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Diabetes and Its Management through Continuous Glucose Monitoring Devices

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Abstract
Pharmacists are integral to the care of diabetes. Due to advancements of new tools in their clinical toolkit, their clinical success has extended to encompass the optimization of technology through continuous glucose monitoring (CGM) to improve diabetic outcomes further. Continuous glucose monitoring (CGM), a key improvement in diabetes technology, improves diabetes management. Patients can get instant information on glucose trends, directional changes, rate of fluctuation, and levels via the continuous glucose monitor (CGM). Pharmacists can assist patients in alleviating the fear and uncertainty related to the utilization of a continuous glucose monitor (CGM) by being accessible in both community and hospital environments. They can assist patients in obtaining precise and reliable monitoring results to aid in managing their diabetes care plan.

Keywords: Diabetes, continuous glucose monitoring, Hyperosmolar hyperglycemic state (HHS), hypoglycemia, hyperglycemia, HbAIc

Overview

The National Institute of Health (NIH) reports that diabetes currently affects approximately 38 million individuals in the United States, with its incidence rate rising globally. Approximately one in ten individuals have diabetes. Approximately 35 million people, or 95% of these instances, have type 2 diabetes, a chronic condition in which the body cannot use insulin as it should, leading to elevated blood glucose levels. Uncontrolled diabetes can result in long-term consequences such as retinopathy, neuropathy, nephropathy, and cardiovascular disease. Historically, type 2 diabetes was diagnosed as adult-onset diabetes due to its prevalence in adults. Currently, it is increasingly diagnosed in children and young people. Type 2 diabetes can be effectively treated with lifestyle modifications, blood glucose monitoring, and pharmacological interventions that reduce blood glucose levels. Enhanced glycemic control diminishes the likelihood of long-term diabetic problems, yet research indicates that the incidence of severe hypoglycemia crises has increased. "In the last decade, novel classes of medications for diabetes management have emerged, transforming the treatment landscape," states Yale Medicine endocrinologist Anika Anam, MD. "Significant advancements in diabetes technologies, including continuous glucose monitors and 'closed loop' insulin pumps, have enhanced patients' ability to manage their diabetes more effectively." Continuous Glucose Monitoring (CGM) is a significant recent advancement in diabetes technology that enhances glucose regulation without needing additional medication. Unlike self-monitoring blood glucose (SMBG), which only offers one blood glucose measurement at the time of the test, the CGM provides information on glucose concentrations, direction of change, rate of change, and overall glucose trends. 7.8 Because of these characteristics, multiple studies have shown that CGM can enhance glycemic control, potentially reducing both micro- and macrovascular problems associated with diabetes without raising the risk of hypoglycemia. [1][2][3][4]

Prediabetes and type 2 Diabetes

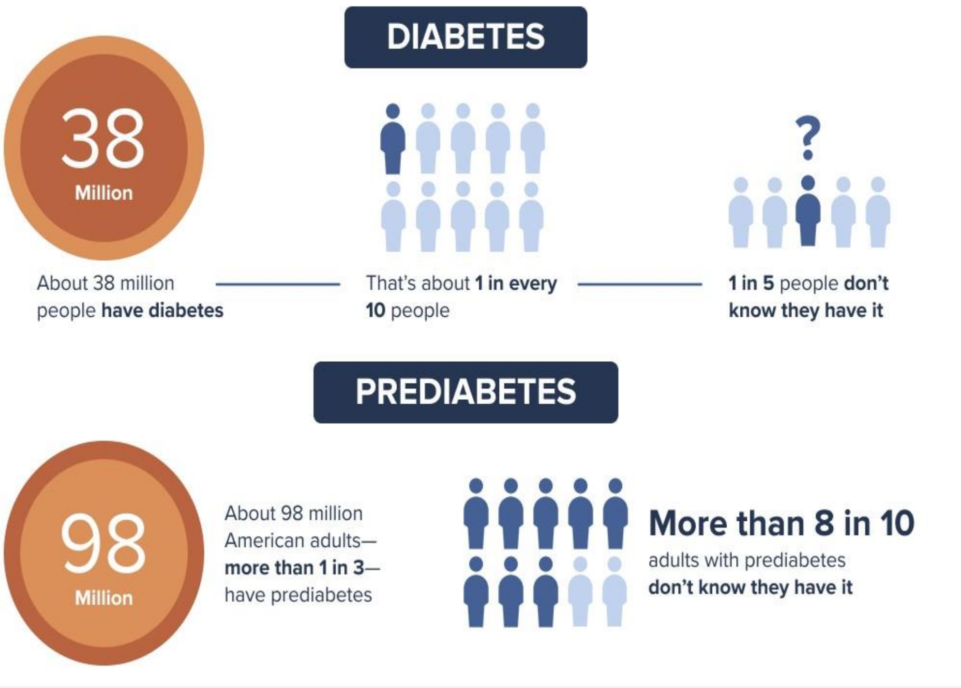
Prediabetes is when blood glucose levels are elevated above the normal glucose range but not high enough to be classified as diabetes. Even if they do not exhibit any symptoms, individuals with prediabetes are more prone to develop type 2 diabetes, heart disease, and stroke. Approximately one in three persons in the U.S. has prediabetes, although most are oblivious to their condition.

