Factors predicting achievement of recommend time-in-range at 6-months post-commencement amongst closed-loop users with elevated baseline HbA1c levels

TSJ Crabtree[1,2,3], TP Griffin[4], P Narendran[5],, G Gallen[6], J Elliott[7], YW Yap[8], A Lumb[9], P Hammond[19], REJ Ryder[3], P Choudhary[4], EG Wilmot[1,2] on behalf of all ABCD Closed-Loop Audit contributors

1. University Hospitals of Derby & Burton NHS Trust, UK; 2. University of Nottingham, UK; 3. Sandwell & West Birmingham Hospitals NHS Trust, UK; 4. University Hospitals of Leicester NHS Trust, UK; 5. University Hospitals of Birmingham NHS Trust, UK; 6. King's College Hospitals NHS Trust, UK; 7. Sheffield Teaching Hospitals NHS Trust, UK; 8. Liverpool University Hospitals NHS Foundation Trust, UK ; 9. Oxford University Hospitals NHS Trust, UK; 10. Harrogate and District Hospitals NHS Trust, UK

The ABCD audit captured data from the NHS England Hybrid Closed-Loop (HCL) pilot launched in 2021 which funded HCL therapy for individuals living with T1DM using an insulin pump and FreeStyle Libre with HbA1c ≥ 69mmol/mol. Whilst randomised control trials have demonstrated improvements in HbA1c and time-in-range in individuals with elevated HbA1c at baseline, it is unclear what factors might predict the achievement of recognised sensor defined glucose targets[1,2].

The aim of this analysis is to identify factors that predict achievement of target time-in-range (TIR, 3.9-10mmol/L) ≥70% at follow-up.

Methods

Participants who had data recorded on the secure online tool and were using HCL therapy at baseline and at 6-month (3-9 months) follow up were included. Relevant covariates were assessed for their predictive value in a multiple logistical regression model, performed in Stata 16.

The variables assessed at baseline (unless otherwise stated) are displayed in **Box 1.**

References

1. Choudhary P et al, 2022 Lancet D&E
2. Battelino T et al, 2019 Diabetes Care

Box 1. Variables assessed for the ability to predict 70% TIR at follow-up following HCL commencement

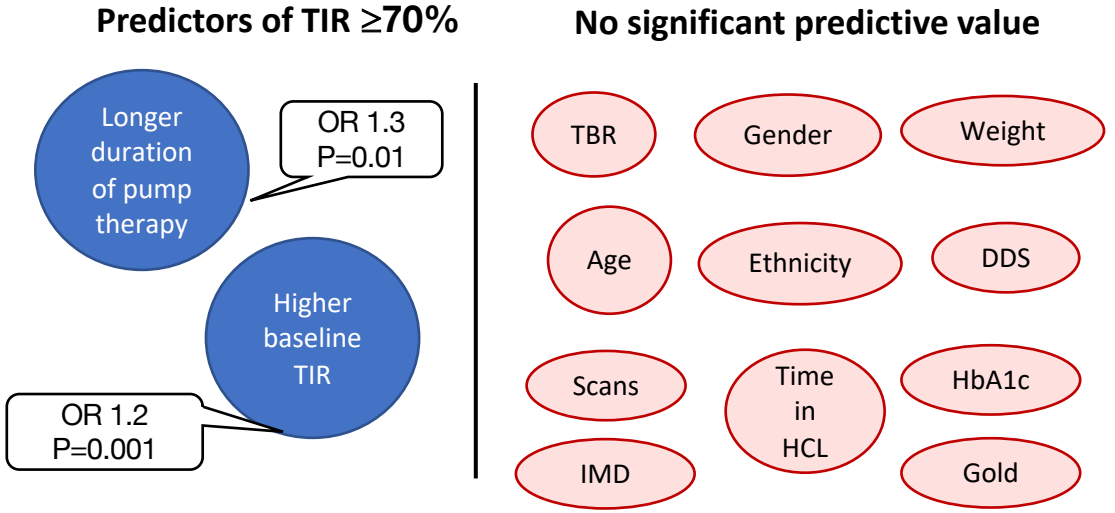
- **TIR**
- **time-below-range (TBR, <3.9mmol/L)**
- **HbA1c**
- **Age**
- **Gender**
- **Duration of pump therapy**
- **Diabetes Distress Score (DDS)**
- **Ethnicity**
- **Index of multiple deprivation (IMD)**
- **Weight**
- **Gold Score**
- **FreeStyle Libre scans per day**
- **Time in closed loop (%) [follow-up]**

Results

Data were included for 501 individuals: age 40.4±13.7 years, baseline HbA1c 79.2±9.6mmol/mol, diabetes duration 21years (IQR 14.1-30.4), pump therapy duration 7.6years (IQR 4.7-11). Majority were female (67.5%) and White British (91%), median index of multiple deprivation decile was 6 (IQR 3-8). Follow-up was 5.1months (IQR 3.9-6.6).

The results for predictors are summarised in **Fig 1.**

Figure 1. Variables capable of predicting 70% TIR at follow-up following HCL commencement within our multinomial logistic regression model



Conclusion

In the NHS England pilot, those with higher baseline TIR and longer duration of pump therapy were more likely to achieve TIR≥70% at follow-up. In the real-world HCL seems democratic in it's ability to improve glucose outcomes. Notably baseline deprivation status and ethnicity showed no association – **we must work to ensure that access to HCL is equitable for all.**