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Afiliación Institucional:
[1]Clínica Pediátrica Kidoz, Servicio de Endocrinología, San José, Costa Rica. Caja Costarricense del Seguro Social, Hospital Nacional de Niños, Servicio de Endocrinología, San José, Costa Rica. fcavalloa@gmail.com
0000-0002-6028-5285
[2]Caja Costarricense del Seguro Social, Hospital San Juan de Dios, Servicio de Endocrinología, San José, Costa Rica. alejandro.cobg@gmail.com
0000-0003-2826-5265
[3]Caja Costarricense del Seguro Social, Hospital Rafael Ángel Calderón Guardia, División de Endocrinología, San José, Costa Rica. mychgr@hotmail.com
0009-0001-5608-4333
[4]Caja Costarricense del Seguro Social, Hospital San Rafael de Alajuela, Servicio de Endocrinología, Alajuela, Costa Rica. cristina.rdrz@gmail.com
0000-0002-6472-5647
[5]Caja Costarricense del Seguro Social, Hospital México, Servicio de Endocrinología, San José, Costa Rica.
0000-0001-5842-9932
Correo electrónico: fruizsalazar@gmail.com
[6]Caja Costarricense del Seguro Social, Hospital San Vicente de Paúl, Servicio de Endocrinología, Heredia, Costa Rica. lauraulateo@gmail.com
0009-0003-8082-3364

Abbreviations
CGM; Continuous glucose monitoring.
FSL; FreeStyle Libre.
FSL2; FreeStyle Libre 2.HbA1c; Glycated hemoglobin.
ICU; Intensive care unit.
isCGM; Intermittently continuous glucose monitoring.
T1D; Type 1 Diabetes.
T2D; Type 2 Diabetes.
TBR; Time-below-range.
TIR; Time-in-range.

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✉ fcavalloa@gmail.com

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Original

Recommendations by a Specialist Panel on the Use of Continuous Glucose Monitoring with FreeStyle Libre System in Costa Rica

(Recomendaciones de un grupo de especialistas sobre el uso del monitoreo continuo de glucosa con el sistema FreeStyle Libre en Costa Rica)

Fred Cavallo-Aita[1]*, Alejandro Cob-Guillén[2], Michelle González-Rojas[3], Cristina Rodríguez-Rodríguez[4], Francis Ruiz-Salazar[5], Laura Ulate-Oviedo[6]

Abstract

Background: Continuous glucose monitoring has transformed diabetes care globally, yet no national guidelines exist in Costa Rica to guide its clinical use. This document aims to develop evidence-informed, context-specific recommendations for implementing continuous glucose monitoring in the Costa Rican healthcare system. **Methods:** We conducted a structured literature review focused on FreeStyle Libre 14-day and FreeStyle Libre 2 systems, including publications from 2015 through November 16, 2024. Ten clinical scenarios reflecting local practice needs were developed a priori. On February 1, 2025, six endocrinologists from Costa Rica's public and private sectors convened in San José and employed a modified Delphi process with anonymous voting to approve recommendations at a prespecified threshold of⩾80% agreement. **Results:** The panel issued 20 recommendations. Continuous glucose monitoring has been endorsed as the standard of care in type 1 diabetes and during pregnancy with type 1 diabetes. Selective use was supported in type 2 diabetes, especially for insulin-treated patients, those with hypoglycemia risk, and as a short-term educational tool, considering the particularities of the Costa Rican health care system. Use during hospitalization was recommended for stable patients able to self-manage. Routine use of continuous glucose monitoring in critically ill patients, individuals without caregiver support, or those receiving dialysis was discouraged. All uses should be paired with education and clinical oversight. **Conclusions**: These FreeStyle Libre 14-day and FreeStyle Libre 2 suggestions provide practical guidance for local implementation and identify priorities for future research, education, and health policy in Costa Rica.