The condition known as type 2 diabetes, or type 2 diabetes mellitus, is characterized by higher-than-usual blood glucose (a form of sugar) levels. The body's primary energy source is glucose. The body typically absorbs glucose and other nutrients after consuming a carbohydrate-rich meal like bread. After entering the bloodstream, the glucose is distributed to all of the body's cells. The pancreas produces the hormone insulin, which the body utilizes to assist the glucose entering the cells.

Type 2 diabetes occurs when the body's cells do not respond correctly to insulin, and glucose does not transfer efficiently from the bloodstream into the cells. This phenomenon is referred to as insulin resistance. Consequently, the concentration of glucose in the bloodstream increases. In response to elevated blood glucose level, the pancreas first increases insulin production, which may temporarily regulate blood glucose levels; however, the pancreas fails to produce sufficient insulin to maintain blood glucose level within the normal range.

Hyperglycemia, or elevated blood glucose, results from glucose accumulation in the blood. Elevated blood glucose levels can harm blood vessels and nerves, resulting in many symptoms, including polyuria, polydipsia, weariness, blurred vision, and weakness.

Type 2 diabetes is not the same as type 1 diabetes, which is characterized by elevated blood glucose levels and little or no insulin production by the body. [1][2]



https://idahopublichealth.com/type-2-diabetes/ [21]

Risk factors for type 2 diabetes

The following are risk factors for type 2 diabetes:

- **Personal or Familial history of type 2 diabetes in a progenitor or sibling**: The risk is higher for women who have had gestational diabetes and polycystic ovarian syndrome, and for people with a family history of type 2 diabetes, hypertension, existing prediabetes, history of cardiac insufficiency or myocardial infraction or High levels of triglycerides and low levels of good (HDL) cholesterol.
- **Excess weight and obesity**: Obesity, which is common in people with metabolic syndrome, impairs the body's cells' ability to react to insulin. Insulin aids in the transport of glucose into the cells for energy. When the body is unable to produce enough insulin to overcome this resistance, blood sugar levels rise, and type 2 diabetes develop.
- **A sedentary lifestyle and lack of physical activity**: smoking, tobacco or alcohol use, some drugs, such as atypical antipsychotics, thiazide diuretics, and glucocorticoids Exposure to specific poisons, such as arsenic, bisphenol A (BPA), and insecticides contribute to the risk of metabolic syndrome.
- **Age and Diet**: Predominantly observed in those over 45 years old and Intake of red meat, processed meat, and sugary drinks, together with a low intake of fiber [22][23][24]

risk-factors-of-type-2-diabetes.jpg (1500×975) [25]

Symptoms of type 2 Diabetes

In several instances, individuals with type 2 diabetes exhibit no symptoms. When symptoms occur, they could include increased nighttime urination, increased thirst, hunger, and appetite, excessive exhaustion, blurred vision, inadvertent weight loss, and tingling and numbness in the hands and feet. Recurrent infections or ulcers that exhibit delayed healing.

