

The 13th سیزدهمین Diabetes in Practice همایش دیابت رویکرد کاربردی

Updates on Patient-Centered
Management of Diabetes

تازه‌های مدیریت بیمار محور دیابت



PIONEERING
DIABETES
TECHNOLOGY



وزارت بهداشت، درمان و آموزش پزشکی



و خدمات بهداشتی درمانی تهران



Diabetes Technology is Redefining Diabetes Care

Panel:



Syed Adel Jahed; M.D.
Endocrinologist



Hadieh Sanei Fard; M.D.
Pediatric Endocrinologist



Marjan Shakiba; M.D.
Pediatric Endocrinologist



Hamidreza Aghaei Meybodi; M.D.
Endocrinologist

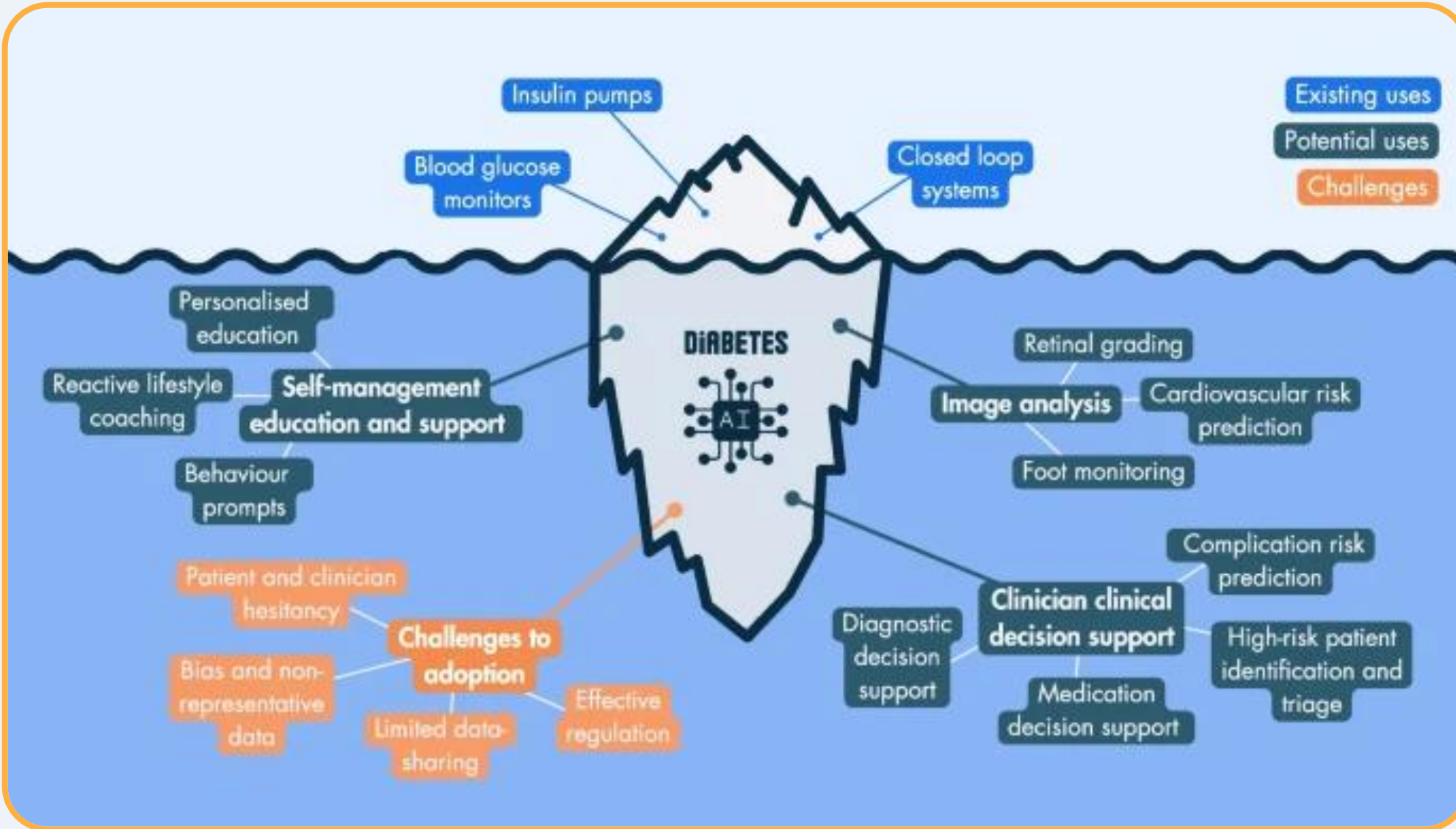
Diabetes
Academy
GABRIC





Technology in Diabetes

Mackenzie, S.C. et al. *Diabetologia* 67, 223–235 (2024).



Early CGM Initiation in Newly Diagnosed Type 1 Diabetes



Hadieh Sanei Fard; M.D.
Pediatric Endocrinologist

Diabetes
Academy
GABRIC



Clinical Case Scenario

A 9-year-old boy was admitted with classic symptoms of polyuria, polydipsia, and weight loss over 3 weeks. Laboratory results confirmed new-onset type 1 diabetes. Patient has started multiple daily injections.

Daily medications:

Multiple daily injections (MDI)

- Glargine U-300 20 U
- Aspart based on carb counting

Lab Data:

HbA1c: 13%

FBS: 330 mg/dL

His family asks your advice on using CGM
What is your recommendation?



Clinical Case Summary

- 9-year-old boy with new-onset Type 1 Diabetes Mellitus (T1DM)
- Symptoms: polyuria, polydipsia, weight loss over 3 weeks
- Labs: HbA1c 13%, FBS 330 mg/dL
- Treatment: Glargine U-300 (20U) + Aspart (carb-counting)



Guideline Recommendations

- ISPAD 2024: Recommend CGM from time of diagnosis when available
- ADA 2025: Offer real-time or intermittently scanned CGM to all youth at diagnosis
- NICE 2023: All children with T1DM should be offered CGM regardless of regimen



Clinical Evidence and Benefits

- CGM users show HbA1c reduction of 0.5–1% within 6–12 months
- Time-in-range improves by 10–15% (~2–3 extra hours/day in target)
- Lower risk of severe and nocturnal hypoglycemia



Family-Centered Education

- Education on sensor insertion, calibration, and interpretation
- Structured follow-up within 1–2 weeks of CGM start
- Shared decision-making: engage both parents and child
- Teach use of Ambulatory Glucose Profile (AGP) for data review



Practical Considerations

- Initiate CGM within first 1–4 weeks after diagnosis.
- Choose device based on availability
- Share data via portals
- Advocate for insurance coverage; emphasize cost-effectiveness



Barriers and Solutions

- Anxiety or body image → trial period, decorative covers
- Alarm fatigue → customize alerts early
- Technical issues → educator follow-up and hotline support
- Cost → use guidelines to justify medical necessity



Long-Term Impact

- Better long-term HbA1c trajectories and metabolic outcomes
- Fewer episodes of DKA and hypoglycemia
- Improved quality of life for child and parents
- Early adoption enables smoother transition to hybrid closed-loop systems



Summary Recommendation

- Initiate CGM early after diagnosis with structured education
- Involve family and ensure ongoing support
- Use continuous data for personalized insulin adjustment
- → Improves engagement, safety, and glycemic control

“A case-based reflection on education, adherence, and family engagement”

Continuous Glucose Monitoring in Children:
from Evidence to Everyday Challenges



FABRIC

**Diabetes
Academy**



Discussion points:

- Early CGM initiation, even at diagnosis, enhances understanding and engagement.
- Family-centered education is critical for successful CGM adoption.
- Continuous data empowers both families and clinicians to personalize therapy.
- Addressing psychological and technical barriers early prevents dropout.