Keywords: continuousglucose monitoring, diabetes mellitus, freestyle libre, Costa Rica

Resumen

Introducción: El monitoreo continuo de glucosa ha transformado la atención de la diabetes a nivel mundial; sin embargo, en Costa Rica no existen guías nacionales que orienten su uso clínico. Este consenso tuvo como objetivo desarrollar recomendaciones basadas en la evidencia y específicas para cada contexto, para la implementación del monitoreo continuo de glucosa en el sistema de salud costarricense. **Métodos**: Se realizó una revisión bibliográfica estructurada centrada en FreeStyle Libre 14 días y FreeStyle Libre 2, que incluyó publicaciones entre 2015 y el 16 de noviembre de 2024. Con base en esa evidencia se desarrollaron diez escenarios clínicos adaptados a la práctica local. Un panel de seis endocrinólogos de los sectores público y privado se reunió en San José el 1 de febrero de 2025 y utilizó un método Delphi modificado para elaborar y aprobar recomendaciones con un umbral de acuerdo ⩾80%. **Resultados:** El panel emitió

20 recomendaciones. El monitoreo continuo de glucosa se aprobó como estándar de atención en la diabetes tipo 1 y durante el embarazo con diabetes tipo 1. Se apoyó el uso selectivo en la diabetes tipo 2, especialmente en pacientes tratados con insulina, aquellos con riesgo de hipoglucemia y como herramienta educativa a corto plazo, considerando las particularidades del sistema de salud costarricense. Se recomendó su uso durante la hospitalización en pacientes estables capaces de autocontrolarse. Se desaconsejó el uso rutinario del monitoreo continuo de glucosa en pacientes críticos, personas sin apoyo de cuidadores o en diálisis. Todos los usos deben ir acompañados de educación y supervisión clínica. **Conclusiones:** Estas recomendaciones sobre el monitoreo continuo de glucosa en Costa Rica proporcionan una guía clara y práctica para la implementación local y destacan las prioridades para futuras investigaciones, educación y políticas de salud.

Descriptores: monitoreo continuo de glucosa, diabetes mellitus, free style libre, Costa Rica

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According to the Pan American Health Organization, diabetes mellitus is a major health concern in Costa Rica, affecting approximately 12.8% of the adult population, with more recent data from the Costa Rican Social Security System reporting a prevalence of 14.8% among adults over 19 years of age.[1] While not listed among the top ten direct causes of death, diabetes remains a key contributor to the country's leading causes—ischemic heart disease and cerebrovascular disease. The International Diabetes Federation estimates annual diabetes-related healthcare costs in Costa Rica at around $2,890 USD per person.[2]

As stated by the Organization for Economic Cooperation and Development, the Costa Rican healthcare system offers universal coverage to over 90% of the population. Yet, managing diabetes within this framework remains complex. National treatment guidelines for type 2 diabetes prioritize glycated hemoglobin (HbA1c) targets below 7%, with a stepwise approach that starts with metformin, followed by sulfonylureas and insulin.[1] Access to newer medications, continuous education, and timely specialist referral is often limited—particularly in primary care settings.[1]

Continuous glucose monitoring (CGM) technologies have significantly influenced diabetes care in recent decades. CGM enables real-time tracking of glycemic patterns and has demonstrated clinical benefits in both type 1 and type 2 diabetes.[3] Devices like FreeStyle Libre and FreeStyle Libre 2 are increasingly used across Costa Rica's public and private healthcare sectors, reflecting global trends in CGM adoption.[3]

Although international guidelines address CGM use, there is currently no locally adapted guidance for Costa Rica. Clinicians often need to interpret global recommendations in a health system with mixed public–private delivery, variable access to diabetes education, and heterogeneous pathways for obtaining devices. In practice, access may occur through institutional channels in selected settings or through direct out-of-pocket purchase, which can affect who receives the technology and how consistently it is used. Device operation also influences implementation. FreeStyle Libre 14-day requires active scanning to obtain glucose values and does not provide automated glucose alarms. FreeStyle Libre 2 adds optional alarm functionality, which is typically configured through smartphone-based use and may be less practical for some patients depending on digital literacy, device availability, and patient preferences. These operational differences become clinically relevant when recommendations depend on hypoglycemia risk mitigation, overnight monitoring, or caregiver involvement, such as in older adults or patients with limited self-management capacity.

To address these gaps, we selected a structured consensus process that integrates published evidence with local clinical expertise, particularly in areas where randomized trial data are limited or not directly transferable to Costa Rica.[4]

The aim of this initiative was to establish evidence-informed, context-sensitive recommendations for the clinical use of FreeStyle Libre 14-day and FreeStyle Libre 2 across Costa Rica, intended for endocrinologists, internists, pediatricians, and general practitioners involved in diabetes care.

