Intended audience: UK and Ireland medical and trade media

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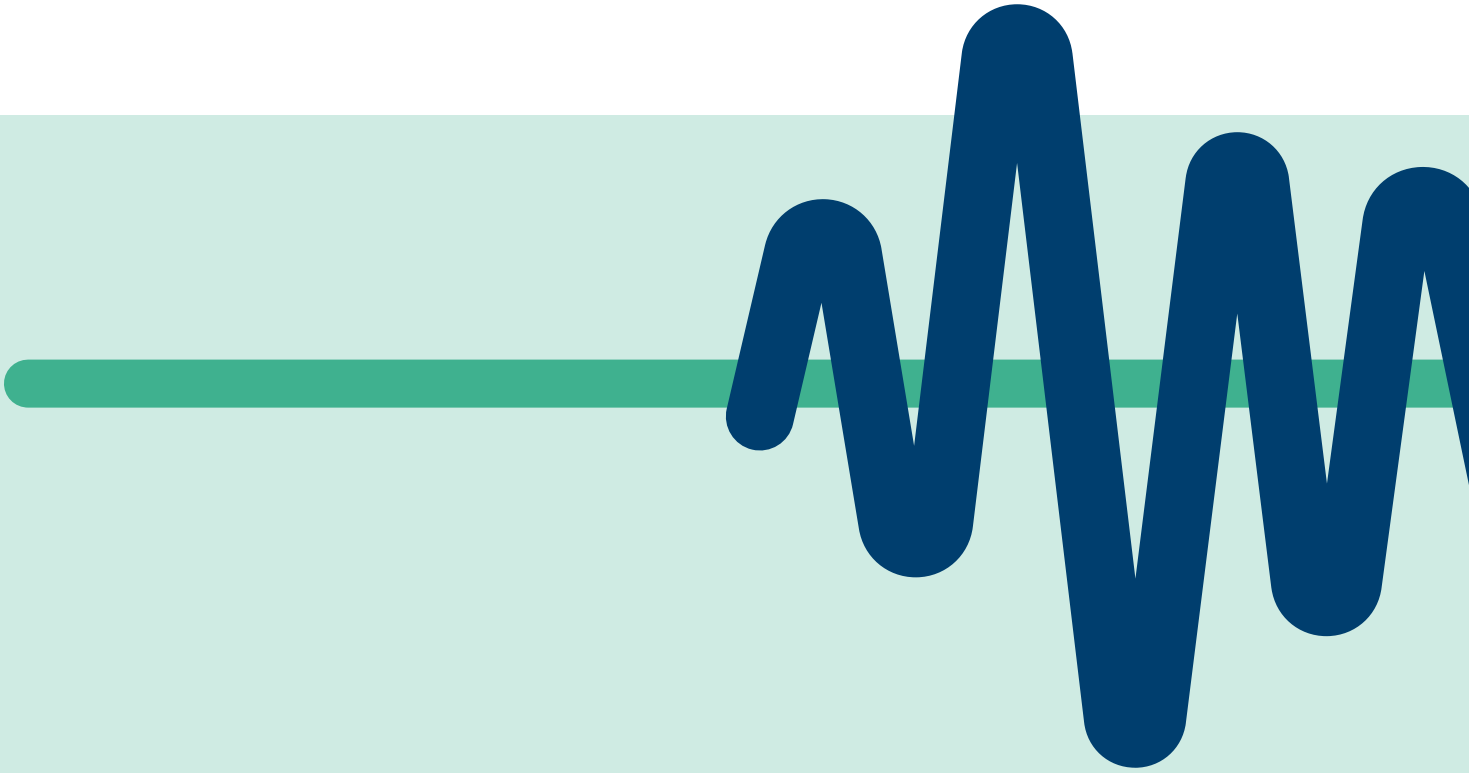


