HbA1c and sensor glucose level changes with hybrid closed-loop therapy in the real-world: Results from the ABCD audit of the NHS England Closed-Loop Pilot

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Introduction

The NHS England pilot launched in 2021 and funded access to hybrid closed-loop therapy (HCL) for individuals using pump therapy, FreeStyle Libre 2 and with a HbA1c≥69mmol/mol. Six-month results demonstrated improvements in HbA1c and sensor glucose levels. The initial report of the 6-month outcomes has been published and demonstrated significant improvements in HbA1c, sensor glucometrics and improvements in quality of life with reductions in diabetes distress(1).

We report longer-term follow-up from the cohort. **A poster reporting the factors which predict achievement of HbA1c and time in range targets is available (P249).**

Methods

Data were inputted into a secure online tool and extracted from this for analysis. Outcomes for HbA1c and sensor glucose data at 12-months (9-18months) follow-up are reported. Multivariate linear regression analysis was used to assess changes from baseline corrected for baseline HbA1c, weight, age, gender, diabetes duration and pump duration and centre. All analyses were performed in Stata 16.

Results

Data were included for 235 individuals: age 41.1±13.6 years, baseline HbA1c 78.4±12.4mmol/mol, median diabetes duration was 18.0years (IQR 13.7-29.2), and median pump therapy duration was 8.2 years (IQR 4.7-11.2). The majority were female (63.4%) and White British (92.5%), median index of multiple deprivation decile was 6 (IQR 3-9). Median follow-up was 1.3 years (IQR 1.0-1.8).

The baseline characteristics are summarised in **table 1** below.

Mean±SD HbA1c (paired) was 78.2±12.5mmol/mol reducing to 63.2±11.9mmol/mol at 12-months. This is a decrease of 16.7mmol/mol (95% CI 15.2-18.2; P<0.001) by 12-months compared to baseline when corrected for covariates.

Table 1. Baseline characteristics of the cohort

Baseline Characteristics		
Variable	**Measure**	**Total n=235**
Age, year	Mean±SD	41.1±13.6
Gender, Female	n (%)	149 (63.4)
Diabetes duration, years	Median (IQR)	21.3 (13.7-29.2)
Pump Duration, years	Median (IQR)	8.2 (4.7-11.2)
Ethnicity, White British	n (%)	211 (92.5)
Index of multiple deprivation, decile	Median (IQR)	6 (3-9)
Weight, kg	Mean±SD	82.1±17.7
HbA1c, mmol/mol	Mean±SD	78.4±12.4
Time above range, % >10mmol/L	Mean±SD	61.7±16.5
Time in range, % 3.9-10mmol/L	Mean±SD	36.2±15.8
Time below range, % <3.9mmol/L	Mean±SD	2.1±2.7

Results

At follow-up, time-in-range increased from 37.9% to 62.9% and time >13.9mmol/L decreased from 33.6% to 12.9%. When corrected for change in covariates this was a mean difference of +23.5% (95% CI 20.0-27.0; P<0.001) and -19.6% (95% CI 15.3-23.9; P<0.001) respectively.

Time below range (3-3.8mmol/L) reduced by 0.8% (95% CI 0.1-1.5; P=0.04) and time <3mmol/L reduced by 0.3% (95% CI 0.1-0.5; P=0.01).

HbA1c and sensor glucose outcomes were not significantly different between 6 and 12-month.