These recommendations are intended to guide healthcare professionals—including endocrinologists, internists, pediatricians, and general practitioners—on the safe, effective, and locally appropriate implementation of CGM technologies within the national health system.

Methods

Before the expert panel convened, we conducted a structured literature review to summarize evidence on intermittently scanned continuous glucose monitoring,

specifically FreeStyle Libre 14-day and FreeStyle Libre 2 systems. The review included publications from 2015 through November 16, 2024, and prioritized randomized controlled trials, observational studies, consensus statements, and real-world data relevant to type 1 diabetes, type 2 diabetes, pregnancy, inpatient care, and selected vulnerable populations. PubMed and Embase were searched, with targeted inclusion of key trials[5,6], the FUTURE study,[7], and consensus reports describing standardized interpretation of time in range, time below range, and glycemic variability.[8,9]

Insights from this literature review were used to draft ten clinical scenarios, which structured the discussions during the expert meeting. These scenarios addressed typical use cases encountered in Costa Rica, including diagnosis, insulin therapy, pregnancy, hospitalization, and patients with limited self-management capacity.

A consensus meeting was held in San José, Costa Rica, on February 1, 2025. The panel included six endocrinologists with experience in adult and pediatric diabetes care across public and private practice settings (see supplementary material 1: conflict of interest statements). Panelists were selected based on clinical experience with FreeStyle Libre system and representation of common care contexts in Costa Rica, including outpatient management, pregnancy care, and inpatient consultation.

EpiThink Health Consulting facilitated the session, prepared the evidence summary derived from the literature review (see Supplementary material 2: Methodological aspects), and supported documentation of the deliberations. Ten pre-specified clinical scenarios were used to structure the discussion, covering type 1 diabetes, type 2 diabetes, pregnancy, general ward hospitalization, intensive care unit care, and selected special populations. For each scenario, panelists reviewed the evidence summary, discussed practical implementation considerations, proposed recommendation wording, and refined language to reflect both available evidence and local feasibility.

A modified Delphi approach was used to reach consensus.[10] After discussion of each scenario, recommendations were subjected to anonymous voting. A recommendation was accepted when ⩾80% of panelists voted in agreement. If agreement was not met, wording was revised and re-voted during the same session until the group reached a stable consensus position or agreed that a statement should be excluded. The final set of recommendations was then reviewed for internal consistency, clinical interpretability, and alignment with the defined scope of FreeStyle Libre 14-day and FreeStyle Libre 2 systems. (See supplementary material 3: Interpreting the recommendations and supplementary material 4: Consensus process).

The panel also incorporated CGM-specific targets based on the international consensus on time-in-range (TIR ⩾70%), time-below-range (TBR <4%), and time-above-range <25%.[8] These metrics helped to define clear thresholds for when to activate alarms or initiate device use, especially in patients at high risk of glycemic excursions. In areas where randomized controlled trials were unavailable, such as ICGM use during hospital admission or in dialysis patients, recommendations were based on expert opinion, real-world practice patterns, and real-world evidence.

Final statements were reviewed for clarity, internal consistency, and clinical usability. For each recommendation, the supporting rationale and key context considerations were documented to facilitate transparent interpretation by readers.

Results

For clarity, results are organized into four clinical sections: (1) type 1 diabetes, (2) type 2 diabetes, (3) pregnancy, and (4) inpatient and special populations. Within each section, we present the rationale, and the consensus statements intended to support day-to-day clinical decision-making in Costa Rica.

CGM has reshaped the approach to glycemic control, providing detailed insight beyond glycated hemoglobin (HbA1c). According to the 2019 international consensus, the use of CGM-derived metrics such as time in range (TIR), time below range (TBR), time above range, and glycemic variability allows for a more precise and actionable assessment of glucose patterns.[8]

The primary goal for most adults and children with type 1 or type 2 diabetes is to keep glucose within 70–180 mg/dL (3.9–10.0 mmol/L) for more than 70% of the day. TBR should remain below 4%, with less than 1% of readings falling below 54 mg/dL (3.0 mmol/L). For older or high-risk individuals, a more conservative target of TIR >50% and TBR <1% is recommended to minimize hypoglycemia risk.

