

Glycemic Tracking Before and After Insulin Pump Initiation

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Keywords

type 1 diabetes, insulin pump therapy, glycemic tracking

People with type 1 diabetes mellitus (T1DM) demonstrate stable HbA1c levels over time (glycemic tracking).¹ Glycemic tracking commences five years after diabetes diagnosis, with clinically meaningful improvements in blood glucose rarely occurring thereafter.² Glycemic tracking in people using insulin pumps has not been assessed. We collected anonymized data for 160 patients (60% female mean age at diagnosis 16.7 years and at commencement of insulin pump therapy 37.3 years) diagnosed with T1DM between 1961 and 2016. All had commenced insulin pump therapy at Imperial College Healthcare NHS Trust between 1980 and 2018. Glycemic tracking was defined as a period in which there was no statistically significant difference ($P < .05$) between the HbA1c of any two years in the period before, or any two years in the period following commencement of insulin pump therapy. We found no significant difference between the median HbA1c value of any two-year period in the five years preceding commencement of insulin pump therapy, nor in the five years after initiation of pump therapy, consistent with glycemic tracking. However, there was a statistically significant difference ($P < .0001$) between the median HbA1c in the year immediately prior to and after the date of insulin pump therapy (Figure 1). When comparing the paired median HbA1c for individuals with at least three HbA1c values before and after pump initiation ($n=62$), a significant ($P < .0001$) reduction in median HbA1c, from 65.1 mmol/mol to 58.3 mmol/mol, was also observed, with 49 (79%) patients experiencing a reduction in HbA1c following insulin pump initiation. This analysis provides supportive evidence for the phenomenon of glycemic tracking in established T1DM, with stable glycemia before and after insulin pump initiation. The significant reduction in HbA1c associated with insulin pump therapy suggests that this intervention can lower tracked HbA1c levels for up to five years. Our findings are in agreement with other studies showing the greatest period of HbA1c reduction occurs within the first year of treatment.^{3,4} Larger analyses suggest the magnitude of overall improvement in HbA1c with insulin pump therapy is 5-6 mmol/mol compared with multiple dose injection regimens. It is noteworthy that our real-world data are consistent with these randomized controlled trial data and that the improvement tracked in our population for five years. Other data have suggested that

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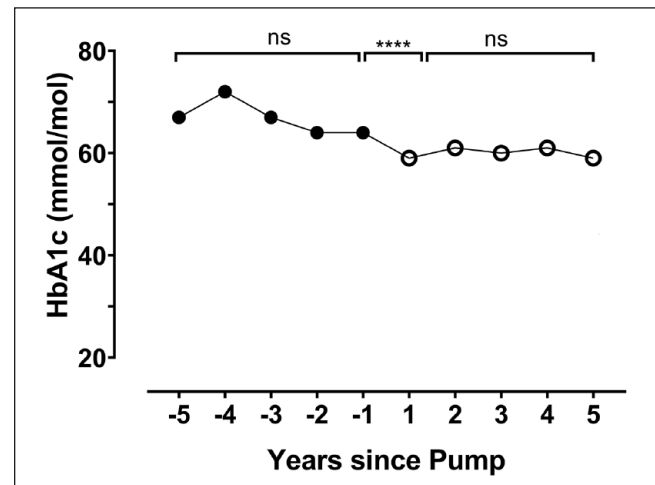



Figure 1. Annual median HbA1c in the five years before and after the date of commencement of insulin pump therapy ($n=51-269$) (**** $P < .0001$).

while 88% of patients on long-term treatment with insulin pumps experience improved glycemic control, only 31% experience an HbA1c improvement that is sustained over five years.⁵ Our analysis has some limitations. The absence of a control arm in this work potentially limits its impact as does the lack of adjustment for confounding factors such as body mass index, socioeconomic status, and patient education, factors that have been shown to influence HbA1c.⁶ However, the use of real-world data collected in a single center and recorded contemporaneously is a strength. In conclusion, this retrospective cohort study provides supportive evidence for the phenomenon of glycemic tracking in T1DM and suggests that

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insulin pump therapy can lower tracked HbA_{1c} levels, with an effect which is sustained for at least five years.

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