# CGM in Primary Care: From Data to Decisions

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## CONTINUING MEDICAL EDUCATION

### LEARNING OBJECTIVES

At the end of the activity, participants will be able to:

- **Apply** accurate strategies for interpreting continuous glucose monitoring (CGM) data to inform diabetes treatment decisions and support integration of CGM into clinical practice.
- **Integrate** CGM into routine care of patients with diabetes in primary care settings and understand who would benefit from CGM use.
- **Describe** new and emerging CGM technologies, including longer wear, over-the-counter CGM devices, and continuous ketone monitoring, including how they can be integrated into clinical practice.
- **Collaborate** with the multidisciplinary health care team for diabetes care and incorporation of CGM into diabetes management.

### TARGET AUDIENCE

Family physicians and clinicians who wish to gain increased knowledge and greater competency regarding primary care management of continuous glucose monitoring.

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Visit https://www.pcmg-us.org/toolkit/cgm for a resource toolkit. References from this article, including the described video, are available from the toolkit.

## INTRODUCTION

Diabetes affects an estimated 38.4 million people in the United States, with 22.8% of adults undiagnosed.[1] Approximately 90% of diabetes care in the United States occurs in the primary care setting, indicating that the majority of patients with diabetes are managed by primary care clini-

## Key takeaways

- CGM offers numerous benefits to patients and clinicians, including increased engagement in diabetes care, improved health behaviors, better indicators of glucose management, and improved clinical outcomes.
- Every patient with diabetes will benefit from using CGM; CGM insurance coverage is possible for many, and the cash price is often affordable.
- Over-the-counter CGM devices are newer technologies that may help patients access CGM, although limitations in glucose measurement ranges and data sharing should be considered.
- Continuous glucose-ketone monitoring is a newer tool that may help prevent and manage diabetic ketoacidosis, pending US Food and Drug Administration approval.
- Clinicians should seek to empower patients and members of the health care team to utilize CGM data for improved clinical care of diabetes.

cians (PCCs).[2] The need for PCCs in diabetes care is emphasized by the shortage of endocrinologists available to treat diabetes.[3]

Progress in the understanding of diabetes pathophysiology and new treatments have advanced the care of patients with type 1 diabetes (T1D) and type 2 diabetes (T2D), yet many patients still do not achieve glycemic targets.[4] Diabetes technology, including continuous glucose monitoring (CGM), has also improved overall care of patients with diabetes in recent years and has the potential to make a larger impact with optimal implementation in primary care settings.[5] The American Diabetes Association (ADA) and the American Association of Clinical Endocrinology (AACE) recommend the use of CGM for many patients with diabetes and recognize the benefits of CGM use.[6,7]

### CASE STUDY 1

A 42-year-old woman with a 5-year history of T2D and a glycated hemoglobin (A1c) of 8.2% presents to her primary care clinic for a routine diabetes follow-up. She is currently taking metformin 2000 mg daily, empagliflozin 25 mg daily, and insulin glargine 30 units daily.

Her A1c has improved over the past few years from treatment intensification, but she feels that her diet and exercise could be further enhanced and she heard that CGM may help with regulating her blood glucose. She asks her PCC about CGM and what her options might be.

In this case study, the patient is an excellent candidate for CGM. As her primary care team describes CGM and helps her access the technology, she is likely to benefit from using CGM. The detailed information on blood glucose patterns helps to inform treatment decisions, as well as lifestyle behaviors, in patients with diabetes.[8]

The usefulness and benefits of CGM are increasingly recognized in monitoring and treating patients with T2D. The ADA 2026 *Standards of Care in Diabetes* recommends that CGM should be used in patients with diabetes who are 1) on insulin therapy, 2) on noninsulin therapies that can cause hypoglycemia, and 3) on any diabetes treatment in which CGM helps in management.[6] These recommendations are based on data from randomized controlled trials, real-world studies, and observational analyses.[6,9]

CGM is associated with many benefits for patients with diabetes, including improved health behaviors, reductions in A1c, less hypoglycemia, decreases in body weight, reduced caloric intake, increased physical activity, improved treatment satisfaction, and adherence to a personal eating plan.[5] For clinicians, CGM benefits include increased patient engagement, better hypoglycemic awareness and improved prevention, greater insight into therapeutic impacts on glucose management, and use of the ambulatory glucose profile (AGP), a compiled analysis of the data for enhanced understanding of glucose patterns that can aid in data visualization.[10] Additionally, in patients for whom A1c measurements are less reliable, such as those with hemoglobinopathies, CGM is a valuable option for assessing glycemic control.[11]