During pregnancy, targets vary by diabetes type. For women with type 1 diabetes, the goal is TIR >70% within 63–140 mg/dL, with TBR <4% and <1% below 54 mg/dL.[11] For gestational diabetes or type 2 diabetes in pregnancy, more ambitious targets, such as TIR >90% and TBR <5% (<63 mg/dL), have been proposed in recent studies and guidelines, although supporting data remain limited and evolving.[12,13]

Glycemic variability, measured as the coefficient of variation, should be ⩽36%. Lower target levels (<33%) may offer added protection in patients at high risk of hypoglycemia,[8] (Table 1).

Table 1. Practical CGM interpretation targets by population (2019 International Consensus, 8)

Population	Time in Range	Time Below Range	Time Above Range	Glycemic Variability
Adults (T1D/T2D)	>70% in 70–180 mg/dL	<4% <70 mg/dL <1% <54 mg/dL	<25% >180 mg/dL <5% >250 mg/dL	≤36% (preferably <33% in high-risk individuals)
Older / High-Risk T1D/T2D	>50% in 70–180 mg/dL	<1% <70 mg/dL	<50% >180 mg/dL	≤36%
Pregnancy (T1D)	>70% in 63–140 mg/dL	<4% <63 mg/dL <1% <54 mg/dL	<25% >140 mg/dL	Not defined
Pregnancy (T2D / Gestational diabetes mellitus)	Aim for maximum time in 63–140 mg/dL	<4% <63 mg/dL	Minimal time >140 mg/dL	Not defined

Targets are provided as a practical reference for the interpretation of CGM data.
Abbreviations: CGM = continuous glucose monitoring; TIR = time in range; TBR = time below range; T1D = type 1 diabetes; T2D = type 2 diabetes.

Each 5% increase in time in range (TIR) has been associated with meaningful improvements in glycemic control and reduced risk of microvascular complications.[14,15] More robust evidence from a DCCT post hoc analysis showed that for every 10% decrease in TIR (glucose 70–180 mg/dL), the risk of retinopathy progression increased by 64%, and the risk of developing microalbuminuria increased by 40%.[14] These findings validate TIR as a clinically relevant outcome and support its use in both trials and routine care. CGM-derived metrics like TIR complement glycated hemoglobin (HbA1c) by capturing daily glycemic fluctuations and offering a more individualized framework for clinical decision-making.

Recommendations for the use of FreeStyle Libre in patients with type 1 diabetes

The panel discussed multiple clinical scenarios for the use of FreeStyle Libre (FSL) in type 1 diabetes. The group agreed that its benefits extend beyond improving suboptimal control and include a preventive role in patients who are already meeting targets. Discussions also focused on the appropriate use of alarms, timing of device initiation, and identification of high-risk profiles for hypoglycemia (Table 2).

Table 2. Consensus recommendations for FreeStyle Libre 14-day and FreeStyle Libre 2 in type 1 diabetes (Costa Rica, February 2025)

Clinical context	Statements	Agreement (%)
General use in adults	The use of FSL or FSL2 is recommended for adults with type 1 diabetes to support improved and sustained glycemic control.	100%
Pediatric use	FSL or FSL2 is recommended for children with type 1 diabetes aged ⩾4 years and ⩾2 years, respectively, to support glycemic control.	100%
Early initiation	FSL or FSL2 should be initiated at the time of diagnosis in patients with type 1 diabetes.	100%
Hypoglycemia reduction	In individuals with type 1 diabetes, the use of FSL or FSL2 is indicated to reduce hypoglycemic episodes, providing continuous monitoring that enhances patient safety.	83%
Hypoglycemia alarms	FSL2 in alarm-enabled mode is recommended for patients with type 1 diabetes who have a TBR >4% or are at elevated risk of hypoglycemia.*	100%
Hyperglycemia alarms	FSL2 in alarm-enabled mode is recommended for patients with type 1 diabetes when time-above-range exceeds targets for their specific clinical profile.	100%

Abbreviations: FSL = FreeStyle Libre; FSL2 = FreeStyle Libre 2; TBR = Time Below Range.
FreeStyle Libre 2 includes optional alarm functionality depending on configuration and use.
* High-risk profiles for hypoglycemia include prior severe hypoglycemia, impaired awareness, nocturnal hypoglycemia, chronic kidney disease, older age, and high glycemic variability.