TABLE. 1. Criteria for the Diagnosis of Diabetes
FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*
OR
2-h plasma glucose ≥200 mg/dL (11.1 mmol/L) during an OGTT. The test should be performed as described by the World Health Organization, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*
OR
A1C ≥6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the Diabetes Control and Complications Trial assay.*
OR
In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).
In the absence of unequivocal hyperglycemia, results should be confirmed by repeat testing.

Acanthosis nigricans is another condition that people with insulin resistance may get. It is characterized by darker skin in places like the armpits, behind the breasts, and the neck. [26]

Hyperosmolar hyperglycemic state (HHS) is a condition that can result from extremely high blood glucose levels. The symptoms of HHS, a potentially fatal illness, include extreme dehydration, confusion, and unconsciousness. [1]

How is type 2 diabetes diagnosed?

When making a diabetes diagnosis, it is important to ask about the patient's medical history, when the symptoms first appeared, and the results of their blood glucose levels.

Hemoglobin A1C (HbA1C) test, also known as A1C, is used to determine the average glucose in the blood over the previous three months. When the A1C level hits 6.5% or more, diabetes is diagnosed. Prediabetes is characteristic of A1C levels that fall between 5.7 and 6.4%.

Fasting plasma glucose (FPG) test is a test that detects fasting blood glucose who have been fasting for at least eight hours. Prediabetes is diagnosed when fasting plasma glucose levels are between 100 and 125 mg/dL; above 126 mg/dl will confirm the diabetes diagnosis. A fasting plasma glucose (FPG) level of 99 mg/dL or below is within the normal range.

Random plasma glucose (RPG) test is used to measure glucose levels in the blood of individuals experiencing symptoms of type 2 diabetes. It is not necessary for patients to fast in order to have this examination. Those who exhibit symptoms and have RPG levels that are at least 200 mg/dL are considered to have diabetes.

Oral glucose tolerance test (OGTT) determines how effectively the body processes glucose. Before blood collecting, the patient must fast for at least eight hours. To detect the level of glucose in the blood while the individual is fasting, the blood sample is tested. The patient is then given a solution containing a high glucose concentration to drink. Following the glucose solution's consumption, blood samples are taken once more at intervals of one, two, and occasionally three hours. In Diabetic patients, the blood glucose level reaches 200 mg/dL after two hours, while prediabetic patients have glucose levels between 140 and 199 mg/dL. [1][2]

https://communitymedicine4asses.wordpress.com/2016/12/27/american-diabetes-association-releases-standards-of-medical-care-in-diabetes-part-1-classification-and-diagnosis-of-diabetes/ [27]

How is type 2 diabetes managed?

The primary goal of type 2 diabetes treatment is to reduce complications and enhance overall quality of life. Keeping blood glucose levels within a specified range relieves symptoms and lowers the risk of complications.

Treatment comprises a diverse strategy that may include:

Patient instruction: An essential part of treatment is educating patients about type 2 diabetes and how it relates to lifestyle choices, blood glucose testing, and treatment.

Lifestyle changes consist of eating a balanced diet and getting frequent exercise. Smokers should give up, and those who are obese or overweight should try to reduce their weight. Refraining from excessive alcohol use is also advised.

Monitoring: Individuals with type 2 diabetes may require blood glucose monitoring. A blood glucose monitoring device and a finger stick with a lancet are usually used for this. In certain instances, a continuous glucose monitoring device may be implanted beneath the skin to measure blood glucose levels continuously throughout the day. Periodic A1C and/or other blood testing is typically required.

Medications: A variety of medications that reduce blood glucose levels are accessible. They function in several ways, such as enhancing the way cells use insulin, boosting the pancreatic production of insulin, or assisting the kidneys in excreting more glucose into the urine. Additionally, type 2 diabetes can be treated with insulin injections.