Figure 1. Violin plot showing HbA1c at baseline and follow-up

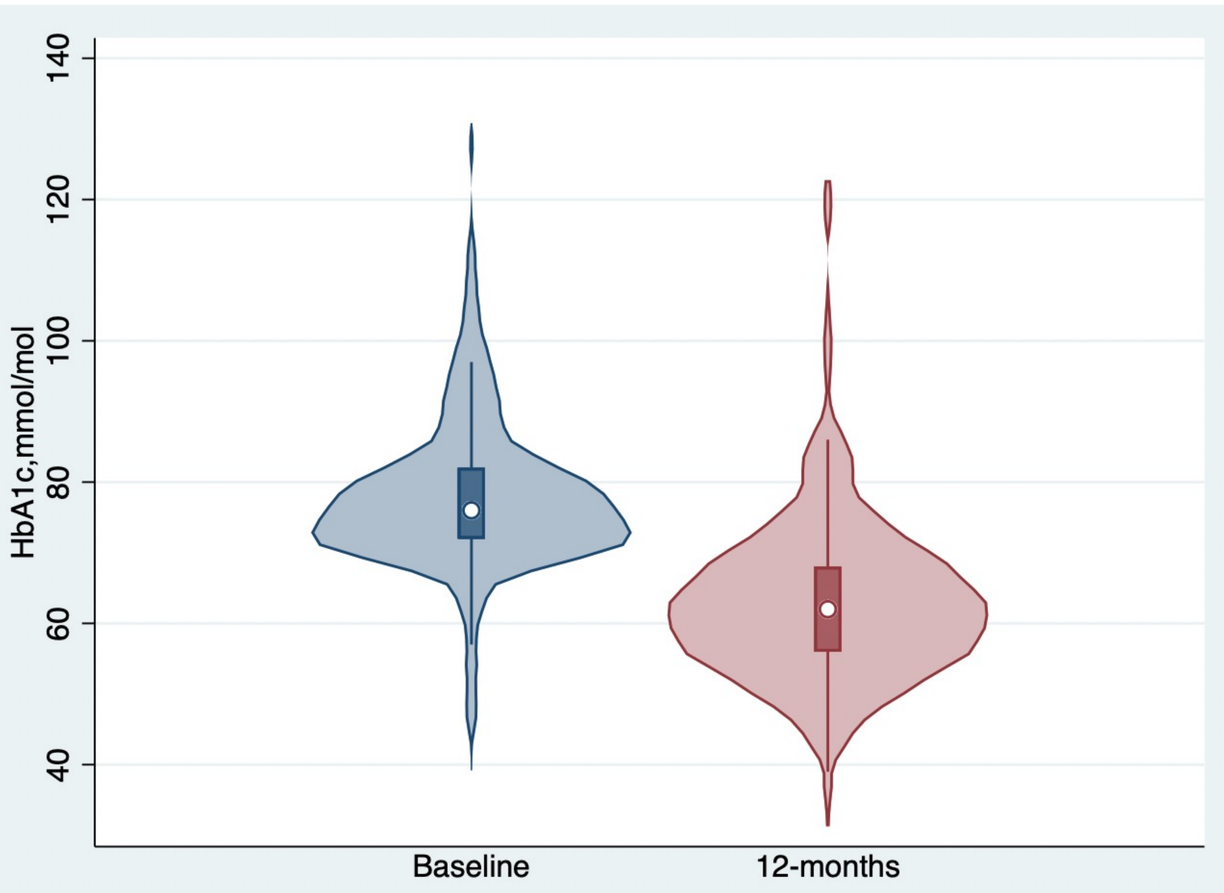
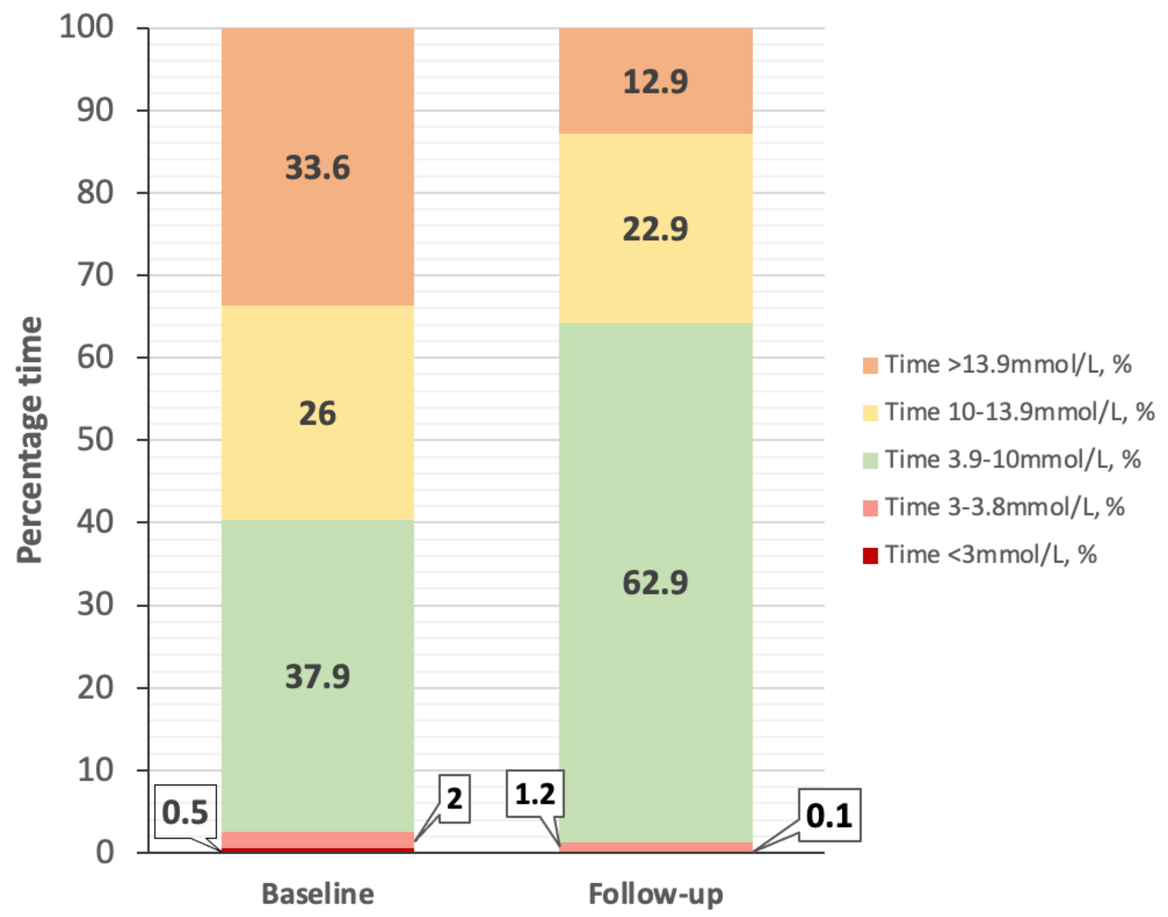


Figure 2. Time in glucose ranges at baseline and follow-up



Conclusions

Significant HbA1c reductions and improvements in sensor glucometrics are seen with hybrid closed-loop therapy. These occur by 6-months and are sustained out to 1.3 years follow-up. Data collection will continue in the long-term to assess whether these positive outcomes are maintained.

References

1. Crabtree et al, Diabetes Care 2023

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