

Time of Initiation of Advanced Hybrid Closed-Loop Therapy and Related Glycemic Outcomes in People with Type 1 Diabetes Transitioning from Multiple Daily Injections

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Introduction

Advanced hybrid closed-loop systems (AHCL) have demonstrated long-term benefits in all people with diabetes. However, unpublished reports suggest that individuals with diabetes using multiple daily injections (MDI) might delay activation of AHCL because of concerns around managing pump therapy.

To the best of our knowledge, there have been no published studies evaluating the impact of early vs. delayed time of initiation of AHCL in people with type 1 diabetes (T1D).

The t:slim X2 insulin pump with Control-IQ technology is an advanced hybrid closed-loop system designed to help improve sensor time in range (TIR) (70-180 mg/dL) using continuous glucose monitoring (CGM) values to predict glucose levels 30 minutes ahead and adjust insulin delivery accordingly.

Aim

To examine the impact of time of initiation of AHCL on glycemic outcomes in a cohort of individuals with T1D transitioning from MDI therapy to the t:slim X2 insulin pump with Control-IQ technology.

Method

We retrospectively studied first 90 days after pump start in prior MDI users with T1D transitioning to Control-IQ technology.

Glycemic metrics such as baseline HbA1c (pre-Control-IQ technology initiation), median sensor time in hypoglycemia (<70 mg/dL) and median sensor TIR for Control-IQ technology use were retrieved from the t:connect web application from Tandem Diabetes Care in November 2021. Group differences were analyzed using Mann Whitney U and Kruskal-Wallis tests.

Results

Overall, the sample included 17,540 participants – mean age (SD) of 34 years (20) and 52% female – categorized into three groups for analysis:

- ✓ **Group 1 (n=14,222)** with mean age of 37.2 years (19.8), initiated Control-IQ technology within two days of pump start
- ✓ **Group 2 (n=2,448)** with mean age of 31.2 years (19.7), initiated between 2-14 days of pump start
- ✓ **Group 3 (n=870)** with mean age of 34.6 years (20.8), initiated within 15-90 days of pump start

There were no significant differences between groups on baseline HbA1c (Group 1 = 8.53% [1.91], Group 2 = 8.49% [1.98], Group 3 = 8.46% [1.89]).

Hypoglycemia Outcomes

With Control-IQ technology, no significant differences were noted

between groups for median sensor time <70 mg/dL in the first 90 days of pump use (Group 1 = 0.87 [0.36-1.8], Group 2 = 0.84 [0.38-1.7], Group 3 = 0.89 [0.37-1.72], p = 0.37), Figure 1. Additionally, no significant differences were observed for median sensor time <54 mg/dL in the first 90 days of pump use (Group 1 = 0.13 [0.04-0.3], Group 2 = 0.12 [0.04-0.31], Group 3 = 0.13 [0.04-0.32]).

Time in Range Outcomes
There were no significant differences between Group 1 and Group 2 on median TIR in the first 90 days of pump use (Group 1 = 68.6% [57.8-78.1], Group 2 = 69.5% [59.1-79.1]). However, Group 3 showed significantly lower median TIR of 66.6% (55.6-77.9) compared to the other two groups (p = 0.003), Figure 2. At the time of this analysis, 99.5% of

participants were continuing to use Control-IQ technology.

Conclusions

While all three groups experienced success with Control-IQ technology, Group 3 (i.e., participants initiating Control-IQ technology within 15-90 days of pump start) showed lower TIR with delayed initiation.