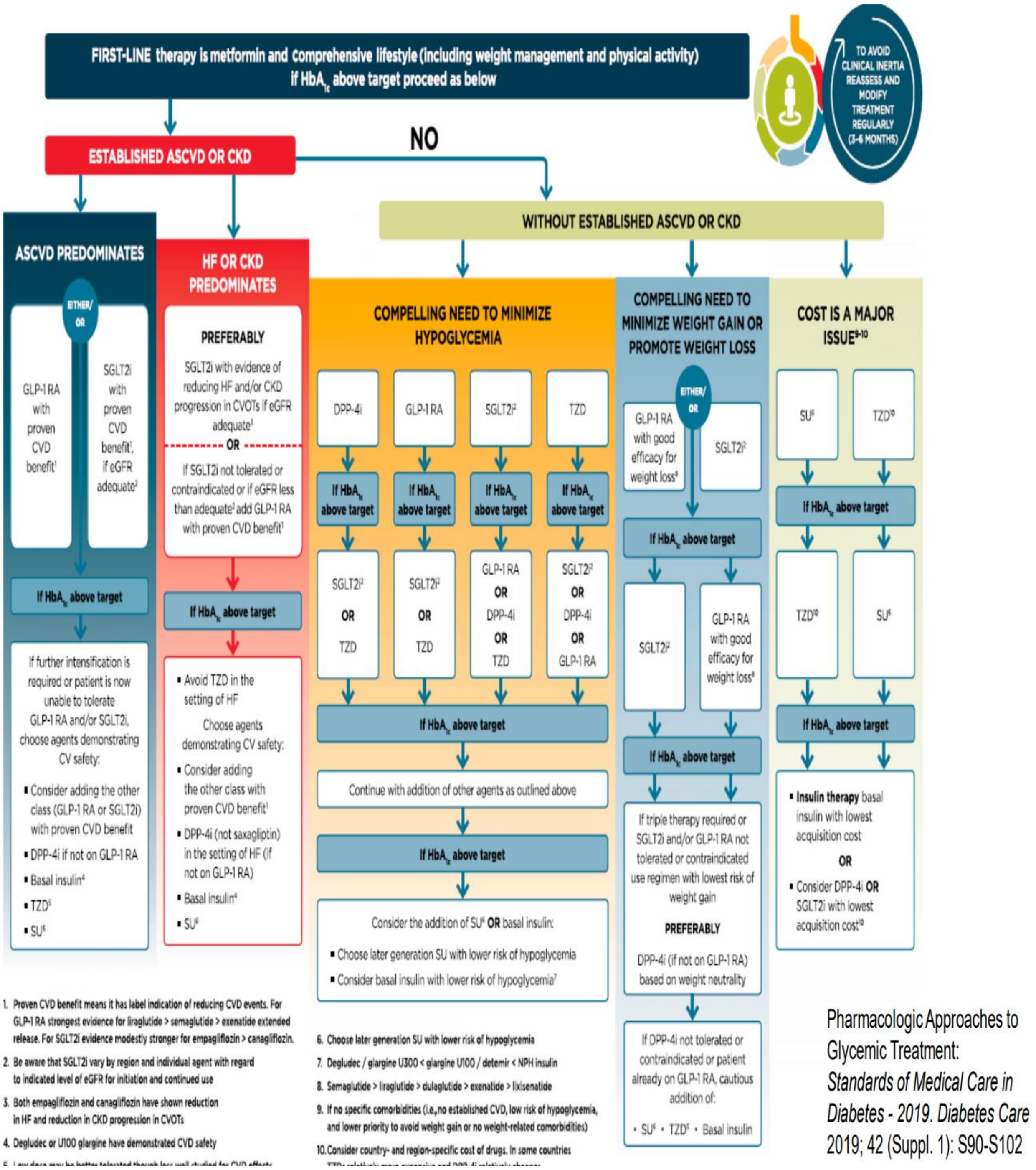


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Table 9.1—Drug-specific and patient factors to consider when selecting antihyperglycemic treatment in adults with type 2 diabetes

