Psychosocial Impact of Control-IQ Technology in Pediatric Users with Type 1 Diabetes: Real-World Insights from the United States

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Introduction

There is an increasing emphasis on understanding the role of sleep while optimizing diabetes management. Recent research efforts have highlighted the physiological and behavioral impact of sleep on diabetes outcomes including development of complications.

In the pediatric population with type 1 diabetes (T1D), poor sleep quality has been related to higher HbA1c, greater likelihood of experiencing severe hypoglycemia, diabetic ketoacidosis, fear of hypoglycemia, and poorer parental sleep quality.

There is a lack of published literature exploring the relationship between diabetes technology and its impact on sleep-related outcomes in the T1D pediatric population and their caretakers.

The t:slim X2™ insulin pump with Control-IQ™ technology (Tandem Diabetes Care) is an advanced hybrid closed-loop system designed to help improve time in range (70-180 mg/dL).* This presentation examines the impact of this technology on psychosocial outcomes including sleep quality in adolescents with T1D.

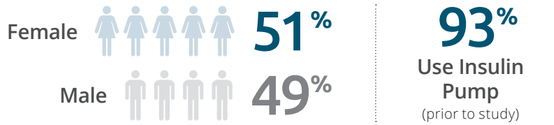
Methods

We analyzed psychosocial outcomes in T1D adolescents who had been using Control-IQ technology in a real-world setting for at least three weeks. These participants were part of a larger study that also included adults with T1D. The study was approved by a research ethics board and participants were recruited in March 2020.

Participants completed online questionnaires including demographics and patient-reported outcomes (PROs) after using Control-IQ technology for at least three weeks. PROs included an item assessing sleep quality, the WHO-5 scale to assess emotional well-being, and the Diabetes Impact and Devices Satisfaction (DIDS) scale to evaluate users' experiences interacting with their insulin delivery devices and the impact of diabetes on their life.

Data was analyzed using inter-factor correlations and multiple-regression analysis.

FIGURE 1: Demographics. 137 study participants (14-17-year-olds).



Results

Demographics / Diabetes-Specific Information

In all, 137 participants (14-17-year-olds) were included in the analysis. The majority were female (51.1%), Caucasian (91%), and had been using an insulin pump prior to study start (92.7%). At study start, participants had been using Control-IQ technology for 45 days (mean, SD=8.8) and their self-reported total daily insulin use was 62 units (mean, SD=27.7). Most recent HbA1c (self-reported) was 7.2% (mean, SD=1.1).

Patient-Reported Outcomes

A positive correlation was observed between participants' emotional well-being and quality of sleep (r=.45, p<0.001) suggesting that participants reporting higher emotional well-being were also likely to experience better sleep quality. (Figure 2)

FIGURE 2: Participant Quotes. Participants highlight the impact of the t:slim X2 insulin pump with Control-IQ technology on the quality of their sleep.

Device-related satisfaction (DS) and quality of sleep were positively correlated (r=.38, p<0.001). Hence, participants who reported greater satisfaction with Control-IQ technology were also more likely to report better quality of sleep. Diabetes-related impact (DI) and quality of sleep were negatively correlated (r= -.35, p<0.001) in that, participants experiencing greater impact of diabetes on their daily lives (i.e. diabetes burden) also reported poorer sleep quality. (Figure 2)

Regression analysis revealed DI and DS as independent predictors of HbA1c (β=.30, p<0.01, ra(b.c)=.26 and β=.26, p<0.01, ra(c.b)=.23, respectively) suggesting that participants' satisfaction with their insulin delivery device and the impact of diabetes on their daily life independently affected their glycemic control.

Conclusions

T1D adolescents who report low satisfaction with their insulin delivery device and/or experience greater diabetes burden on their daily life are likely to experience impaired glycemic outcomes.

* Study **findings highlight quality of sleep as an important factor determining** both device-related satisfaction and **quality of life in T1D adolescents.**

* As measured by CGM. **References: 1.** Farabi SS. Type 1 Diabetes and Sleep. *Diabetes Spectr.* 2016;29(1):10-13. **2.** Jaser SS, Forster NC, Nelson BA, et al. Sleep in children with type 1 diabetes and their parents in the T1D Exchange. *Sleep Med.* 2017;39:108-115. **3.** Perez KM, Hamburger ER, Lyttle M, et al. Sleep in Type 1 Diabetes: Implications for Glycemic Control and Diabetes Management. *Curr Diab Rep.* 2018;18(2):5.