The panel supported these recommendations using randomized trial evidence and real-world data.[5,16,17] The IMPACT study demonstrated clinically meaningful reductions in hypoglycemia with FreeStyle Libre independent of glycated hemoglobin. When hypoglycemia prevention is the primary objective—such as in patients with elevated time below range, marked glycemic variability, or a history of severe or nocturnal hypoglycemia—the panel preferred FreeStyle Libre 2 because the alarm functionality can support earlier detection and timely corrective action when configured and used appropriately.[18]

Implementation barriers include potential user fatigue with alarms, limited access to public systems, and variability in clinical interpretation. Clear education, early adoption, and individualized target setting were identified as key to successful use.

Importantly, the clinical value of CGM lies not only in initiating the device but in ensuring sustained and consistent use over time as part of diabetes treatment. In patients with type 1 diabetes, integrating CGM into routine care has been shown to support behavioral change, reduce hypoglycemia, and improve long-term glycemic control. Its effectiveness depends not merely on access to the technology, but on structured and ongoing application.[7,16]

Recommendations for the use of FreeStyle Libre in patients with type 2 diabetes

The panel's discussion reflected the heterogeneity of type 2 diabetes and the need to tailor CGM recommendations to specific treatment contexts. The use of FreeStyle Libre (FSL or FSL2) was suggested in patients on multiple daily insulins to support improved glycemic control.[6,19] While retrospective analyses have also linked CGM use to reduced acute diabetes-related events such as hospitalizations and emergency visits,[20] these findings are not derived from randomized clinical trials and were therefore noted separately in the commentary rather than included in the core statement.

In insulin-treated type 2 diabetes, the panel similarly favored FreeStyle Libre 2 when hypoglycemia risk mitigation is a clinical priority. Alarm-supported monitoring can be helpful in patients with prior hypoglycemia, impaired awareness, chronic kidney disease, or older age, provided that the patient or caregiver can reliably respond to alerts within the context of a structured treatment plan.

Use of CGM in pediatric patients with type 2 diabetes should be individualized. While some adolescents may require insulin therapy during early metabolic decompensation, many transition to oral hypoglycemic agents after stabilization. Given the limited evidence in this population, CGM use should be based on clinical judgment, with cautious extrapolation from adult data.[21]

In patients with type 2 diabetes using basal insulin, the panel recommended considering FreeStyle Libre (FSL or FSL2) to support improved glycemic control and facilitate daily decision-making. In addition to glycemic benefits, observational studies have suggested a potential reduction in acute diabetes-related events, such as hospitalizations and emergency visits, in this population.[19] However, as these findings were not derived from randomized controlled trials, the panel did not consider them sufficient to strengthen the recommendation beyond selective consideration.

For those on oral antidiabetic therapy, the panel supported highly selective use. CGM may be helpful in individuals with persistent glycemic variability or inadequate control and at risk of hypoglycemia.[22] "Selective consideration" implies individualized use based on medication profile, clinical course, and cost-effectiveness analysis.

Short-term use of FSL/FSL2 as an educational intervention was considered reasonable to support behavior change, particularly when aiming to demonstrate the impact of meals or physical activity on glucose patterns.[23] The intervention should be limited in duration and clearly goal driven.

Routine use of CGM is not recommended in patients managing diabetes solely through lifestyle interventions. The panel agreed that CGM should be considered as an intervention or monitoring tool, not a diagnostic test. Its clinical value lies in consistent use over time to inform treatment decisions, support self-management, and guide behavioral change. Intermittent or one-time use offers limited benefit in the absence of an active treatment plan (Table 3).

Table 3. Recommendations for FreeStyle Libre in patients with type 2 diabetes

Clinical context	Statements	Agreement (%)
Multiple daily insulin injections	In adults with type 2 diabetes using multiple daily insulin injections, FSL or FSL2 should be considered to support glycemic control.	100%
Basal insulin	In adults with type 2 diabetes using basal insulin, FSL or FSL2 should be considered to improve glycemic control.	100%
Oral agents	In adults with type 2 diabetes treated with oral agents who are not achieving glycemic targets, FSL or FSL2 may be selectively considered.	100%
Educational tool	In adults with type 2 diabetes, FSL or FSL2 may be considered as an educational tool to demonstrate the impact of diet or physical activity on glucose levels.	83%
Lifestyle-only management	Routine use of FSL or FSL2 is not recommended for individuals managing type 2 diabetes through lifestyle changes alone.	100%

Abbreviations: FSL = FreeStyle Libre; FSL2 = FreeStyle Libre 2.