Despite these benefits, rates of CGM use remain low, with a 2021 retrospective study finding that only about 13% of patients with T2D had used CGM.[12] Patients who used CGM were more likely to receive care in endocrinology compared to primary care in the study (35.7% vs 23.2%, respectively). Among patients who were not taking insulin, new CGM prescriptions were more common in primary care (28%) than in endocrinology (5%). Notably, the number of patients being prescribed CGM in primary care settings grew at a more rapid rate from 2020 to 2021 (125%) than in endocrinology (5%), highlighting the potential impact of widespread implementation of CGM in primary care.[12]

## USING CGM IN PRACTICE: THE AGP AND ADJUSTING TREATMENT

While A1c and fingerstick blood glucose levels continue to be utilized, they are point-of-care metrics and are limited because they do not provide real-time glucose data, variability, and AGP analysis that CGM offers. CGM metrics measured and reported in the AGP are important and more comprehensive indicators for diabetes management.[5]

### CASE STUDY 2

A 68-year-old man with a 10-year history of T2D and chronic kidney disease who is using CGM presents to his PCC with the most recent AGP report available. He takes metformin 2000 mg daily, empagliflozin 10 mg daily, and insulin glargine 34 units daily. He is unable to tolerate glucagon-like peptide-1 receptor agonists.

The AGP shows trends of 81% time in range (TIR) (70-180 mg/dL), 18% high (181-250 mg/dL), and 1% low (54-69 mg/dL) with CGM active 89% of the time (**FIGURE 1**). Upon closer examination, the PCC notices several days of low glucose readings occurring in the morning, as early as 5:00 am and as late as 11:30 am (**FIGURE 2**). The patient's A1c today is 6.8%, achieving the goal of <7.0%.

In this case study, the patient is achieving his A1c goal and has an overall well-managed glycemic profile, based on the AGP report. However, he is having occasional low blood glucose readings some mornings a few hours after breakfast. While the patient was able to manage these hypoglycemic episodes at home, a reduction in his insulin glargine (e.g., to 28 units daily) will help improve the safety of his treatment regimen, while retaining adequate glucose control for his goals. A collaborative discussion about his lifestyle behaviors that may have prompted hypoglycemic events (such as delayed meals and increased activity) may also be helpful. Of note, based only on A1c measurements, the insulin regimen may not have been adjusted, but with the additional information provided by CGM, a need for adjustment was identified.

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Understanding the AGP is an essential component of incorporating and applying CGM use in diabetes management. The AGP provides CGM summary statistics such as the average glucose, glucose management indicator, and percentage of time the CGM is active over a given time period (usually about 14-15 days).[13] The aggregated glucose profile shows variability in the mean glucose and patterned areas of highs and lows, displaying all values as if collected over a single 24-hour period.[6]

Metrics reported in the AGP that may assist with an assessment of blood glucose control and inform treatment adjustments include[8,14]:

- ***Number of days the sensor is active:*** recommended minimum duration is 14 consecutive days.
- ***Percentage of sensor data captured:*** for reliable analysis of glycemic indices, recommended minimum is 70%.
- ***Mean glucose concentration:*** mean value of glucose measurements during the period analyzed.
- ***Glucose management indicator:*** assesses glycemic control based on mean glucose levels.
- ***Glucose variability:*** variance in glucose measurements during the time period analyzed.
- ***Time above target glucose range:*** percentage of time during the analyzed period when glucose is above a certain threshold (e.g., 180 mg/dL [high], <25%; or 250 mg/dL [very high], <5%).[15]
- ***TIR:*** percentage of time during the analyzed period when glucose is within a certain range (e.g., 70-180 mg/dL [target range], >70%).[15]
- ***Time in tight range:*** percentage of time during the ana-