Ambulatory Glucose Profile (AGP): From Data to Decisions

Making Sense of the AGP: A Practical Case for
Insulin Adjustment in Type 1 Diabetes



Marjan Shakiba; M.D.
Pediatric Endocrinologist

Diabetes
Academy
GABRIC

Clinical Case Scenario

A 16-year-old girl with a 4-year history of type 1 diabetes presents for routine follow-up. She is on a basal-bolus insulin regimen using multiple daily injections and a real-time CGM device.

Daily medications:

Multiple daily injections (MDI)

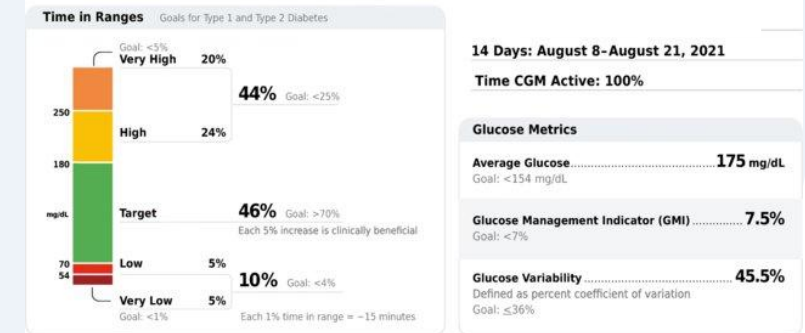
- Glargine U-300 20 U
- Aspart based on carb counting

Lab Data:

HbA1c: 8.3%

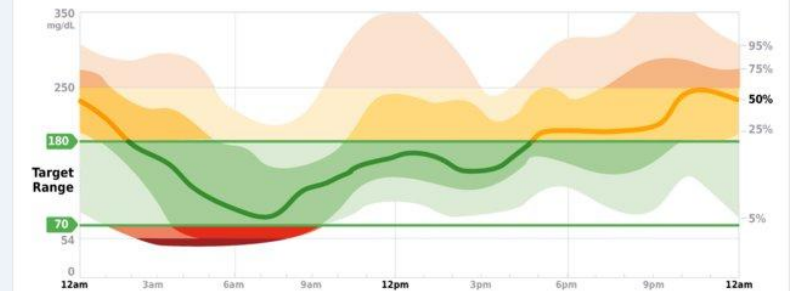
FBS: 150 mg/dL

AGP Report: Continuous Glucose Monitoring



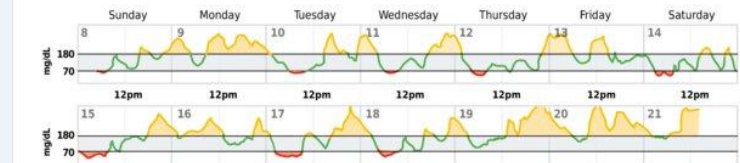
Ambulatory Glucose Profile (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.



Daily Glucose Profiles

Each daily profile represents a midnight-to-midnight period.



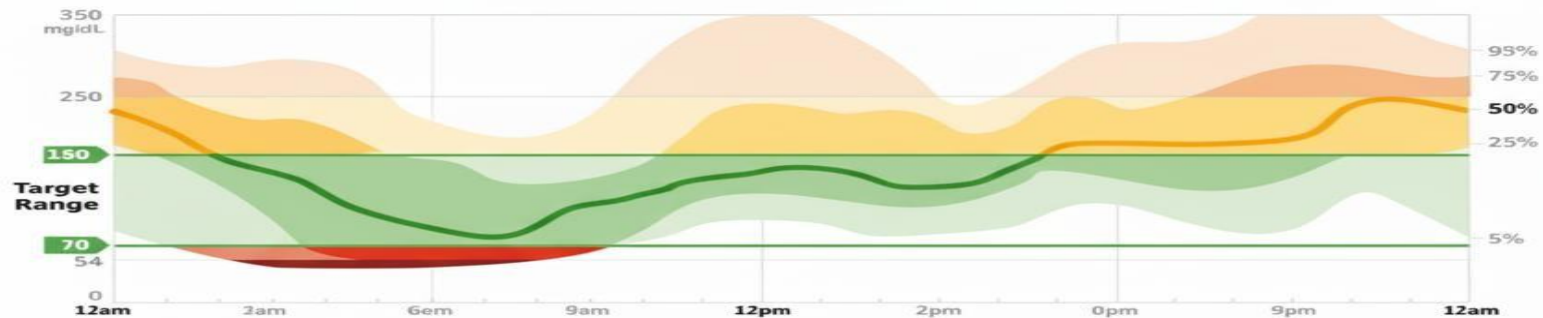
AGP interpretation

AGP Report: Continuous Glucose Monitoring



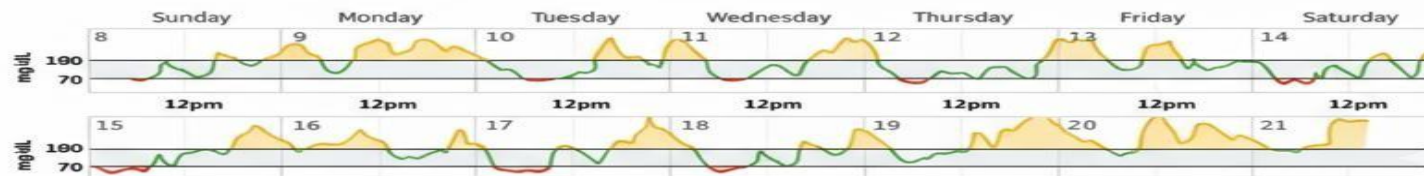
Ambulatory Glucose Profile (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.



Daily Glucose Profiles

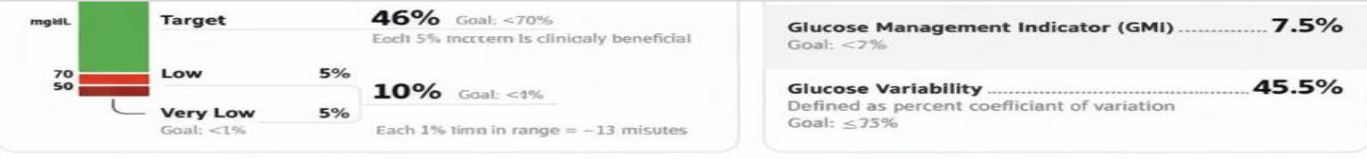
Each daily profile represents a midnight to-midnight period.



General Information

- Test period: August 8–21, 2021 (14 days)
- CGM Active: 100% (excellent data completeness)
- DOB: Jan 1, 1970 (patient's age not directly relevant for interpretation)

Time in Ranges



Range	Glucose (mg/dL)	Percentage of Time	Goal
Very High	>250	44%	<5%
High	181–250	20%	<25%
Target	70–180	46%	>70%
Low	54–69	5%	<4%
Very Low	<54	5%	<1%

Interpretation:

The patient spends 64% of the time above target (hyperglycemia).