None of the recommendations in type 2 diabetes imply continuous, indefinite CGM use. Instead, duration and objectives should be defined from the outset. These statements do not include cost-effectiveness assessments specific to Costa Rica but aim to inform clinical use in a context with limited access to capillary glucose monitoring.

Recommendations for the Use of FreeStyle Libre During Pregnancy

The panel evaluated the use of intermittently scanned continuous glucose monitoring (isCGM) in pregnant women with diabetes, considering three subgroups: type 1 diabetes, type 2 diabetes, and gestational diabetes. While much of the pregnancy outcomes literature is based on real-time CGM, this consensus focused on intermittently scanned systems (FreeStyle Libre 14-day and FreeStyle Libre 2) and interpreted the broader CGM evidence through that operational lens.

For type 1 diabetes, CGM was endorsed as the standard of care during pregnancy. This recommendation is based on robust evidence from randomized controlled trials using real-time CGM, which showed improved neonatal outcomes and reduced complications related to maternal hyperglycemia.[11] Although the supporting data for isCGM in this population are limited, the panel supported its use based on clinical judgment and the broader evidence on CGM benefits.

In women with type 2 diabetes, the recommendation was more selective. While isCGM may help improve daily glucose patterns in insulin-treated patients, available trials have not shown consistent benefits in key outcomes such as macrosomia, preeclampsia, or neonatal hypoglycemia.[24,25] The panel suggested considering isCGM in women at higher risk of hypoglycemia—particularly those using insulin or sulfonylureas, or with chronic kidney disease or hypoglycemia unawareness.

For gestational diabetes, more recent evidence suggests that isCGM may offer meaningful clinical benefits. The FLAMINGO randomized controlled trial found that isCGM use led to improved fasting and postprandial glycemia and a significantly lower rate of fetal macrosomia compared to self-monitoring of blood glucose.[13] A systematic review also concluded that isCGM is safe, accurate, and well accepted by patients with gestational diabetes mellitus, with improved user experience compared to traditional monitoring.[12] A randomized controlled trial in women with well-controlled gestational diabetes (HbA1c <6%) found no significant differences in glycemic metrics or adverse perinatal outcomes between CGM and self-monitoring of blood glucose. CGM users showed better gestational weight gain adherence and slightly lower birthweight, but these findings are limited and insufficient to support routine CGM use in this subgroup.[26]

Overall, the panel recommended considering isCGM in motivated women with gestational diabetes who can use the system correctly. While evidence continues to evolve, isCGM may support better glucose control and potentially improve maternal and neonatal outcomes in selected cases (Table 4).

Table 4. Consensus recommendations for intermittently scanned continuous glucose monitoring in pregnancy (Costa Rica, February 2025)

Clinical context	Statements	Agreement (%)
Type 1 diabetes in pregnancy	Intermittently scanned continuous glucose monitoring is recommended throughout pregnancy for women with type 1 diabetes, ideally starting in the first trimester, as part of structured education and clinical follow-up.	100%
Type 2 diabetes in pregnancy	Intermittently scanned continuous glucose monitoring should be considered selectively in women with type 2 diabetes in pregnancy when insulin is used or when hypoglycemia risk is a clinical concern, with interpretation based on pregnancy-specific targets.	96%
Gestational diabetes	Intermittently scanned continuous glucose monitoring may be considered in motivated women with gestational diabetes when it is expected to improve day-to-day glucose management and adherence, with interpretation based on pregnancy-specific targets.	96%

To support safe implementation, isCGM use during pregnancy should be paired with structured education and scheduled clinical review.[25] Interpretation should use pregnancy-specific time-in-range targets and should focus on patterns over time rather than single readings. When alarms are used in pregnancy, the panel recommended aligning alarm use with clinical goals and pregnancy targets while recognizing that this consensus did not define numeric alarm thresholds.

Recommendations for the use of FreeStyle Libre during general ward hospitalization

The panel reviewed the use of FreeStyle Libre (FSL/FSL2) in non-critical inpatients with diabetes. For individuals already using the system prior to admission, its continued use may be appropriate if the patient is clinically stable and able to manage the device independently.[27,28.]