	Efficacy	Hypoglycemia	Weight change	CV effects		Cost	Oral/SQ	Renal effects		Additional considerations
				ASCVD	CHF			Progression of DKD	Dosing/use considerations*	
Metformin	High	No	Neutral (potential for modest loss)	Potential benefit	Neutral	Low	Oral	Neutral	• Contraindicated with eGFR <30	• Gastrointestinal side effects common (diarrhea, nausea) • Potential for B12 deficiency
SGLT-2 inhibitors	Intermediate	No	Loss	Benefit: empagliflozin†, canagliflozin	Benefit: empagliflozin†, canagliflozin	High	Oral	Benefit: canagliflozin, empagliflozin	• Renal dose adjustment required (canagliflozin, dapagliflozin, empagliflozin, ertugliflozin)	• **FDA Black Box:** Risk of amputation (**canagliflozin**) • Risk of bone fractures (canagliflozin) • DKA risk (all agents, rare in T2DM) • Genitourinary infections • Risk of volume depletion, hypotension • ↑LDL cholesterol • Risk of Fournier's gangrene
GLP-1 RAs	High	No	Loss	Neutral: lixisenatide Benefit: liraglutide† > semaglutide > exenatide extended release	Neutral	High	SQ	Benefit: liraglutide	• Renal dose adjustment required (exenatide, lixisenatide) • Caution when initiating or increasing dose due to potential risk of acute kidney injury	• **FDA Black Box:** Risk of thyroid C-cell tumors (**liraglutide, albiglutide, dulaglutide, exenatide extended release**) • Gastrointestinal side effects common (nausea, vomiting, diarrhea) • Injection site reactions • ?Acute pancreatitis risk
DPP-4 inhibitors	Intermediate	No	Neutral	Neutral	Potential risk: saxagliptin, alogliptin	High	Oral	Neutral	• Renal dose adjustment required (sitagliptin, saxagliptin, alogliptin); can be used in renal impairment • No dose adjustment required for linagliptin	• Potential risk of acute pancreatitis • Joint pain
Thiazolidinediones	High	No	Gain	Potential benefit: pioglitazone	Increased risk	Low	Oral	Neutral	• No dose adjustment required • Generally not recommended in renal impairment due to potential for fluid retention	• **FDA Black Box:** Congestive heart failure (**pioglitazone, rosiglitazone**) • Fluid retention (edema; heart failure) • Benefit in NASH • Risk of bone fractures • Bladder cancer (pioglitazone) • ↑LDL cholesterol (rosiglitazone)
Sulfonylureas (2nd generation)	High	Yes	Gain	Neutral	Neutral	Low	Oral	Neutral	• Glyburide: not recommended • Glipizide and glimepiride: initiate conservatively to avoid hypoglycemia	• FDA Special Warning on increased risk of cardiovascular mortality based on studies of an older sulfonylurea (tolbutamide)
Insulin – Human insulin	Highest	Yes	Gain	Neutral	Neutral	Low	SQ	Neutral	• Lower insulin doses required with a decrease in eGFR; titrate per clinical response	• Injection site reactions • Higher risk of hypoglycemia with human insulin (NPH or premixed formulations) vs. analogs
Insulin – Analogs						High	SQ			

*For agent-specific dosing recommendations, please refer to the manufacturers' prescribing information. †FDA approved for CVD benefit. CHF, congestive heart failure; CV, cardiovascular; DPP-4, dipeptidyl peptidase 4; DKA, diabetic ketoacidosis; DKD, diabetic kidney disease; GLP-1 RAs, glucagon-like peptide 1 receptor agonists; NASH, nonalcoholic steatohepatitis; SGLT2, sodium–glucose cotransporter 2; SQ, subcutaneous; T2DM, type 2 diabetes.

See page S93 in:

Pharmacologic Approaches to Glycemic Treatment: *Standards of Medical Care in Diabetes - 2019. Diabetes Care* 2019; 42 (Suppl. 1): S90-S102

Pharmacologic approaches to glycemic Treatment: standards medical care in diabetes- 2019. Diabetes care 2019; 42 (suppl. 1): S90-S102 [28]

Addressing underlying conditions: Treatment of any related medical issues, such as high blood pressure and high LDL cholesterol, is crucial for those with type 2 diabetes. Some people may also benefit from bariatric surgery to help them lose weight. [1][2][3][4]

Continuous glucose monitoring (CGM)