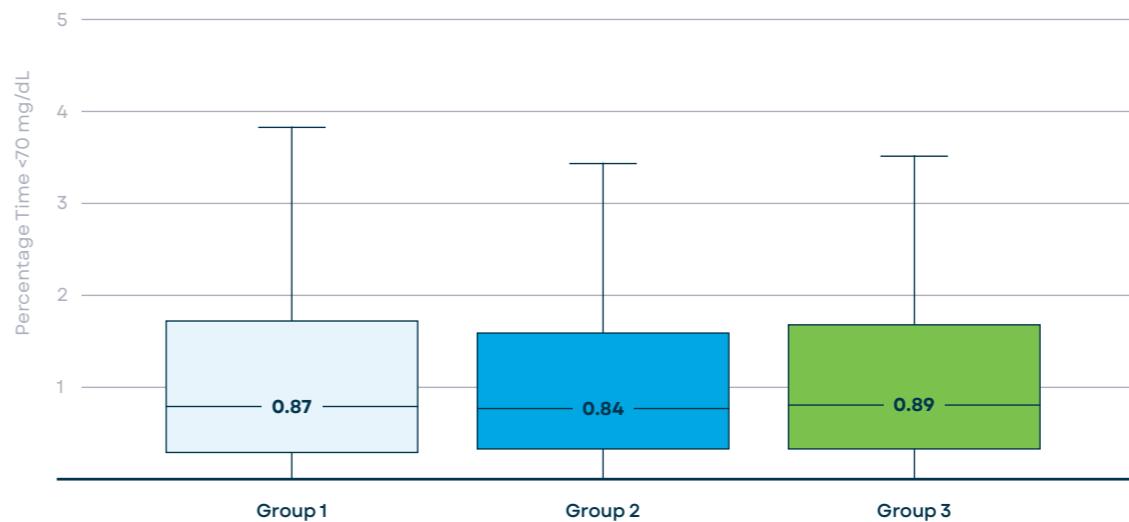


The majority of MDI users (Groups 1 and 2) successfully initiated Control-IQ technology within two days of pump start.

FIGURES

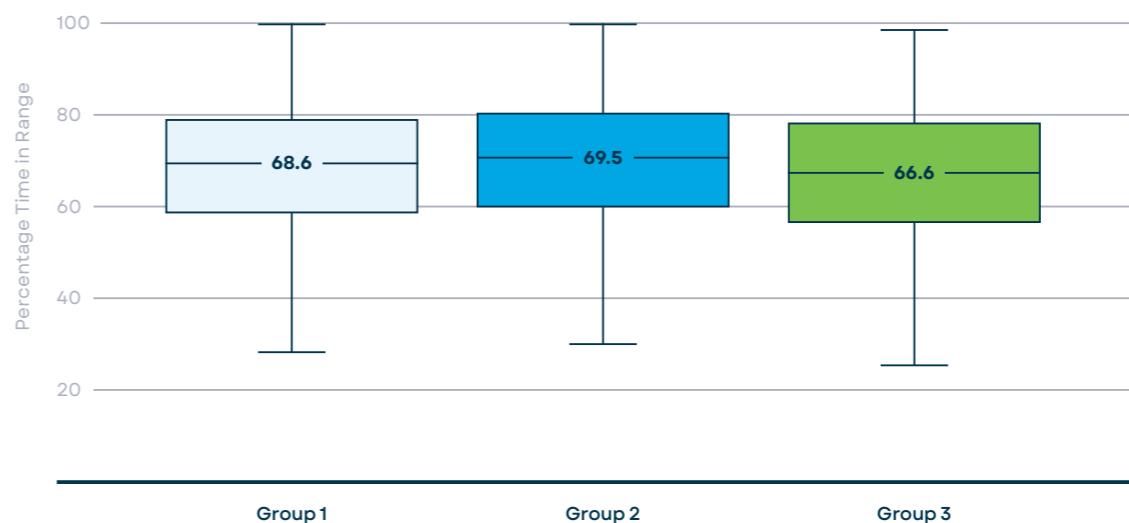
① Median Sensor Time <70 mg/dL in the First 90 Days of Pump Use

For participants transitioning from MDI based on time of initiation of Control-IQ technology.



② Median Sensor Time in Range (70-180 mg/dL)

For participants transitioning from MDI based on time of initiation of Control-IQ technology.



Future studies are encouraged to improve understanding of factors contributing to delayed initiation of advanced technologies like the AHCL in MDI users.

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