**FIGURE 1. AGP report for case study 2.**

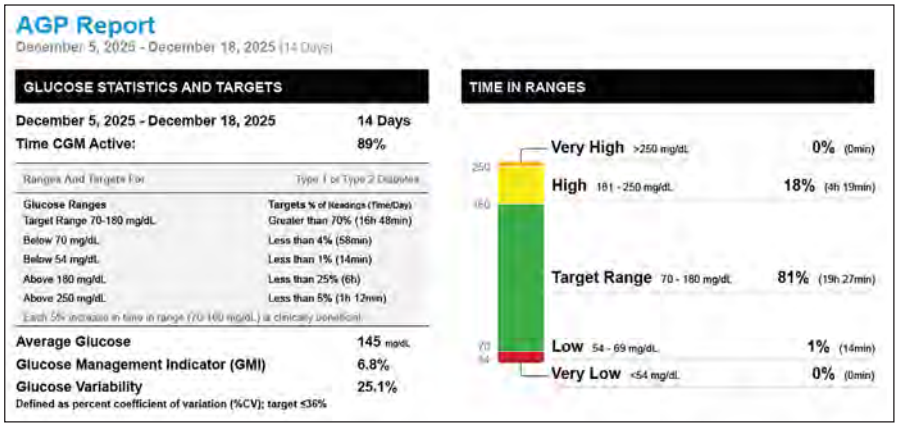
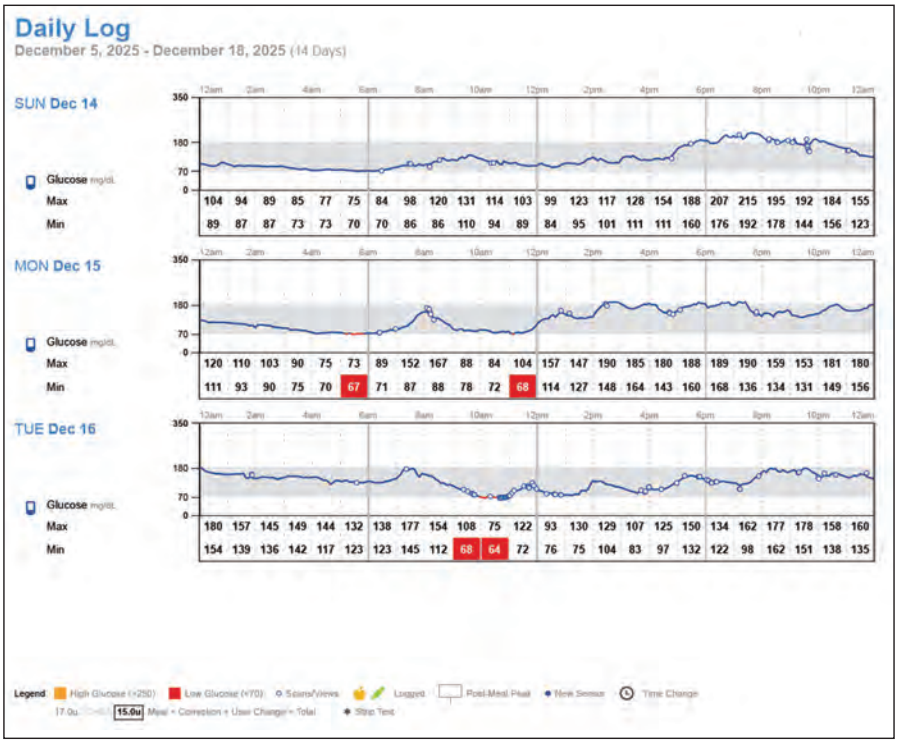



**FIGURE 2. AGP report for case study 2.**



lyzed period when glucose is within a narrower range than TIR; may be more appropriate when glucose levels are closer to normal or tighter glycemic control is required.[16]

- ***Time below target glucose range:*** percentage of time during the analyzed period when glucose is below a certain threshold (e.g., 70 mg/dL [low], <4%; or 54 mg/dL [very low], <1%).[15]

Over-the-counter (OTC) CGM devices provide similar data to an AGP report, though the objective of these devices is typically to deliver patient-focused information about how diet and lifestyle impacts blood glucose, rather than information to evaluate treatment modification.[17] In this sense, OTC CGM devices may be more appropriate for patients who are less dependent on glucose trends for treatment adjustments, such as those who are not receiving multiple daily insulin injections. Notably, OTC CGM devices are intended for people with prediabetes and those who are not using insulin; they are discussed in more detail below.

