Beyond HbA$_{1c}$, it is time to think Time-in-Range

Understanding Time-in-Range, its assessment, impact, and the targets to aim for
Glycaemic variability (GV) is a common challenge for people with diabetes and has been associated with a higher risk for serious consequences.\textsuperscript{1,2}

Managing glycaemia based on HbA\textsubscript{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\textsubscript{1c} level can have markedly different degrees of GV.\textsuperscript{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.\textsuperscript{3}
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**

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.\(^4\)
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
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 (<3.0 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)

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

Includes percentage of values <54 mg/dL (3.0 mmol/L). **Includes percentage of values >250 mg/dL (13.9 mmol/L)

Target % of time

Blood glucose range

<54 mg/dL (3.0 mmol/L) 70 to 180 mg/dL (3.9 to 10.0 mmol/L) >250 mg/dL (13.9 mmol/L)

<1% <70 mg/dL (3.9 mmol/L) >180 mg/dL (10.0 mmol/L)

<4%* <70 mg/dL (3.9 mmol/L) <25%**

<1% <4%* <5%**