Research indicates that enhanced glycemic control diminishes the risk of long-term diabetic complications; nonetheless, the incidence of severe hypoglycemia crises has increased. Continuous

Glucose Monitoring (CGM) represents a significant recent advancement in diabetes technology that enhances glucose regulation without additional medication. The Continuous Glucose Monitor (CGM) offers data on glucose levels, trends, pace, and direction of change while self-monitoring blood glucose (SMBG) yields just a single glucose measurement at the time of testing. [31][32]
Due to these characteristics, multiple studies have demonstrated that continuous glucose monitoring (CGM) can enhance glycemic management, potentially diminishing both microvascular and macrovascular problems linked to diabetes without elevating the risk of hypoglycemia. [33][34]

How does continuous glucose monitoring work

A continuous glucose monitorING (CGM) device measures glucose levels at regular intervals and records them over time. A continuous glucose monitor comprises three components. A small sensor can be implanted beneath the skin, typically on the abdomen or arm, secured by an adhesive patch. These sensors are referred to as disposable sensors. A different variety of CGM sensors—referred to as implanted sensors—can be inserted into the body. CGM sensors assess the glucose concentration in the interstitial fluid, which closely resembles the glucose level in the bloodstream. Sensors require replacement at set intervals, typically every few weeks, contingent upon the sensor type. The second component of the CGM is a transmitter. The transmitter wirelessly transmits information to a third entity, a software application located on a smartphone, an insulin pump, or a distinct equipment known as a receiver. [1][2][3]
Continuous Glucose Monitoring (CGM) devices are accessible for individual and clinical applications. The patient is directed to utilize the device for a designated duration, typically 1 or 2 weeks consecutively. The physician may make data visible or concealed from the patient utilizing the device. In contrast, the patient possesses continuous glucose monitoring (CGM) equipment, designed for frequent, even continuous, utilization as a real-time CGM (rtCGM) that autonomously records glucose levels without requiring prompts. [13][14]
Intermittent-scanning continuous glucose monitoring (isCGM) devices necessitate scanning to record data. Adjunctive personal-use continuous glucose monitoring (CGM) devices can modify insulin dosages, contingent upon a blood glucose monitor (BGM) confirmation of values. In contrast, nonadjunctive devices can alter dosages without BGM value verification. [14][15]

Who can use a continuous glucose monitor

According to the American Diabetes Association (ADA), anyone with diabetes who can safely and benefit from the device, including pregnant women and children, can use continuous glucose monitors (CGMs). Over time, the ADA has broadened its guidelines for the use of CGMs, and as of 2022, they are advised for those with diabetes and a range of insulin regimens.

The following are some requirements for using a CGM:

Having an insulin prescription or a history of low blood sugar issues; Having been diagnosed with diabetes and receiving treatment with multiple daily injections (MDI) or continuous insulin infusion via a pump; being able to use the device safely, either alone or with a caregiver. [2]

Pediatric CGM Recommendations

In the United States, real-time continuous glucose monitoring (CGM) is authorized for nonadjunctive use in children aged 2 years and older, while intermittently scanned CGM is approved for nonadjunctive use in children aged 4 years and older. Parents, caregivers, and teenagers should receive initial and continuous instruction and assistance for continuous glucose monitoring (CGM). The ADA proposes a greater degree of evidence for usage in juvenile patients with type 1 diabetes, which deviates slightly from the general adult recommendations. According to the American Diabetes Association, pediatric patient with T1D who receive multiple daily insulin injections or continuous subcutaneous insulin infusion (via pump) and who can use the device independently or with assistance from a caregiver should be offered rtCGM (evidence grade A) or isCGM (evidence level E) to manage their diabetes. Although the American Diabetes Association (ADA) strongly advises that the patient's choices, needs, and circumstances be considered when choosing a device, offering either rtCGM or isCGM to control type 2 diabetes (T2D) in kids was recommended at an evidence grade E.