## PRACTICAL TIPS FOR INTEGRATING CGM INTO PRIMARY CARE PRACTICE

Identifying the right patient for CGM is critical. Patients who are good candidates for a CGM might include those who[18]:

- Need or want more engagement with their diabetes.
- Are at risk for hypoglycemia (e.g., patients of younger or older age, patients taking insulin).
- Need modification of current treatment or are experiencing clinical inertia.
- Have poorly managed diabetes and would benefit from greater understanding of diet, activity, and medication on glycemic management.
- Want to actively participate in their diabetes care, including making lifestyle changes.

Every person with diabetes could benefit from the information offered by a real-time CGM, but not all patients may be able to obtain a CGM or be willing to wear one. A key benefit of using CGM in any patient with diabetes is addressing clinical inertia; CGM can help facilitate interventions in patients who may otherwise see little change in their blood glucose control.[19]

Cost and lack of insurance coverage prevents many patients from using CGM. Clinicians can help Medicare patients navigate these challenges. In 2023, the Centers for Medicare & Medicaid Services expanded coverage for CGM to allow any Medicare patient using insulin to have access to a CGM device and related services.[20]

Appropriate coding and reimbursement processes can also help support clinic time spent on CGM implementation and monitoring. Coding for CGM includes the following[21]: 95249: personal CGM start-up and training; 95250: professional CGM; 95251: CGM interpretation; 99212-99215: evaluation and management of CGM.

Furthermore, involving the health care team can improve diabetes outcomes and access to CGM. This includes incorporating clinic staff such as nurse practitioners, physician associates, nurses, pharmacists, and diabetes educators to assist with patient education and access to CGM and referring to specialists when necessary.[22]

To understand patient perspectives on CGM use and its application in practice, visit https://www.pcmg-us.org/toolkit/cgm, where a patient with diabetes explains their CGM journey, including the health benefits since starting CGM, the process of accessing and obtaining CGM, and perspectives about interactions with clinicians about their CGM.

## NEW AND EMERGING CGM TECHNOLOGIES

CGM technologies began with the first CGM device approval in the US in 1999 and have continued to evolve over the past few decades.[17,23,24] Notable recent advances include OTC CGM devices and continuous glucose-ketone monitoring. Additionally, insulin pump integration is another benefit of certain CGM devices for patients who use insulin pumps. There are currently several CGM and insulin pump devices that automatically adjust insulin dosing based on CGM data to predict future glucose levels and reduce the risk of hyperglycemia and hypoglycemia.[25,26]

### *OTC CGM devices*

One reason OTC CGM devices have been developed is to expand use of CGM to those who do not qualify for insurance coverage of CGM because they have prediabetes or are not using insulin. Some have suggested that these OTC technologies may bridge the gap in access to wearable glucose-monitoring technologies in select populations.[17] Differentiating between the available OTC CGM products can help clinicians determine which may be most appropriate for certain patients.[17]

Three OTC CGM devices are currently approved: the Stelo Glucose Biosensor System, the Lingo Continuous Glucose Monitor, and the Libre Rio Continuous Glucose Monitoring System (**TABLE 1**).[17] Lingo is intended for healthy individuals who want to track blood glucose for overall health and wellness. Libre Rio was created for those with prediabetes or patients with diabetes who do not use insulin. Stelo is intended for patients who are aged 18 years or older with diabetes and who do not use insulin.[17]

### *Continuous ketone monitoring*

Both patients with T1D and T2D are at risk for acute complications such as diabetic ketoacidosis (DKA).[27] DKA is a

**TABLE 1. Characteristics of currently approved OTC CGM devices.[17]**

| Characteristic | Lingo Continuous Glucose Monitor | Libre Rio Continuous Glucose Monitoring System | Stelo Glucose Biosensor System |
|---|---|---|---|
| Duration of wear | 14 days | 15 days | 15 days (+12-hour grace period) |
| Frequency of measured glucose | Every 15 minutes | — | Every 15 minutes |
| Glucose measurement range | 55-200 mg/dL | 40-400 mg/dL | 70-250 mg/dL |
| Smart device compatibility[a] | Yes | No | Yes |
| Alarm for low/high glucose levels | No | No | No |
| Data sharing | Download and export | — | Connects to Clarity software |
| Patient population | Aged ≥ 18 y and healthy | Aged ≥ 18 y with prediabetes or diabetes who are not on insulin | Aged ≥ 18 y with diabetes who are not on insulin |
| Mean monthly retail price, $ | 89[b] | — | 89[b] |
| Mean absolute relative difference, % | 8.4% | — | 8.3% |

**Abbreviation:** USD, United States dollar.

[a]Users must have a compatible smartphone; no separate data readers are available.