Beyond HbA_{1c}, it is time to think **Time-in-Range**

Understanding Time-in-Range, its assessment, impact, and the targets to aim for

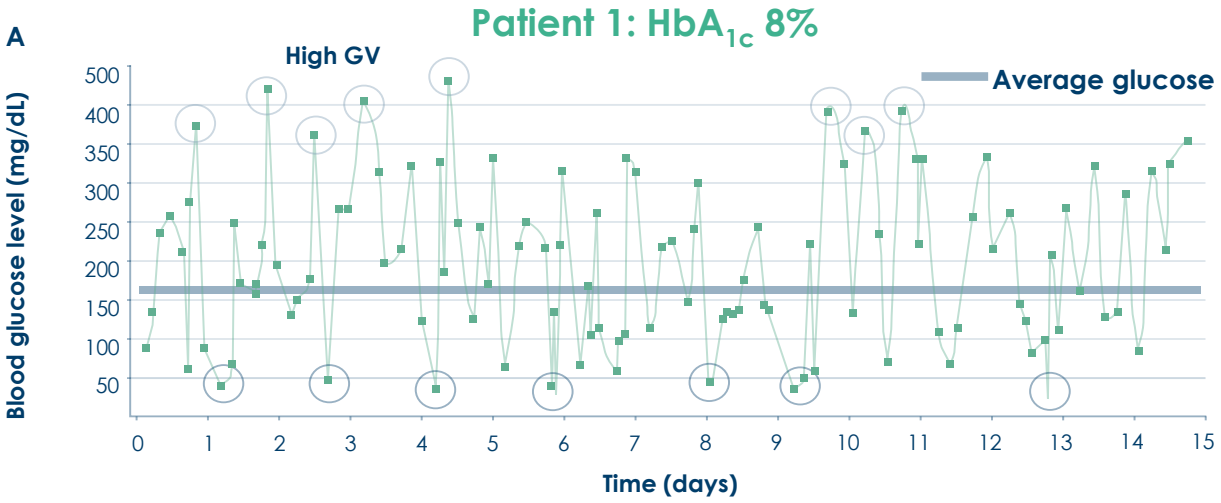
MAT-XU-2201319 (v1.0). Date of Preparation: April 2022.

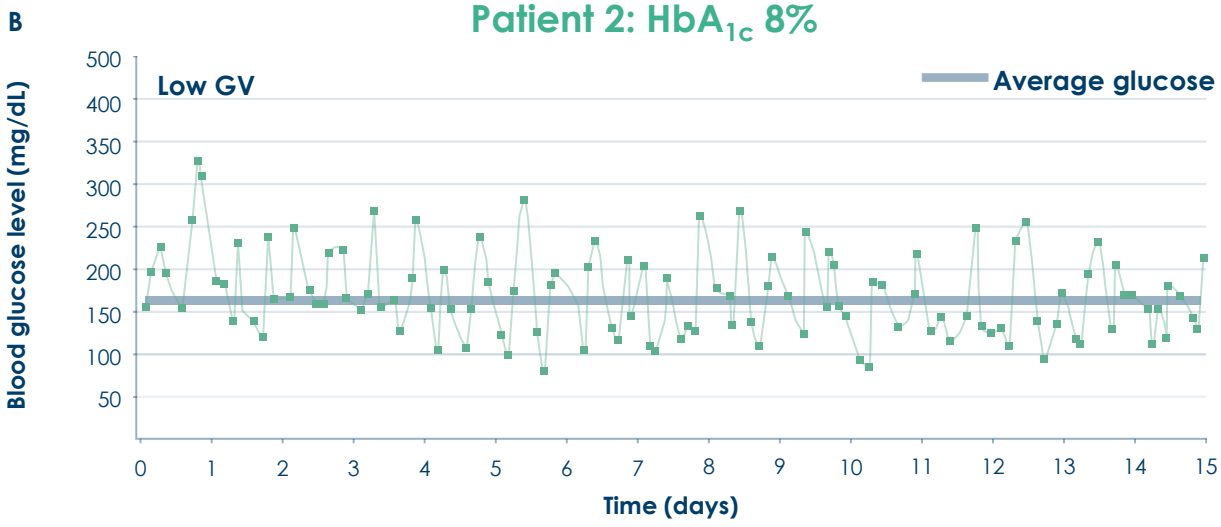
Glycaemic variability

Glycaemic variability (GV) is a common challenge for people with diabetes and has been associated with a higher risk for serious consequences.[1,2]