Only 46% within target (should ideally be >70%).

10% in hypoglycemia, which is higher than safe limits — especially the 5% very low time.

➔ Indicates poor overall glucose control, with both highs and lows — suggesting unstable diabetes management.

Glucose Metrics

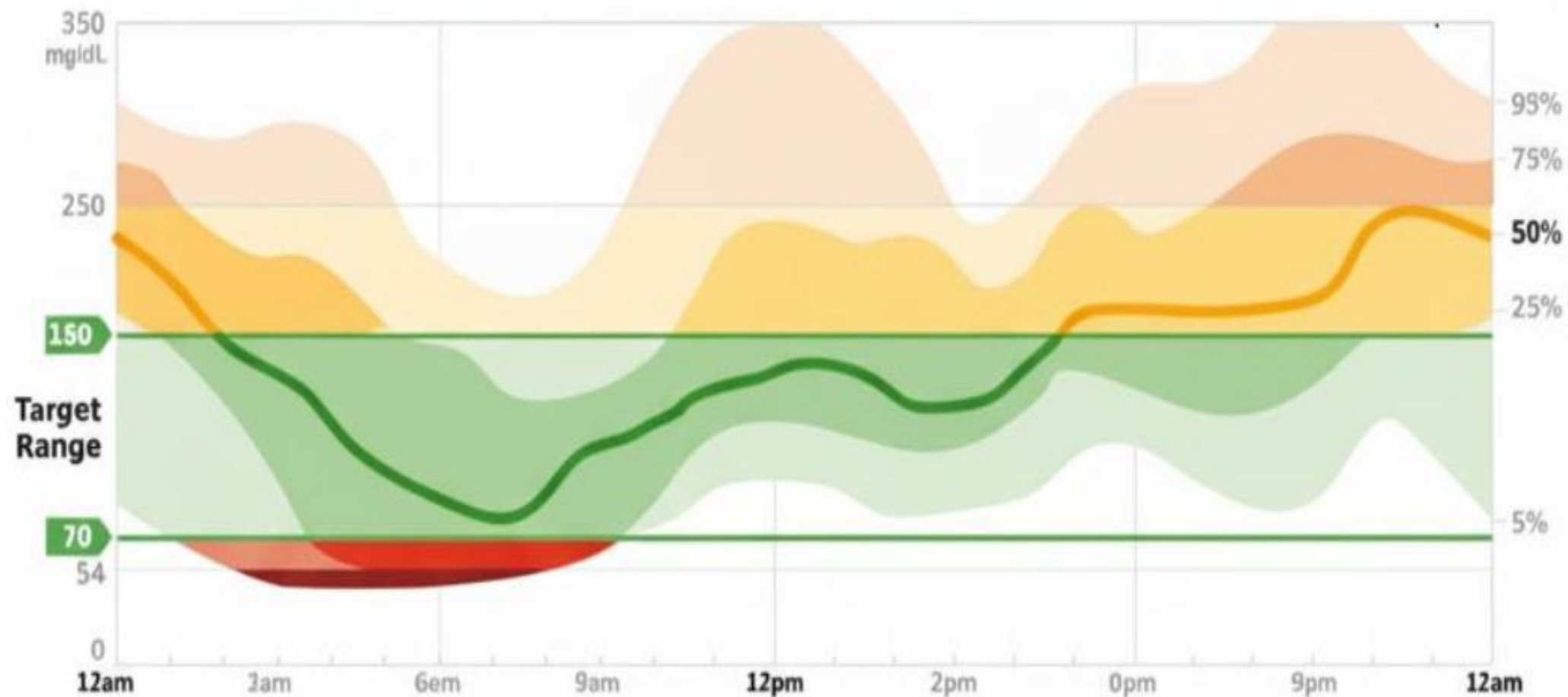
Metric	Value	Goal	Comment
Average Glucose	175 mg/dL	<154 mg/dL	Elevated mean glucose
Glucose Management Indicator (GMI)	7.5%	Goal <7%	Equivalent to HbA1c ≈ 7.5%
Glucose Variability	45.5%	Goal <36%	Very high variability

Interpretation:

High average glucose and GMI indicate suboptimal control.

High variability (swings between highs and lows) increases risk of both complications and hypoglycemia.

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if they occurred in a single day.

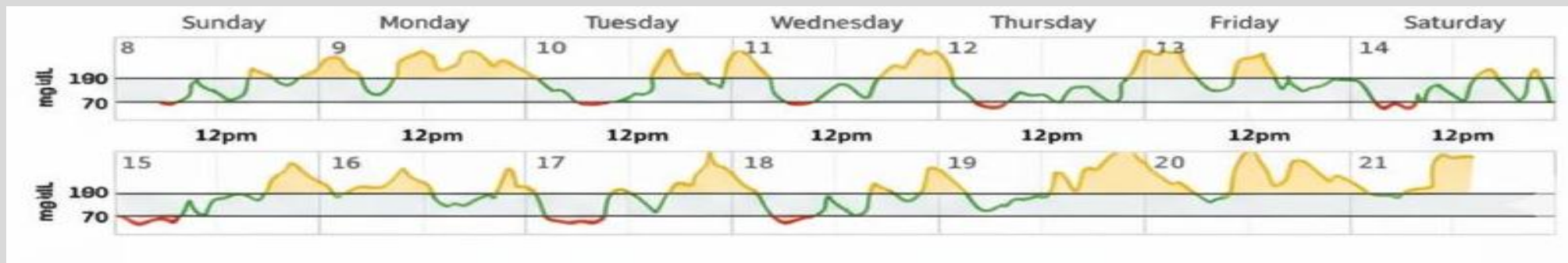


Ambulatory Glucose Profile (AGP)

- The median line (dark green) shows glucose trends over 24 hours.
- The shaded areas (10–90th percentiles) reflect variability
-  **Pattern:**
 - Early morning (around 2–6 am): glucose tends to dip, with risk of hypoglycemia.
 - Midday: glucose remains near or within target.
 - Evening (after ~6 pm): steady rise, with glucose peaking late evening/night → postprandial hyperglycemia or insufficient evening insulin.
- **Interpretation:**
 - Suggests overnight lows and evening highs — possibly due to:
 - Excess basal insulin or Bad timing due to pharmacokinetic and dynamic of basal insulin (for low)
 - Insufficient bolus insulin, insulin to carb mismatch or carb counting mistakes (for highs)

Daily Glucose Profiles

- Recurrent daytime spikes after meals, especially around lunch and dinner.
- Occasional nocturnal hypoglycemia (seen by dips overnight).
- Large fluctuations day-to-day → inconsistent control.



Clinical Impression

- This report reflects poorly controlled and highly variable glucose levels, with both frequent hyperglycemia and occasional hypoglycemia.
- **Possible causes:**
- Incorrect management of carbohydrate intake (Insulin to Carb mismatch or bolus injection bad timing)
- Suboptimal insulin regimen (especially basal/bolus balance)
- Incorrect basal insulin dose or time of injection.
- Lack of adjustments for physical activity or meals
- Possible dawn or dusk glucose phenomena

Suggestions

- Review and adjust insulin timing and doses (esp. evening bolus and nighttime basal).
- Consider dietary education and carbohydrate counting.
- Address overnight lows with basal insulin review or bedtime snack.
- Use CGM alerts to prevent extreme highs/lows.
- Aim to increase time in target range >70% and reduce variability <36%.

