Do-It-Yourself Artificial Pancreas Systems for Type 1 Diabetes Reduce Hyperglycemia Without Increasing Hypoglycemia

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- No Disclosures

Background

- Patient-driven innovation has led to the use of Do-It-Yourself Artificial Pancreas Systems (DIYAPS) for management of type 1 diabetes (T1D).
- DIYAPS allow for automated adjustments of insulin delivery based on continuous glucose monitoring (CGM).
- There is limited data on glycemic outcomes with the use of DIYAPS compared to conventional sensor-augmented pump (SAP) therapy.

Methods

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Retrospective double cohort study

- Study group:

CGM data from OpenAPS Data Commons for people using **DIYAPS**

- Comparison group:

CGM data from Tidepool Big Data Donation Project for a random, age-matched sample of people using **SAP**

Inclusion Criteria

- All ages
- At least one month of CGM data contributed
- At least 70% of possible CGM readings available (data sufficiency)

Exclusion Criteria

- Diagnosis of T1D within 1 year

Primary Outcome

- Percent of sensor glucose (SG) <70 mg/dl

Secondary Outcomes

- # of hypoglycemic events per month
- Percent of SG in target range (70-180 mg/dl)
- Percent of SG >180 mg/dl
- Mean SG
- Coefficient of variation

Table 1: Participant Demographics

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	DIYAPS (n=74)	SAP (n=98)	p-value
Age (yr)	35.6 +/- 14.7	35.1 +/- 14.4	0.83
Age if <18yr (n=23)	9.9 +/- 2.6	10.9 +/- 4.3	0.55
Age at T1D diagnosis (yr)	13.4 +/- 9.4	15.4 +/- 9.2	0.19
Time since T1D diagnosis (yr)	23.6 +/- 15.8	19.7 +/- 13.4	0.09

Mean +/- SD; p-value is for t-test comparison of means

Table 2: Characteristics of DIYAPS Group (n=74)

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		Percent
Who	Self with T1D	80.9%
	Parent/Caregiver	17.7%
	Spouse/Partner	1.5%
Country	U.S.	64.7%
	Outside U.S.	35.3%
DIYAPS Type	OpenAPS	76.5%
	Loop	8.8%
	AndroidAPS	1.5%
	Other	13.2%

	Mean +/- SD
Time on pump (yr)	10.7 +/- 6.5
Time on CGM (yr)	6.1 +/- 8.3
Time on DIYAPS (yr)	0.6 +/- 0.5
Self-reported HbA1c (%)	6.4 +/- 0.7

Figure 1: Comparison of CGM Metrics

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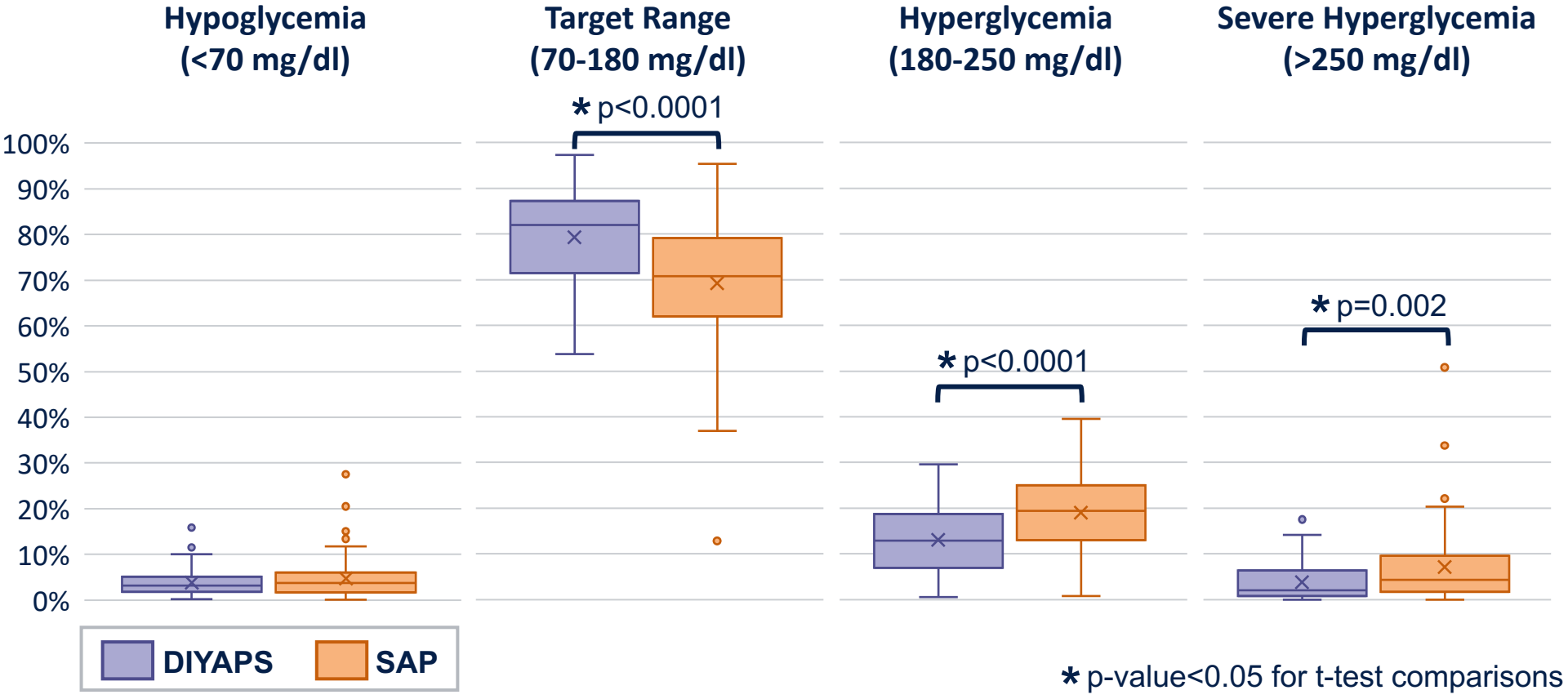

* p-value<0.05 for t-test comparisons

Table 3: Secondary Outcomes

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	DIYAPS n=74	SAP n=98	p-value
# of Hypoglycemic Events/month	32.9 [27.9-37.9]	33.4 [28.7-38.2]	0.87
Mean Sensor Glucose, mg/dl	135 [131-139]	150 [145-155]	<0.0001*
Coefficient of Variation, %	34.5 [33.2-35.8]	35.9 [34.7-37.0]	0.11

Mean [95% CI]; p-value is for t-test comparison of means.
Hypoglycemic event was defined as sensor values below 70 mg/dl for at least 15 minutes.

Conclusions

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- Users of DIYAPS had a comparable amount of hypoglycemia to those using SAP
- Mean sensor glucose and frequency of hyperglycemia were lower in the DIYAPS group
- Percent of sensor glucose in target range (70-180 mg/dl) was significantly greater for DIYAPS users
- Benefit of DIYAPS is reduction of hyperglycemia without compromising the low occurrence of hypoglycemia

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#WeAreNotWaiting

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