[b]Subscription required for pricing shown; can be purchased in a 3-month subscription for an additional discount.

Adapted from Arriazola J et al, 2025.

life-threatening metabolic emergency resulting from insulin deficiency and increased ketogenesis, characterized by hyperglycemia, metabolic acidosis, and dehydration.[27-29]

While traditional blood and urine ketone testing has enabled detection of DKA, these methods are rarely used, and emerging continuous ketone monitoring (CKM) technologies, including combined glucose-ketone monitoring sensors, promise enhanced real-time assessment, trend analysis, and early intervention to predict and prevent DKA.[27,30,31] While knowledge of CKM remains limited among clinicians, this has been an active area of research and development for years, including the publication of a CKM consensus report in 2021 and international expert recommendations published in January 2026.[32,33]

Ketone monitoring is critical to early detection of DKA, but it is rarely done in practice, as the traditional methods for testing are cumbersome and have several limitations. Historically, detection of ketosis has relied on either urine or blood ketone testing (breath-based ketone testing has been studied but lacks evidence for medical use)[27]:

- ***Urine ketone testing:*** This testing uses nitroprusside-based dipsticks to detect acetoacetate. While inexpensive and noninvasive, urine testing has several limitations: it reflects ketone accumulation over hours rather than real-time status, measures only a fraction (~20%) of circulating ketones, may produce false-positive or false-negative results due to interfering substances, and requires proactive patient initiation. These factors reduce sensitivity and may delay recognition of impending DKA.
- ***Blood ketone testing:*** Capillary blood measurement of β-hydroxybutyrate provides a more accurate assessment and better correlation with DKA risk. However, finger-prick testing is painful, inconvenient, requires strips with limited shelf life, and depends on patient adherence and awareness. Surveys of patients with T1D reveal that up to 64% do not routinely perform ketone testing at home, highlighting significant real-world barriers.[34,35]

The reliance on episodic testing and its shortcomings in the real world indicate that clinicians may not fully understand the limitations of these approaches or their implications for early DKA detection and patient safety. CKM is poised to address the limitations of current approaches to ketone monitoring, as these devices are designed with many expert-recommended "desirable characteristics" of ketone testing methods (**TABLE 2**).[27,32] Of note, a dual glucose-ketone sensing device was authorized by the FDA in August 2026 for people aged 2 years and older living with diabetes.[36]

## SUMMARY

PCCs play an increasingly important role in diabetes management in the United States. The use of CGM and data posted on the AGP report provide clinicians, patients, and caregivers more detailed information than historically available with A1c and traditional blood glucose testing alone. CGM and AGP reporting also provide blood glucose data when patients are not in a clinical setting (e.g., at home). Every person with diabetes will benefit from CGM, yet, unfortunately, not all have CGM covered by insurance.

## TABLE 2. Desirable characteristics of ketone testing technologies.[27,32]

| |
|---|
| Accurate at lower end of range |
| Relevant dynamic range (0-10 mmol/L) |
| Does not require user to initiate check |
| Provides trend information and alarms |
| Reliable (low failure rate) |
| Durable (similar life to other analyte sensors [7-14 d]) |
| Minimally intrusive |
| Single insertion multianalyte platform |
| Signal integrated with other technologies (e,g., CGM, automated insulin delivery) |
| Factory calibrated |
| Cost effective |

Increased adoption of CGM by PCCs will result in improved glycemic control for patients. New and emerging technologies in CGM include OTC CGM devices, CKM, and the prospect of continuous glucose-ketone monitoring. Expansion of the use of OTC CGM devices in those with prediabetes or diabetes without insulin use will further help patients collaborate with their clinicians to manage blood glucose levels. ●

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