Discussion points:

- **How can AGP reports be integrated into routine clinic visits to optimize Type 1 Diabetes management — and who should interpret them: clinicians, educators, or patients themselves?**
- **How tight should be time in range in pediatrics?**
- **What are the reasons behind the discrepancy between GMI and HbA1c**

How can AGP reports be integrated into routine clinic visits to optimize Type 1 Diabetes

- Use ≥ 14 days of CGM data with $\geq 70\%$ wear for reliable AGP interpretation (International Consensus).
- Key AGP metrics: Time in Range (TIR $>70\%$), Time Below Range (TBR $<4\%$), Time Above Range (TAR $<25\%$), Glucose Management Indicator (GMI), Coefficient of Variation (CV).
- Clinic workflow: pre-visit data upload $\rightarrow$ staff verifies data quality $\rightarrow$ clinician reviews 1-page AGP $\rightarrow$ identify 1–2 major glucose patterns $\rightarrow$ set SMART goals.
- Focus interpretation on reproducible patterns by time of day (overnight, post-meal, etc.) rather than single excursions.
- Use AGP discussions to guide collaborative care — emphasize pattern recognition, not blame; reinforce self-management behaviors.
- Reassess AGP after therapy changes or at least every 3 months; document metrics and action plan in EMR.

management — and who should interpret them: clinicians, educators, or patients

Optimal CGM interpretation is collaborative, not exclusive to one group. Each stakeholder has a defined role:

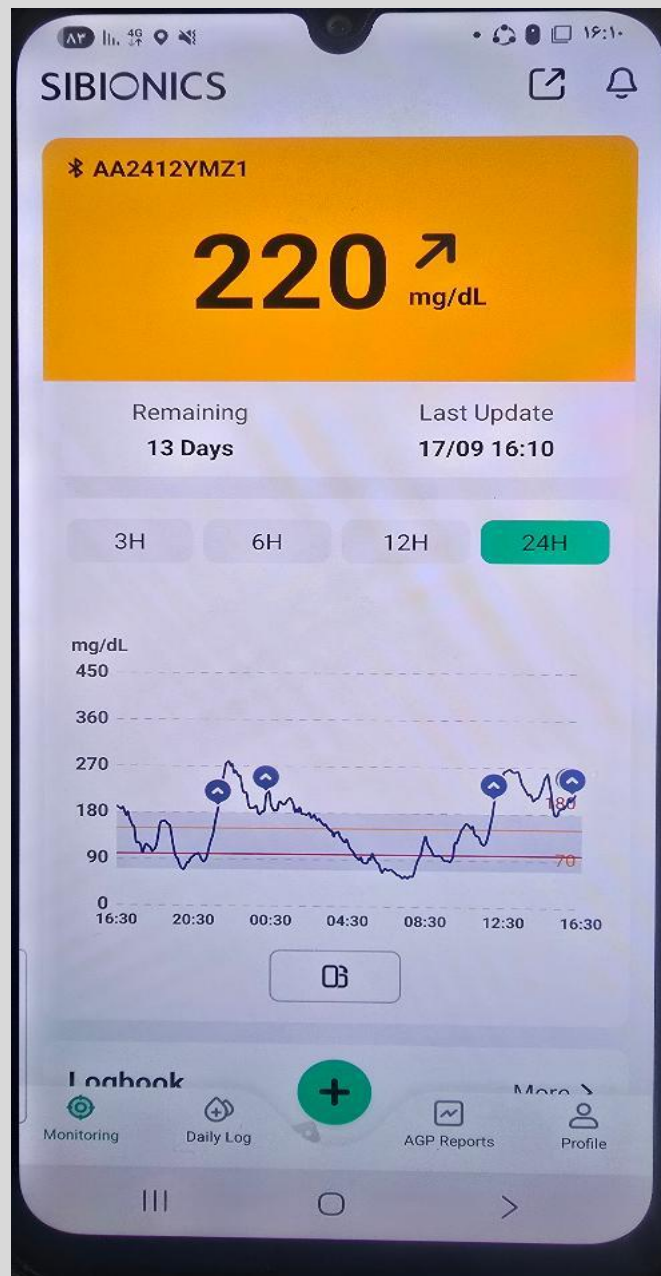
Role	Primary Focus	Typical Tasks
Clinicians (endocrinologists, diabetologists, PCPs)	Clinical decision-making and therapy adjustment	Interpret AGP + trend data in context of insulin regimen, comorbidities, and goals. Adjust insulin doses, pump settings, or medications accordingly. Teach patients to recognize AGP patterns, link to lifestyle (meals, exercise, stress), and troubleshoot sensor or insulin timing issues. Prepare annotated summaries for clinician review.
Diabetes Educators (CDEs, nurses, dietitians)	Behavioral translation and patient coaching	

