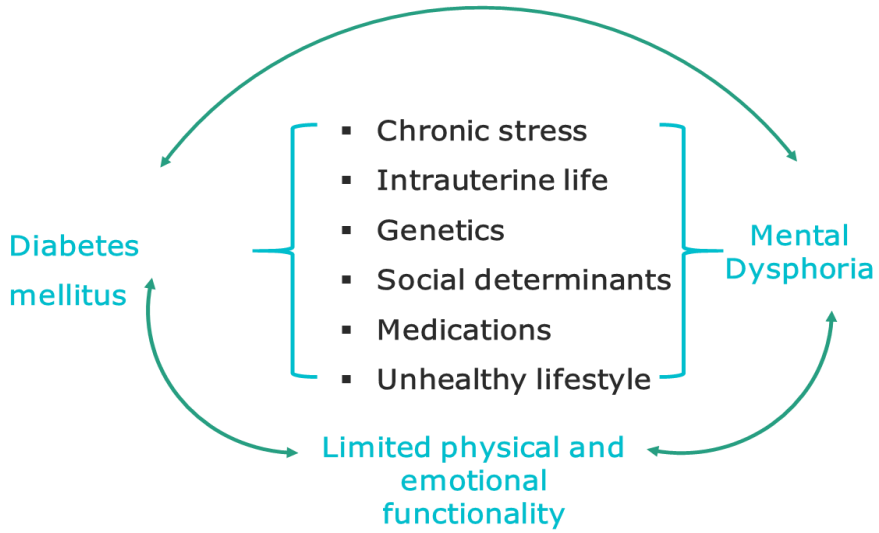


Mental wellbeing in patients with diabetes

Mental Well-being

A state of mental health where an individual feels balanced, is able to cope with the stresses of life, work productively, and contribute to their community. It involves the ability to manage emotions, maintain positive relationships, and function effectively in daily life.

Diabetes and Mental / psychological dysphoria can lead to restrictions in the physical and emotional functionality of those who suffer, forming a self-feeding cycle of interaction.[18]



Diabetes Distress – Source & description[18]

Powerlessness: A state of helplessness when individuals unsuccessfully try to control several challenging, and often uncontrollable, aspects of diabetes.

Negative social perceptions: Feelings of social mistreatment and discrimination by people and employers.

Physician distress: Feelings of mistrust and incompetence about the physician treating diabetes.

Friend/ Family distress: Feeling of being treated as sick and different by family members and friends. Feeling that family and friends exaggerate the threat posed by diabetes.

Hypoglycemia distress: Fearful feelings of experiencing sudden episodes of hypoglycemia such as during driving or sleeping, and fear of failing to notice signs of hypoglycemia.

Management distress: Feeling distressed over not constantly monitoring one's blood glucose levels and feelings of not being sufficiently considerate to diabetes care.

Eating distress: Feeling distressed over unhealthy eating and not exercising disciplined earing behavior to support better management of diabetes.

Cognitive Impairment[19]

Diabetes-Associated Cognitive Decrements (DACD)

Subtle cognitive dysfunction in diabetes with no disruption in everyday activities.

Mild Cognitive Impairment (MCI)

A transitional state between DACD and severe cognitive impairment (e.g., dementia).

Amnesic MCI

Memory-related issues (forgetfulness is very common) causing noticeable disruption, requiring formal testing and management.

Severe Cognitive Impairment

Progression to formal disorders (e.g., dementia), with significant impairment in multiple cognitive domains, disrupting daily activities.

Depression prevalence remains significant in those with type 1 and type 2 diabetes. Effective chronic disease management in people with diabetes is important, particularly screening and managing depression and diabetes distress in specialist care settings.[19]

Depression[19]

Depression Prevalence

Affects over 10% of people globally, marked by symptoms like low mood, fatigue, loss of interest, and sleep disturbances lasting at least two weeks.

Depression in Diabetes

1.5 to 2 times more common in people with diabetes, worsening both conditions and increasing the risk of complications and disability

The Treatment Gap for Depression

Burden of Depression

- 279 million people globally suffer from depression disorders
- Leading cause of disability - 32 million YLL and 34 millions DALYs
- Substantial treatment gap - Globally only one third receive treatment
- And only 8% in LMICs

But Why?

- Limited financing
- Insufficient workforce
- Underdeveloped infrastructure
- People take informal support (such as faith leaders)

What to do?