Managing glycaemia based on HbA_{1c} tells us little about the variability of blood glucose individuals in diabetes. For instance, it is known today that two people with an identical HbA_{1c} level can have markedly different degrees of GV.[3]

In the figures below, patient 1 has high GV, reflected by numerous episodes of both hypo- and hyperglycaemia, whereas low GV in patient 2 resulted in no such episodes.[3]





GV: glycaemic variability
Adapted from Kovatchev B & Cobelli C. 2016[3]

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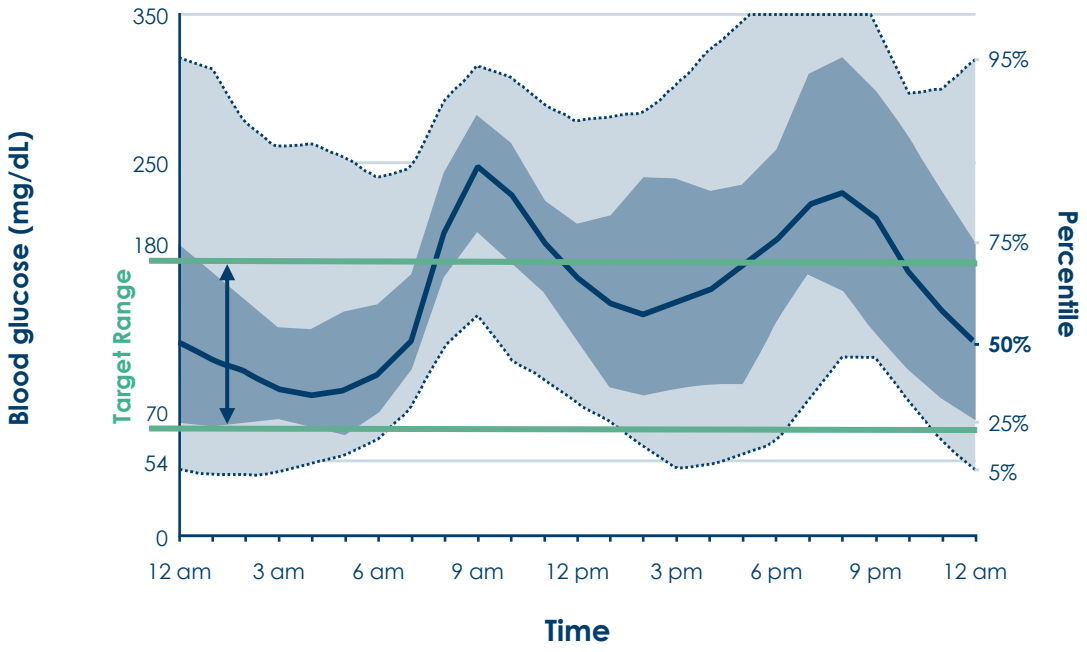
What is Time-in-Range?

Time-in-Range (TIR) represents a new key metric for glycaemic control. It is defined as the percentage of time over a 24-hour period in which blood glucose levels fall within a target range.[4]

Ambulatory glucose profile



Target range (70–180 mg/dL)

Adapted from Battelino T et al., 2019[4]

Evaluating TIR can aid understanding of whether hypoglycaemia (represented by time-below-range) or hyperglycaemia (time-above-range) are improving with treatment over time.[5]

Consequently, as per the 2019 International Consensus on Time-in-Range, TIR has been identified as a metric of glycaemic control that provides more actionable information than HbA_{1c} alone.[4]

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The impact of Time-in-Range

Optimising TIR may be useful in effective diabetes management and could help to reduce the risk of negative consequences for patients.[6-7]

Studies have shown the following risks associated with reductions in TIR:

Beck, 2019:[6]

- A post hoc analysis of 1440 people with **type 1 diabetes mellitus (T1DM)** in the Diabetes Control and Complications Trial (DCCT). Measurements were collected via fingerstick samples rather than continuous glucose monitoring.[6]
- A **10% drop in TIR increased the risk of retinopathy by 64%** (95% CI 51,78) and **increased the risk of microalbuminuria by 40%** (95% CI 25, 56).[6]

Mayeda, 2020:[7]

- A prospective cohort study of 105 people with **type 2 diabetes mellitus (T2DM)** treated with insulin or sulfonylurea and measured via continuous glucose monitoring.[7]
- A **10% drop in TIR increased the risk of distal peripheral neuropathy by 25%** (95% CI 1.02, 1.52) in people with T2DM and chronic kidney disease.[7]

TIR is an important physical and emotional measure of success for people with diabetes.