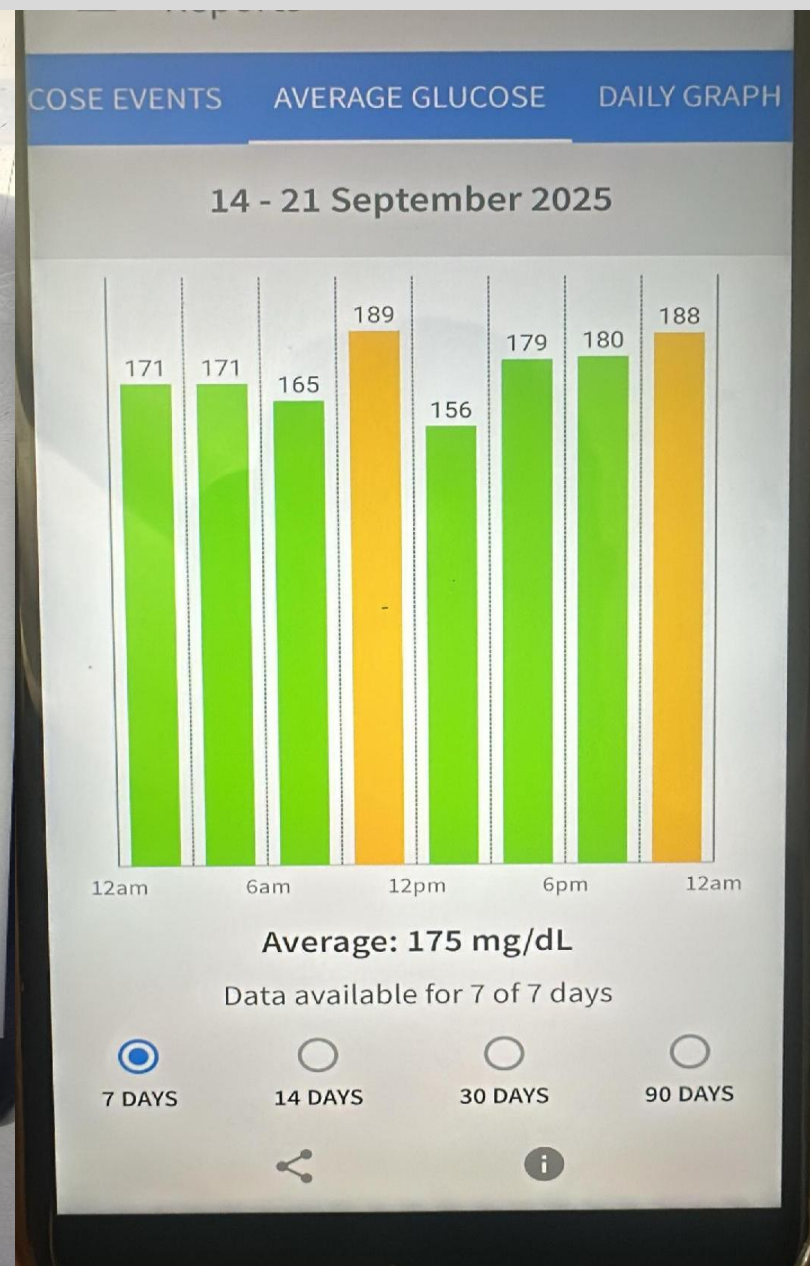
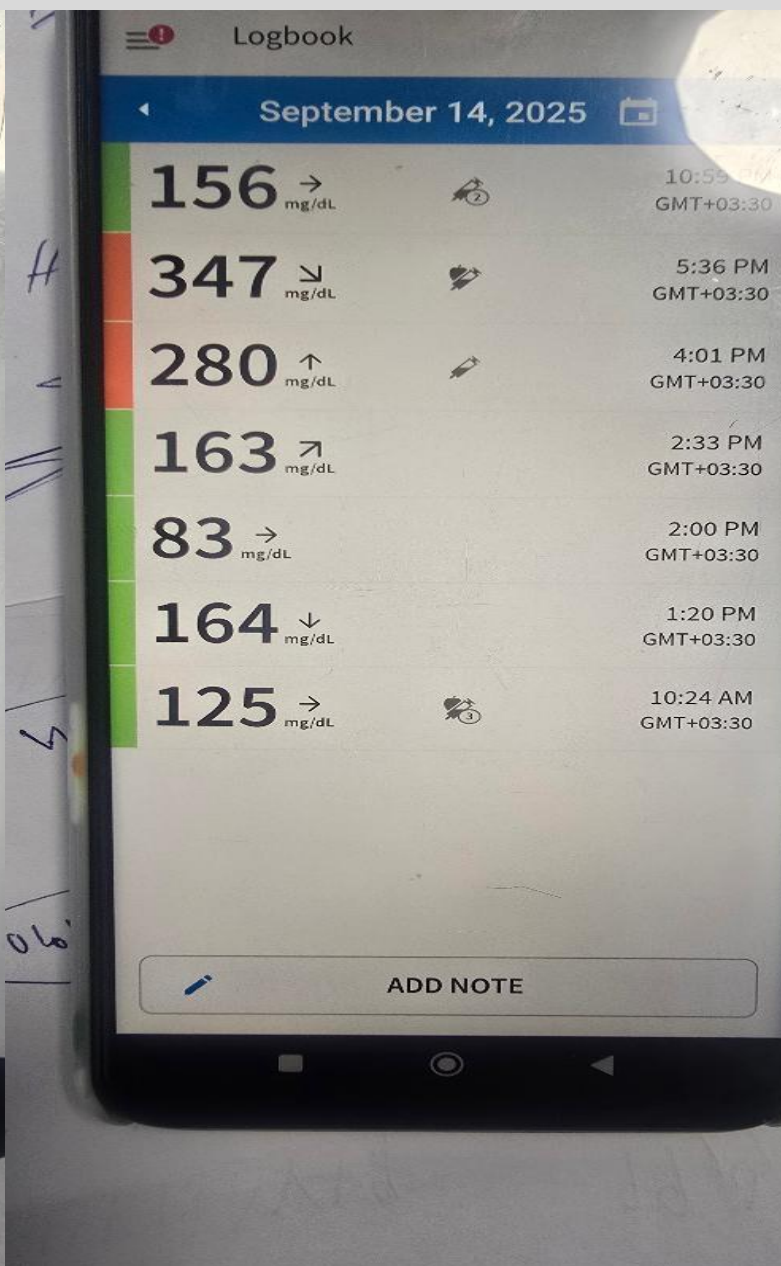
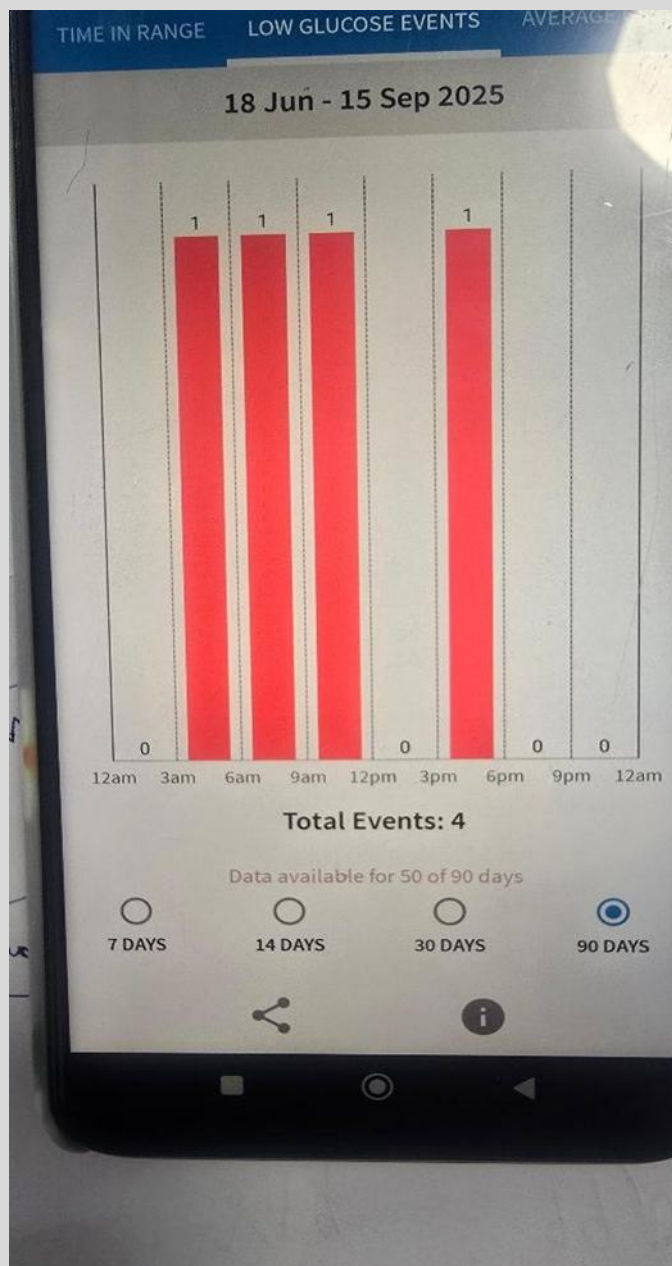
How tight should be time in range in pediatrics?