- Simple, effective and low cost treatments (including psychotherapies)
- Task shifting (Shifting roles of specialists to those with non-specialist background)

Developing and Evaluating a Behavioural Activation Intervention for people with Depression and Diabetes in South Asia[20]

Aim:

To develop and evaluate a culturally appropriate approach to the recognition and treatment of depression in people with diabetes in Bangladesh and Pakistan

Objectives

- **Develop a culturally relevant, scalable intervention delivered by non-specialists, integrated within diabetes care (DiaDeM)**
- **Test the feasibility of DiaDeM, and develop procedures for a full trial evaluation**
- **Evaluate the clinical and cost-effectiveness of DiaDeM versus optimised usual care**

What is the simplest psychotherapeutic treatment option to consider?

Behavioural Activation (BA) is a structured, brief psychotherapeutic approach that aims to:

(a) increase engagement in adaptive activities

(b) decrease engagement in activities that sustain depression or increase risk for depression

(c) solve problems that limit access to reward

BA is effective for depression compared to waitlist control, supportive therapy, and usual care.

Equally effective as CBT and less complex.

Can be delivered by junior mental health workers and nurses due to its simplicity

Why behavioural activation (BA) in diabetes care?

- Relationship between diabetes and depression; there is a lack of integrated care.
- Behavioural Activation (BA) is a therapy that seeks to break the cycle of low mood and behaviour, by encouraging people to engage in positive behaviour (e.g. through planning, ranking, reviewing).
- Good evidence for its effectiveness, can be delivered by non-mental health professionals.

The DiaDeM Programme – **'Developing and evaluating an adapted behavioural activation intervention for people with depression and diabetes in South Asia'**,

Diabetes' Hidden Burden[21]

Diabetes impacts the mental well-being of nearly 8 in 10 Pakistanis living with the condition

Prevalence

- **Over three quarters (78%) of those living with diabetes in Pakistan have experienced anxiety, depression or another mental health condition as a result of their diabetes.**
- **Over half (58%) having faced stigma because of their condition**

Diabetes related factors leading to mental health conditions

- Fear of developing complications (72%)
- Accessing medicines and supplies (69%)
- Accessing support from a healthcare professional (65%)
- Daily diabetes management (62%)

Need for support

- Over three quarters **(79%)** of those affected by burnout admitted to **stopping or interrupting their diabetes treatment** due to stress or feeling overwhelmed
- **78%** of Pakistanis living with diabetes **seeking increased support** for their emotional and mental well-being from their healthcare providers

Anxiety[22]

- **Prevalence**

  Anxiety affects 14% of diabetes patients, compared to 4% in the general population.

- **Causes**

  Dietary restrictions, medication routines, and glucose monitoring can trigger anxiety symptoms.

- **Impact on Health**

  Anxiety may worsen eating habits and reduce physical activity, negatively affecting glucose control.

- **Combined Effect**

  Anxiety and diabetes together can lead to poor diabetes management

Self-esteem and identity[22]

- **Body Image & Self-Esteem**

  Individuals with diabetes, especially those using insulin or with visible complications, may experience challenges with body image and self-esteem.

- **Stigma**

  Diabetes is often wrongly associated with lifestyle choices, leading to social stigma, guilt, shame, and feelings of isolation.

Evaluation of mental wellbeing in patients with diabetes[22]

- **Assessment Tools**

  Use standardized questionnaires like the Diabetes Distress Scale, Beck Depression Inventory, and GAD-7 during diabetes evaluations.

- **Monitoring Indicators**

  Track treatment adherence, lifestyle changes, and patient interactions to detect potential mental health issues.

- **Holistic Care**

  Incorporate regular mental health assessments into diabetes care for comprehensive support.

- **Professional Referrals**

  Refer to mental health specialists when significant distress or disorders are identified.

Using well standardized measures, collaborative, structured SMBG leads to reductions, not increases, in depressive symptoms and diabetes distress over time, for the large number of moderately depressed or distressed type 2 patients in poor glycemic control. Changes in affective status are independent of improvements in glycemic control and changes in SMBG frequency for these patients.[23]

iMPACT – Improving mental and physical health together.