In an online survey of **1026 people with T1DM** and **1154 people with T2DM taking insulin**:

57% people with T1DM and **45%** of people with T2DM taking insulin ranked TIR as the measurable therapy outcome that had the biggest impact on daily life with diabetes.[8]

54% of people with T1DM and **36%** T2DM taking insulin ranked TIR as the highest driver of a positive mindset.[8]

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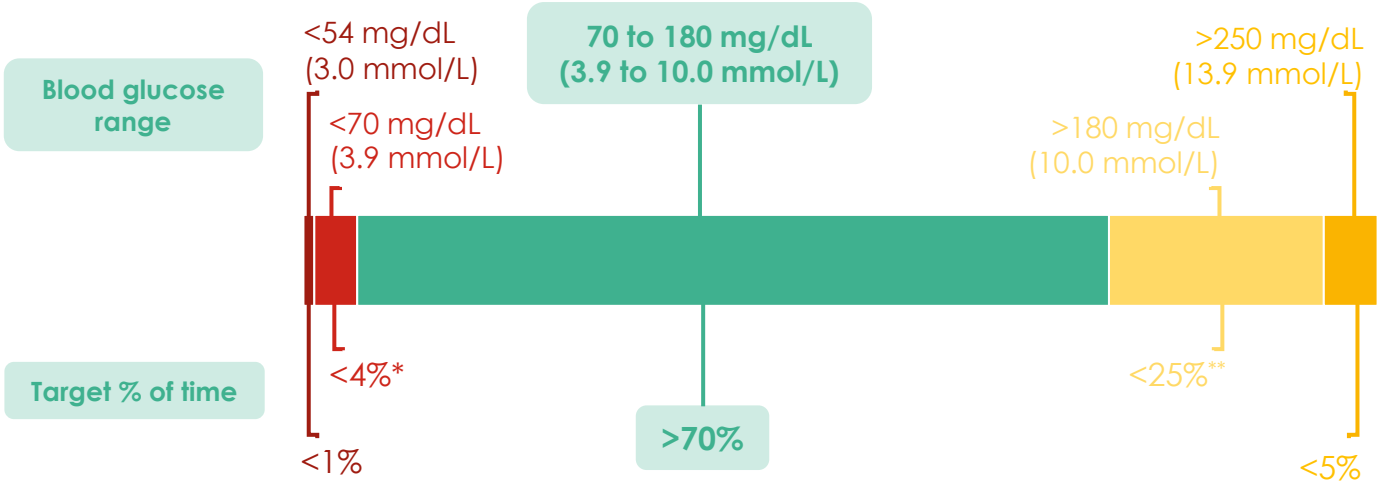
Which Time-in-Range target should you aim for?

International guidelines recommend a target of >70% TIR (70–180 mg/dL) for most adult patients with T1DM or T2DM:[4]



Hypoglycaemia

<1 hour per day
with blood glucose <70 mg/dL (<3.9 mmol/L)

<15 minutes per day
with blood glucose <54 mg/dL (<3.0 mmol/L)

TIR

>16 hours, 48 mins per day

Hyperglycaemia

<1 hour, 12 mins per day
with blood glucose >250 mg/dL (>13.9 mmol/L)

<6 hours per day
with blood glucose >180 mg/dL (>10.0 mmol/L)

*Includes percentage of values <54 mg/dL (3.0 mmol/L). **Includes percentage of values >250 mg/dL (13.9 mmol/L)
TIR: Time-in-Range
Adapted from Battelino T et al., 2019[4]

Each incremental 5% increase in TIR is associated with clinically significant benefits for adults with T1DM or T2DM.[4]

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