Different types of continuous glucose monitoring

All CGMs assess blood glucose, but they store and show data differently. Some CGMs automatically display data on the phone or receiver. These are "real-time" CGMs. Intermittent-scan CGMs continuously estimate glucose levels. They scan the CGM with a separate receiver or smartphone every few hours to view and store data. Healthcare professionals can download and evaluate blood glucose data from a third form of CGM. For diabetic monitoring, doctors prescribe this CGM for a limited duration. Other CGM model changes includes Sensor placement (skin or implanted), Replacement frequency, Warm-up time, Program settings adjustment. Some CGM units require a finger-stick test with a standard blood glucose monitor to calibrate and verify readings. [2][3]

	Dexcom G6	Dexcom G7	Guardian Sensor 3	Guardian Sensor 4	FreeStyle Libre	FreeStyle Libre 2	FreeStyle Libre 3	Eversense	Eversense E3
Company	Dexcom	Dexcom	Medtronic	Medtronic	Abbott	Abbott	Abbott	Senseonics	Senseonics
Size, mm	45×30×15	27.3×24×4.6	35×28×9.5	35×28×9.5	35×5	35×5	21×2.9	18.3×3[a]	18.3×3[a]
FDA approved year	2018	Awaiting	2018	Awaiting	2017	2020	2022	2018	2022
Approved age	≥2 years	≥2 years	≥2 years	≥14 years	≥18 years	≥4 years	≥4 years	≥18 years	≥18 years
Sensor type	Real-time	Real-time	Real-time	Real-time	Intermittent scanning	Intermittent scanning	Real-time	Real-time (implantable)	Real-time (implantable)
Wear time	10 days	10.5 days	7 days	7 days	14 days	14 days	14 days	90 days	180 days
Warm-up period	2 hours	27 minutes	2 hours	2 hours	1 hour	1 hour	1 hour	24 hours	24 hours
Calibration required	No	No	Yes (2 times/ day)	No	No	No	No	Yes (2 times/ day)	Yes (2 times/day for 21 days, 1 time/day after day 21)
Alarms for hypo/ hyperglycemia	Yes	Yes (can be delayed up to 6 hours)	Yes	Yes	No	Yes (optional)	Yes (optional)	Yes (on-body vibration)	Yes (on-body vibration)
Integrity with insulin pumps	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
Platform	Dexcom clarity	Dexcom clarity	CareLink Personal	CareLink Personal	Libreview	Libreview	Libreview		
LibreLinkUp	Eversense DMS	Eversense DMS							
Accuracy (MARD)	10.0%	8.2% (arm), 9.1% (abdomen)	8.7% (arm), 9.6% (abdomen)	10.6%	11.4% (arm)	9.2% (adults), 9.7% (pediatrics)	9.2% (adults), 9.7% (pediatrics)	8.8%	9.1%
Accuracy in low glucose range (MAD)	10.9 mg/dL (glucose level <54 mg/dL)	8.5 mg/dL (arm), 10.3 mg/dL (abdomen) (glucose level 40–60 mg/dL)	NA	NA	11.3 mg/dL (glucose level <100 mg/dL)	9.1 mg/dL (adults), 8.8 mg/dL (pediatrics)	9.1 mg/dL (adults), 8.8 mg/dL (pediatrics)	NA	7.5 mg/dL (glucose level ≤60 mg/dL)
Bluetooth free range	6 m	6 m	6 m	6 m	NA	NA	10 m	7.6 m	7.6 m

FDA, U.S. Food and Drug Administration; MARD, mean absolute relative difference; MAD, mean absolute difference; NA, not applicable.
[a]Implantable sensor size.

Advances in Continuous Glucose Monitoring and Integrated Devices for Management of Diabetes with Insulin-Based Therapy: Improvement in Glycemic Control - Scientific Figure on ResearchGate.