IMPACT is a NIHR Global Health Research Centre established to improve mental and physical health together in Pakistan and Afghanistan

- Theme A: Population-level interventions
- Theme B: Addressing the mental health treatment gap
- Theme C: Preventing diabetes
- Theme D: Reducing cardiovascular disease risk

Concluding Thoughts

- Intervention appeared to work well: participants reported improvement in mood, behaviour, and diabetes management.
- Motivation, planned activities, link between mental and physical health important
- The therapeutic relationship particularly important:
    - Strong Facilitator-Participant Relationship
- Works primarily on an individual level, rather than addressing the wider environment: however family support, and integration with the health system are important.
- For sustainability and integration important to consider:
    - Needs sustainable funding
    - Develop and implement training programs for healthcare providers
    - Advocate for policy changes that support the integration of mental health services into diabetes care

Societal wellbeing in patients with diabetes[24]

Societal wellbeing and diabetes

Societal well-being refers to the ability to participate in and feel valued within a broader social context.

Community Engagement

- Participation in community improvement initiatives often involves collaboration with local residents.
- Engaging in these larger activities fosters strong bonds and cultivates relationships that may not develop in our typical professional or personal settings.

Understanding societal wellbeing in diabetes

- Societal wellbeing involves feeling connected, supported, and engaged in healthy relationships.

- For people with diabetes, societal wellbeing can be affected by the burden of self-care, lifestyle changes, and health management.

The impact of diabetes on social life[25]

- Diabetes management can create social stress:
- Constant monitoring of blood sugar levels
- Dietary restrictions
- Managing symptoms in social situations (e.g., hypoglycemia)
- Fear of stigma or isolation due to the condition

Importance of social support in diabetes management[25]

- Positive social networks are crucial: Emotional support from family, friends, and peers
- Practical help with diabetes management tasks (meal prep, reminders for glucose checks)
- Encouragement in maintaining lifestyle changes

Role of SMBG in societal wellbeing[25]

- Provides immediate feedback on glucose levels.
- Reduces anxiety by offering control over their health in social settings.
- Helps individuals make informed decisions when engaging in social activities (e.g., dining out, parties).

SMBG helps empower people with diabetes

SMBG for enhancing confidence in social settings[25]

- Helps avoid hypo- or hyperglycemia in social situations
- Builds confidence in managing diabetes during gatherings
- Patients feel more at ease participating in social events.

How to ensure social wellbeing? [25]

Connect - Meeting other people with diabetes provides a judgement free space and they can connect with the community more freely.

Inspire - Inspiration to the community to manage diabetes better, feel encouraged and empowered to work towards a better quality of life.

Participate - Active engagement with friends and family will act as a support system

Bonding - Make diabetes an experience!

Comprehensive care in diabetes management[26]

- Comprehensive care models focus on multi-disciplinary, patient-centered approaches to diabetes management.

Collaborative Care Model (CCM) in Diabetes

- Multiple HCPs work together with patients, families, and communities to provide optimal care
- CCM reduces medical errors and improves patient health outcomes.

Evidence-Based Results

- 50% of patients achieve target HbA1c
- 57.8% achieve target LDL cholesterol

Key components of comprehensive diabetes care[26]

- **Multidisciplinary Team**

  Physicians, dieticians, endocrinologists, nurses, diabetes educators, and mental health professionals.

- **Patient-Centred Approach**

  Tailoring care plans to individual patient needs and preferences.

- **Continuous Monitoring**

  Use of SMBG, CGM, and HbA1c monitoring

Importance of interdisciplinary care in diabetes management[27]

- **Optimal Diabetes Care:** Complex and interdisciplinary
- **Routine Management:** Patients may see a physician, diabetes nurse educator, and dietician regularly
- **For Complicated Cases:** Endocrinologists, ophthalmologists, and podiatrists may be involved

Approaches for interdisciplinary care in diabetes management

- **Team-based Approach**

  Recommended for comprehensive care, ideally within a patient-centred medical home.

- **New model**

  Shifts from individual doctor-patient focus to a collaborative team approach, where all providers work at the top of their expertise.

Under utilisation of multidisciplinary teams[28]

Barriers to utilization

- Non-referral and lack of perceived need for services
- Multidisciplinary collaboration in primary healthcare (PHC) remains underused.

CCM is crucial for effective diabetes management, but barriers still hinder its full potential in PHC settings.

Key Takeaways

- The increasing global prevalence of diabetes and its related comorbidities requires immediate and focused attention.
- Diabetes management should adopt a holistic approach, addressing not only physical health but also mental and societal well-being.
- Self-Monitoring of Blood Glucose (SMBG) plays a crucial role in empowering patients to take control of their diabetes management.
- Effective diabetes care involves comprehensive, patient-centered strategies tailored to individual needs.
- Collaborative care, involving endocrinologists, mental health professionals, and nutritionists, is essential for optimizing diabetes management and achieving better patient outcomes.

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