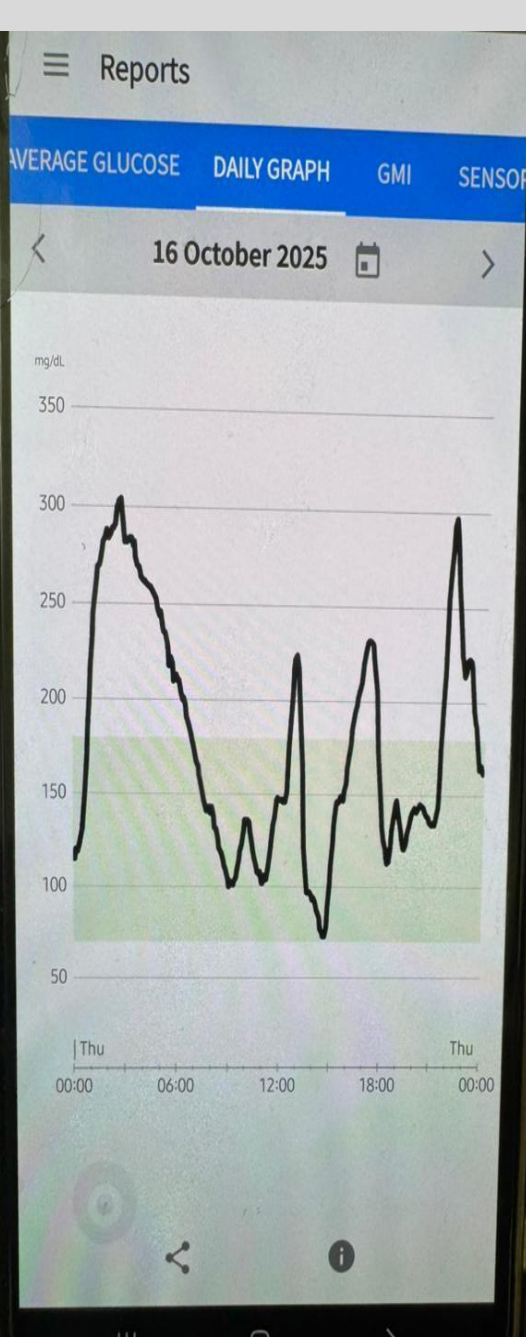
Metric	Pediatric Target (most children/adolescents)	Rationale / Notes
Time in Range (TIR, 70–180 mg/dL)	>70% ($\approx$ <6 hours/day above range)	Equivalent to an estimated A1C $\approx$ 7.0% (53 mmol/mol). Achievable for most youth with CGM & modern insulin therapy.
Time Below Range (TBR <70 mg/dL)	<4% ($\approx$ <1 hour/day)**	Hypoglycemia prevention is critical in young children due to neurocognitive risk.
TBR <54 mg/dL	<1% ($\approx$ <15 minutes/day)**	Avoid significant or prolonged hypoglycemia.

What are the reasons behind the discrepancy between GMI and HbA1c

-  Patient Example:
 - • HbA1c: 8.3%
 - • GMI: 7.5%
-  Reasons for Discrepancy:
 - • HbA1c reflects 2–3 months; CGM reflects 10–14 days.
 - • Recent improvement → GMI lower than HbA1c.
 - • Differences in red blood cell lifespan.
 - • Iron deficiency or hemoglobin variants can alter HbA1c.
 - • CGM sensor inaccuracy or calibration shifts.
 - • Incomplete CGM wear time.
 - • High day-to-day glucose variability.







William Osler



The practice of medicine is an art, not a trade; a calling, not a business; a calling in which your heart will be exercised equally with your head.

National CGM and SMBG Consensus



Syed Adel Jahed; M.D.
Endocrinologist



First National Iranian Consensus on SMBG





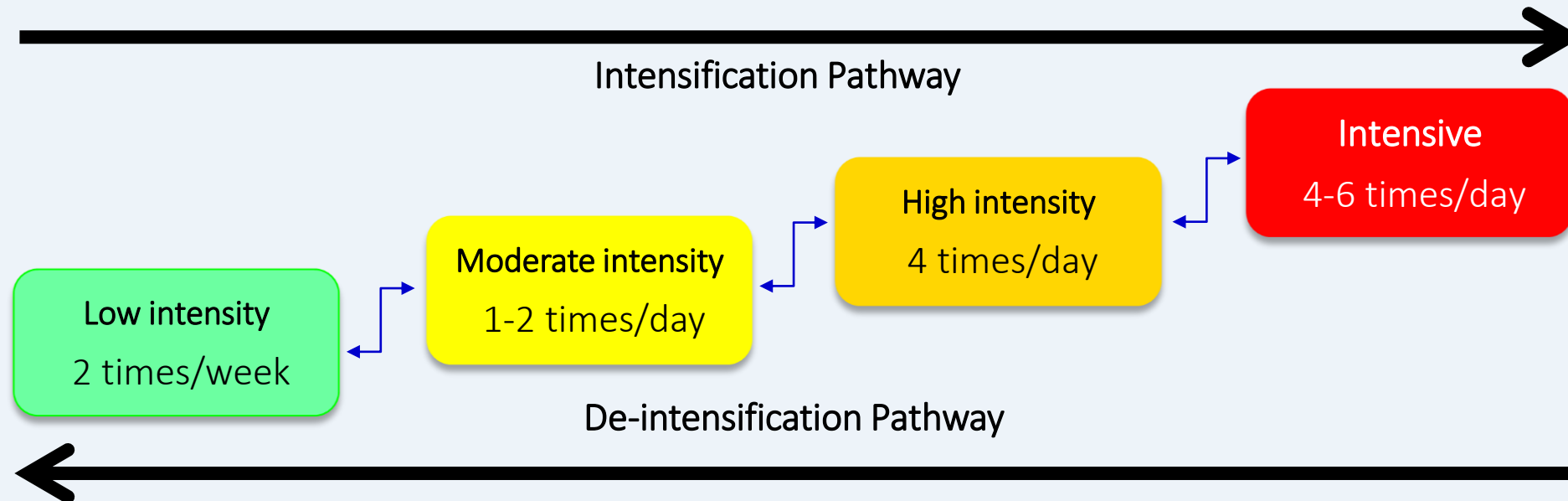
SMBG Protocol Categories

We recommend 4 SMBG protocols, including:

- Low intensity: 2 times per week
- Moderate intensity: 1-2 times per day
- High intensity: 4 times per day
- Intensive: 4-6 times per day