Because inpatient workflows often require rapid decisions by non-specialist clinicians, we retained separate quick-reference tables for general ward and intensive care unit settings to reduce ambiguity at the bedside.

Routine capillary glucose checks are not required in this context but should be performed in specific situations. These include symptomatic hypoglycemia, severe hyperglycemia (>250 mg/dL), mismatched sensor readings and symptoms, or recent use of interfering substances such as high-dose acetaminophen or vitamin C.[28] If FSL/FSL2 readings differ by more than 20% from capillary glucose or consistently lack clinical correlation, capillary testing should be prioritized, and the sensor replaced if needed.[27]

To ensure safe use, staff must be trained to interpret CGM data accurately and document results appropriately. This includes understanding when to verify sensor values, how to respond to discrepancies, and when to escalate care. Proper use can reduce unnecessary finger sticks and support timely therapeutic decisions (Table 5).

Table 5. Recommendations for FreeStyle Libre use in hospitalized patients (general ward)

Clinical context	Statements	Agreement (%)
Ongoing FSL/FSL2 use	Continue FSL/FSL2 in patients previously using it if clinically stable and capable of self-management.	100%
Non-self-managing patients	FSL/FSL2 is not recommended for hospitalized patients with diabetes who are unable to self-manage unless trained staff is available.	96%
Capillary testing during ongoing FSL/FSL2 use	Routine capillary glucose testing is not needed unless specific clinical concerns arise.	100%

Abbreviations: FSL = FreeStyle Libre; FSL2 = FreeStyle Libre 2.

Recommendations for the use of FreeStyle Libre in the ICU

The panel agreed that FSL/FSL2 should not be used routinely to guide treatment in critically ill patients, regardless of their physical location. Evidence shows reduced sensor accuracy under conditions common in critical care—such as hypotension, vasopressor use, edema, and impaired perfusion.[29,30] In these cases, glucose monitoring should rely on capillary testing or arterial blood gases, following institutional protocols.

For patients in the intensive care unit (ICU) who have achieved clinical stability, the use of FSL/FSL2 may be considered to support monitoring.

Staff education is essential in all settings where CGM is used, especially when patients cannot self-manage the device. Institutional protocols are recommended to ensure safety, consistency, and proper interpretation of data (Table 6).

Table 6. Recommendations for FreeStyle Libre use in the ICU

Clinical context	Statements	Agreement (%)
Critically ill patients	FSL/FSL2 is not recommended for routine use in critically ill patients to guide treatment adjustments.	90%
Stable patients in ICU	FSL/FSL2 may be considered in ICU patients with diabetes once they are clinically stable.	96%

Abbreviations: FSL = FreeStyle Libre; FSL2 = FreeStyle Libre 2; ICU = Intensive Care Unit.

Recommendations for the use of FreeStyle Libre in special hospital populations

The panel discussed the use of FSL/FSL2 in hospitalized patients with specific vulnerabilities, including older adults, individuals with cognitive impairment, and patients on renal replacement therapy. These groups often present unique challenges in the use and interpretation of CGM data.

For patients unable to self-manage their diabetes, the presence of a reliable support system, such as trained caregivers, was considered key. The panel agreed that the absence of such a support network should preclude the use of FSL/FSL2, as these devices require consistent handling and accurate interpretation.

In patients undergoing dialysis, the panel advised against routine use of FSL/FSL2 to guide treatment decisions. Evidence in this population is limited, and accuracy may be compromised by factors such as fluid shifts, altered perfusion, and certain medications.[28–30] Current CGM technology has not been validated for this context, making capillary glucose evaluating the preferred approach.

Older adults were recognized as a group that may benefit from CGM, since it is associated with a reduction in HbA1c and a reduction in TBR[31,32], especially those at elevated risk of hypoglycemia. Still, decisions should consider their ability to engage with the device or the presence of trained caregivers.

These recommendations emphasize the need for staff training to ensure safe use of CGM in patients who cannot manage it independently (Table 7).