Available from: https://www.researchgate.net/figure/Comparison-of-continuous-glucose-monitoring-systems_tbl1_367115238 [accessed 15 Dec 2024] [28]

Advantage of CGM use:

The CGM offers many glucose readings, improving patient care by observing glucose trends. CGM provides real-time blood glucose data and can be accessed by healthcare practitioners and patients to track glycemic trends. [34]. A CGM can help control glucose levels daily, have fewer low blood glucose emergencies, and require fewer finger sticks than a traditional blood glucose meter. The use of CGM can prevent hypoglycemia and hyperglycemic crises since the patient will behave. A CGM alert and graphic may reveal whether the glucose level rises or falls and how rapidly the best method may be picked to attain the target range. Managing glucose levels can help avoid diabetes complications over time. CGM users who use it daily or nearly daily benefit most. [2][3]

Disadvantage of CGM use:

Even though Researchers are improving CGM accuracy and usability, CGM use may cause difficulties. If patients or healthcare providers have doubts about their CGM readings, or their insulin dose has to be changed, or receive a warning alert, CGM glucose results need to be compared with finger-stick tests and traditional blood glucose meters for safety. Over time, CGM parts may need replacement. Depending on the model, disposable CGM sensors should be replaced every 7–14 days, while implantable sensors last 180 days. Some CGM transmitters also need replacement. A malfunctioning CGM may require reconnecting the transmitter, receiver, and smartphone. Some people experience skin redness or irritation with sensor adhesive patches. [2][3][4]

Coverage and Potential Cost Savings of CGM

Most private health insurance and Medicare cover physician-prescribed continuous glucose monitors (CGMs). Most commercial insurers cover CGMs for significant type 1 diabetes. Most commercial insurance holders pay $0 to $35 monthly for FreeStyle Libre CGM sensors. CGMs are covered by Medicare Part B for seniors and disabled people. Medicare Advantage programs cover CGMs and supplies at or above Medicare. Most state Medicaid programs cover CGMs, but not all. Coverage is higher in states with expanded Medicaid. Devices and supplies may cost a lot, even with insurance. Through a durable medical device provision, several commercial payers limit CGM coverage to T1D patients. Although T2D patients with intense insulin therapy have a similar risk of insulin-induced hypoglycemia as T1D patients, few cover the technology. CGM coverage through the pharmacy benefit allows people with diabetes to pick up their supplies, treatments, and glucose monitors at the pharmacy and avoid insulin monitoring issues. Most pharmacy benefit managers have Dexcom CGM systems and components on their national preferred formularies. Health plans and plan sponsors can elect to provide them as a pharmacy benefit.

FDA approved first over the counter CGM:

On 05-Mar-2024 The U.S. Food and Drug Administration cleared for marketing the first over the counter (OTC) continuous glucose monitor (CGM). The Dexcom Stelo Glucose Biosensor System is an integrated CGM (iCGM) uses a wearable sensor, paired with an application installed on a user's smartphone or other smart device, to continuously measure, record, analyze and display glucose values in people 18 years and older that are not on insulin and who do not have problematic hypoglycemia (low blood sugar). Users can wear each sensor for up to 15 days before replacing with a new sensor. The device presents blood glucose measurements and trends every 15 minutes in the accompanying app. Users should not make medical decisions based on the device's output without talking to their healthcare provider. [35]

Conclusion/ The future of continuous glucose monitoring:

In 2021, 11.6% of the U.S. population, or 38.4 million individuals, had diabetes, while 8.7 million adults aged 18 or older had undiagnosed diabetes, or 22.8% of all adults with diabetes. One in three Americans may have diabetes by 2050, according to predictions. This alarming statistic makes it even more important to optimize diabetes technologies, including CGM, and the hardware and software needed to allow people with diabetes to self-manage their condition. CGM revolutionizes insulin therapy and opens new avenues for innovation and standardization. It provides patients and caregivers with actionable information to enhance outcomes. Diabetes technology now includes "CGM-informed algorithms" that regulate insulin delivery. As the use of CGM becomes more sophisticated and evolved, these technological innovations require knowledge and support to succeed. By increasing access to eligible patients and partnering to identify and resolve health disparities and social variables that negatively impact people with diabetes, pharmacists can enhance this resolve by embracing technology for optimal utilization. Pharmacists should stay current on guideline recommendations and emergency data that tell the healthcare community of the clinical benefits of optimum CGM and other diabetes technologies as they become available. The assumption is that CGM will continue to reduce insulin-requiring diabetes' cognitive, emotional, physiological, and economic challenges. [36][2]

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