Tailored target groups, based on

- Glycemic control
- Type of diabetes
- Therapeutic regimen



Standard Care

Affordable and *Available*
SMBG Practice

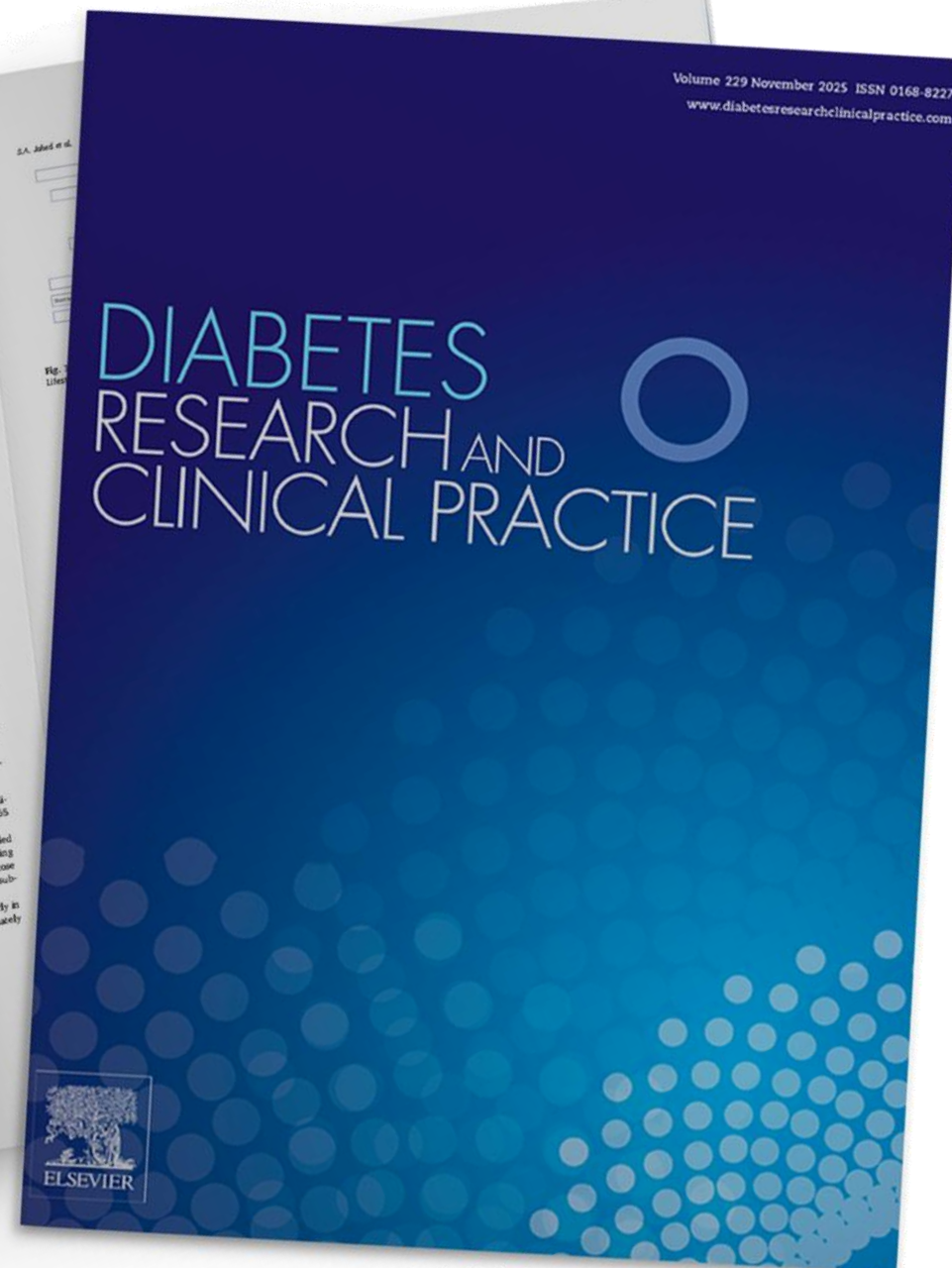
<i>Status</i>		<i>Table Number</i>
T₁DM	HbA _{1c} in Target, >5 years old	1-3
	Children ≤ 5 years old	1-4
	HbA _{1c} Not in Target, regardless of age	1-4
	Pregnant	1-4
T₂DM	HbA _{1c} in Target, on OAD with no hypoglycemia risk	1-1
	HbA _{1c} in Target, on OAD with hypoglycemia risk	1-2
	HbA _{1c} in Target, on non-MDI insulin, ± OAD	1-2
	HbA _{1c} Not in Target, on OAD with no hypoglycemia risk	1-2
	HbA _{1c} in Target, on MDI insulin ± OAD	1-3
	HbA _{1c} Not in Target, on OAD with hypoglycemia risk	1-3
	HbA _{1c} Not in Target, on non-MDI insulin, ± OAD	1-3
	HbA _{1c} Not in Target, on MDI insulin ± OAD	1-4
	Pregnant, on insulin	1-4
GDM	HbA _{1c} in Target, only on LSM/metformin	1-2
	HbA _{1c} Not in Target, only on LSM/metformin	1-3
	On Insulin	1-4

Limited Care

Unaffordable or *Unavailable*
SMBG Practice

<i>Status</i>		<i>Table Number</i>
T₁DM	HbA _{1c} in Target, > 5 years old	2-2
	Children ≤5 years old, regardless of control	2-3
	HbA _{1c} Not in Target, > 5 years old	2-3
	Pregnant	2-3
T₂DM	HbA _{1c} in Target, on OAD with hypoglycemia risk	2-1
	HbA _{1c} in Target on non-MDI insulin, ± OAD	2-1
	<i>If possible: In target T₂DM on OAD with no hypoglycemia risk</i>	2-1
	HbA _{1c} Not in Target, on OAD with no hypoglycemia risk	2-1
	HbA _{1c} in Target, on MDI ± OAD	2-2
	HbA _{1c} Not in Target, on OAD with hypoglycemia risk	2-2
	HbA _{1c} Not in Target, on non-MDI insulin, ± OAD	2-2
	HbA _{1c} Not in Target, on MDI ± OAD	2-3
	Pregnant, on insulin	2-3
GDM	HbA _{1c} in Target, only on LSM/metformin	2-1
	HbA _{1c} Not in Target, only on LSM/metformin	2-3
	On Insulin	2-3

National Consensus “The use of CGM in outpatient diabetes care” Published!





The Need for National Consensus

diabetesresearchandclinicalpractice 230 (2025) 112961



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Diabetes Research and Clinical Practice

journal homepage: www.journals.elsevier.com/diabetes-research-and-clinical-practice



Review

The use of continuous glucose monitoring in outpatient diabetes care: Iranian expert consensus statement

Seyed Adel Jahed^a, Amirkamran Nikoosokhan^b, Hossein Moravej^c, Peymaneh Sarkheil^d,
Mojtaba Malek^e, Alireza Esteghamati^f, Farhad Hosseinpanah^g, Sara Sedaghat^{a,*} , on behalf of
CGM consensus collaborative group