Table 7. Recommendations for FreeStyle Libre in special hospital populations

Clinical context	Statements	Agreement (%)
No support network	FSL/FSL2 is not recommended in hospitalized patients who cannot self-manage and lack a support network.	100%
Renal replacement therapy	Routine use of FSL/FSL2 is not recommended in patients on dialysis to guide treatment adjustments.	100%

Abbreviations: FSL = FreeStyle Libre; FSL2 = FreeStyle Libre 2.

Discussion

These recommendations mark the first structured effort to adapt CGM guidance to the Costa Rican healthcare system. By integrating international evidence with local clinical realities, the panel addressed a critical gap in the national management of diabetes. The recommendations provide context-sensitive guidance for using FSL and FSL2 in a range of clinical settings and patient populations.

The main findings of this report can be summarized in four clinical areas. First, the panel viewed continuous glucose monitoring as a core component of care in type 1 diabetes across ages, with emphasis on early initiation, sustained use, and alarm-supported strategies when hypoglycemia risk is high. Second, in type 2 diabetes, recommendations were deliberately selective and tied to treatment context, with stronger support in insulin-treated patients and goal-directed, time-limited use for education or regimen adjustment. Third, during pregnancy, the panel endorsed isCGM as standard practice for type 1 diabetes and supported selective use in type 2 diabetes and gestational diabetes when clinical circumstances suggest meaningful benefit, with interpretation anchored to pregnancy-specific targets. Fourth, for inpatient care and special populations, the panel emphasized safety and workflow: continued use is reasonable in stable patients who can self-manage, routine use in critically ill patients is discouraged due to accuracy concerns and use in vulnerable groups requires dependable support and staff competence.

These recommendations reflect both randomized trial data and real-world considerations, including the barriers faced in Costa Rica's mixed public-private health system. A key strength of this process was the integration of international literature with national clinical expertise, supported by a Delphi method that enabled structured dialogue and iterative refinement. Inclusion of panelists from both public and private sectors captured the diversity of practice across the country. Still, limitations remain. The number of panelists was small, though offset by their broad experience and coverage of key subpopulations.

Implementation in Costa Rica depends as much on access and workflow as on the recommendation wording. In routine practice, patients may obtain sensors through limited institutional pathways or through direct out-of-pocket purchase, and this reality shapes continuity of use and follow-up. Clinicians should anticipate that device choice and setup (reader-based use vs smartphone-based use) can affect whether alarm functionality is available and whether patients can interpret trend data reliably, particularly among older adults and those with limited digital literacy.

Affordability remains a practical barrier, and this consensus did not include a Costa Rica–specific formal cost-effectiveness analysis. From a clinical prioritization perspective, the panel's strongest recommendations align with groups in whom continuous monitoring most directly supports prevention of hypoglycemia and adverse outcomes, such as type 1 diabetes and selected insulin-treated patients, including during pregnancy. Where access is intermittent, short-term use can be framed as a targeted intervention with predefined goals, coupled with education and a clear follow-up plan so that data translate into treatment decisions rather than isolated measurements.

This work focused exclusively on FreeStyle Libre devices, and while the recommendations are applicable to similar technologies, future updates should explicitly address other CGM platforms. The panel also did not conduct formal cost-effectiveness analyses, which limits economic conclusions within the local healthcare context. Despite these limitations, the consensus fills a critical gap by offering structured, locally relevant guidance where formal guidelines are absent.

Future efforts should focus on building structured patient education programs, defining clinical algorithms for initiation and follow-up, and developing hospital protocols for inpatient monitoring. Cost-effectiveness studies and equity analyses will be essential to support broader adoption. Additional research in understudied populations, such as children with type 2 diabetes, dialysis patients, and non-insulin-treated adults, will help refine and extend these recommendations.

This article presented here provides clear, practical recommendations for implementing isCGM (FreeStyle Libre, FreeStyle Libre 2) in Costa Rica. It supports expanded use in type 1 diabetes and selected indications in type 2 diabetes, pregnancy, and hospital settings, always tied to specific clinical goals and patient capacity. The findings offer a foundation for national implementation strategies but also highlight areas where further development is needed.

External review

A preliminary version of this manuscript underwent external peer review, and all relevant modifications were incorporated based on reviewer feedback.

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Supplementary Material

Supplementary Material 1. Conflicts of Interest Statements.

Supplementary Material 2. Methodological aspects.

Supplementary Material 3. Interpreting the Recommendations.

Supplementary Material 4. Consensus Process.

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