^a Gabric Diabetes Education Association, Tehran, Iran

^b Iranian Diabetes Society, Tehran, Iran

^c Department of Pediatrics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

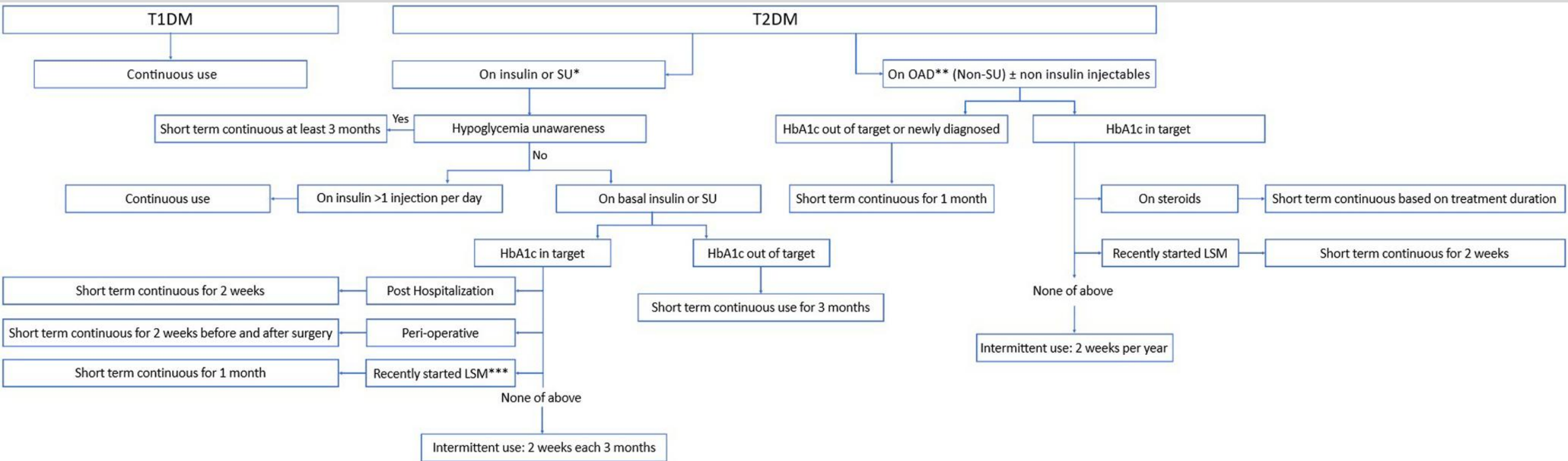
^d Personalized Medicine and Genometabolomics Research Center, Hope Generation Foundation, Tehran, Iran

^e Research Center for Prevention of Cardiovascular Disease, Institute of Endocrinology and Metabolism, Iran University of Medical Sciences, Tehran, Iran

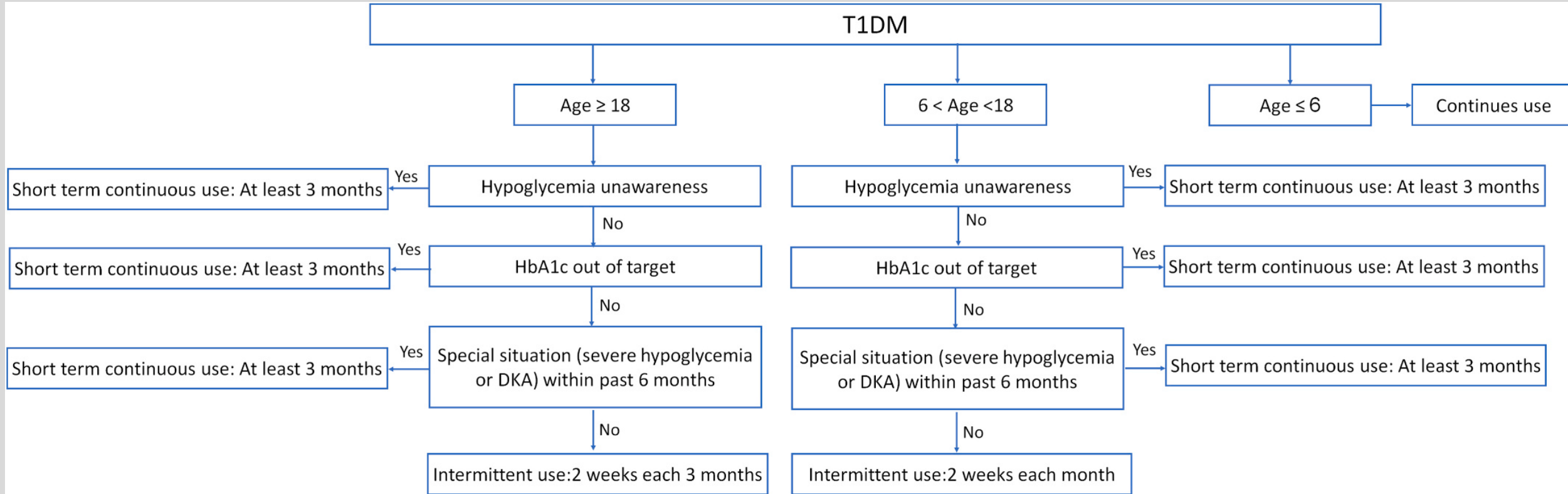
^f Endocrinology and Metabolism Research Center (EMRC), Vali-Asr Hospital, Tehran University of Medical Sciences, Tehran, Iran

^g Obesity Research Center, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

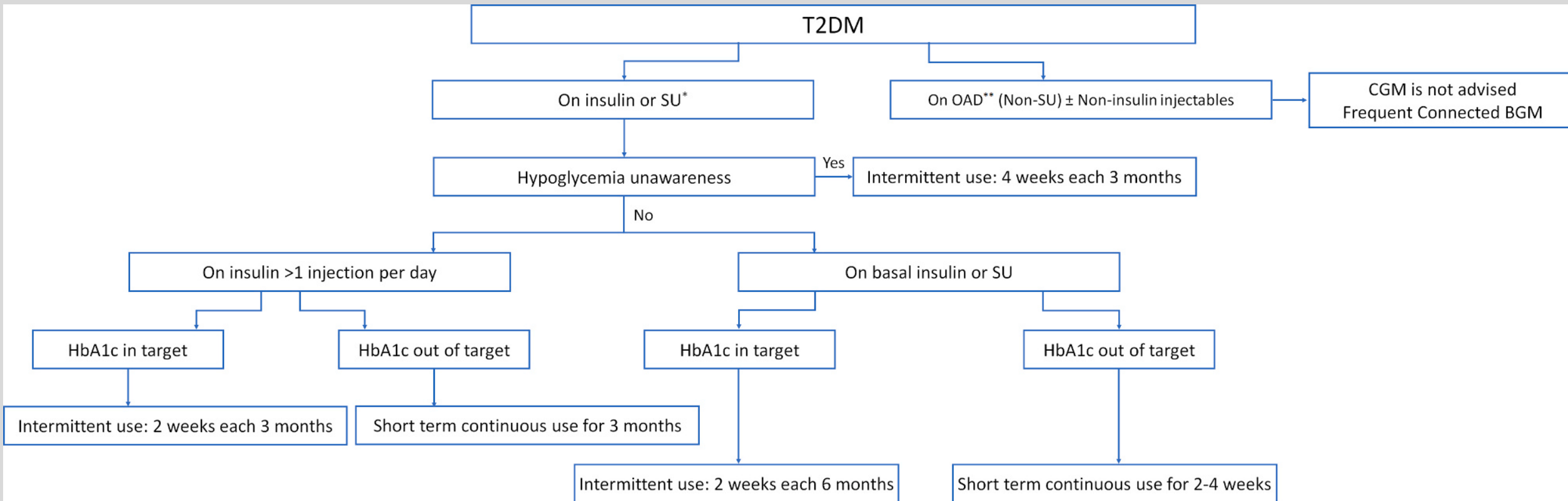
The use of CGM for non-pregnant individuals with T1DM and T2DM in affordable setting



The use of CGM in non-pregnant individuals with T1DM in non-affordable setting



The use of CGM in non-pregnant individuals with T2DM in non-affordable setting





Gabric Diabetes Virtual Academy

- Providing virtual scientific courses
- Most Updated Content from Diabetes Field Experts
- to learn at your own pace, anytime anywhere!

www.GabricViDA.com

