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Supplementary Table S1. Eligibility and Exclusion Criteria

Eligibility Criteria

1) Clinical diagnosis of type 1 diabetes and using daily insulin therapy for at least one year and an insulin infusion pump for at least 6 months (*The diagnosis of type 1 diabetes is based on the investigator's judgment; C peptide level and antibody determinations were not required)*
2) Age 15 - 45 years
3) Glycated hemoglobin level ≤10.0% (86 mmol/mol)
   - Measured with DCA2000 or equivalent device for assessing eligibility
   - Glycated hemoglobin measurements performed as part of usual clinical care within 2 weeks prior to obtaining informed consent for participation in the trial may be used.
4) Uninterrupted internet access while study system in use overnight and for uploading of study data the following morning
5) Living with a significant other or family member ("companion") committed to participating in all study activities, and being present and available to provide assistance when the system is in use at night
6) An understanding of and willingness to follow the protocol and sign the informed consent

Exclusion Criteria

1) Diabetic ketoacidosis in the past 6 months
2) Hypoglycemic seizure or loss of consciousness in the past 6 months
3) History of seizure disorder (except for hypoglycemic seizure)
4) History of any heart disease including coronary artery disease, heart failure, or arrhythmias
5) Cystic fibrosis
6) Current use of oral/inhaled glucocorticoids, beta-blockers or other medications, which in the judgment of the investigator would be a contraindication to participation in the study.
7) History of ongoing renal disease (other than microalbuminuria). Creatinine level to have been obtained within the last year if participant has diabetes of >10 years duration. If creatinine is >1.5 mg/dL (132 μmol/L), the participant is excluded.
8) Medical or psychiatric condition that in the judgment of the investigator might interfere with the completion of the protocol such as:
   - Inpatient psychiatric treatment in the past 6 months
   - Uncontrolled adrenal disorder
   - Abuse of alcohol
9) Pregnancy

If female and sexually active, must agree to use a form of contraception to prevent pregnancy while a participant in the study. A negative serum pregnancy test will be required for all premenopausal women who are not surgically sterile. Participants who become pregnant will be discontinued from the study.

10) Liver disease as defined by an ALT greater than 3 times the upper limit of normal

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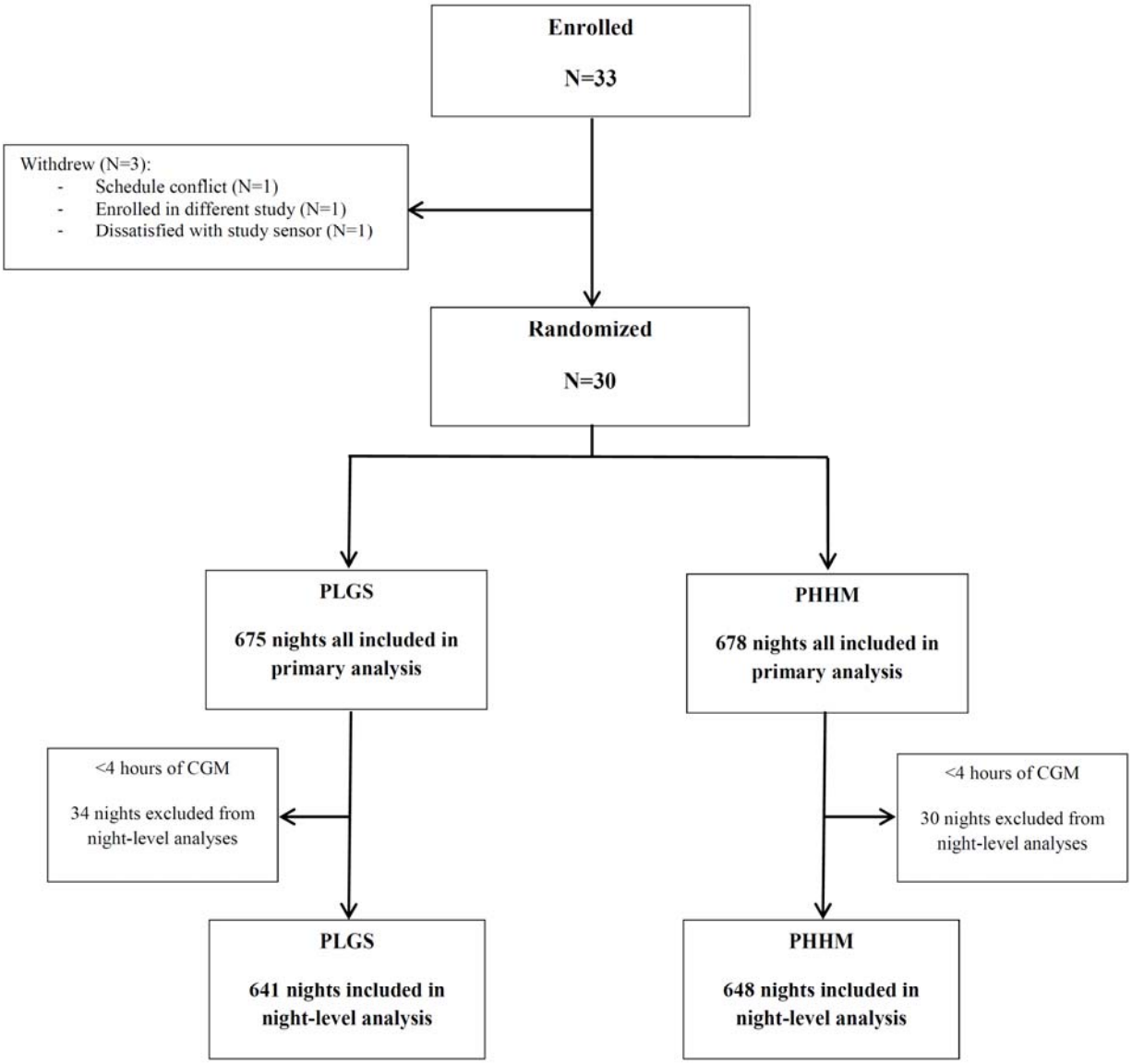
Supplementary Figure S2. Study Flowchart



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Supplementary Table S3. Participant Characteristics at Enrollment (N=30 Participants) – *medians (IQR)* or *n (%)*

Characteristic	
Age (yrs)	31 (22, 38)
Range	15 to 43
Male	15 (50%)
Race	
White non-Hispanic	26 (87%)
Hispanic	2 (7%)
Pacific Islander	1 (3%)
Unknown	1 (3%)
Diabetes duration (yr)	17 (11, 27)
Range	3 to 38
Body-mass index (kg/m^2)	26.4 (23.0, 30.1)
Daily insulin dose (U/kg/day)	0.58 (0.46, 0.68)
Enrollment HbA1c (%)	7.5 (6.9, 7.7)
(mmol/mol)	58 (52, 61)
Randomization HbA1c (%)	7.1 (6.7, 7.4)
(mmol/mol)	54 (50, 57)
End of study HbA1c (%)	7.1 (6.6, 7.4)
(mmol/mol)	54 (49, 57)

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Supplementary Table S4. Night-Level Secondary Insulin Outcomes

	PLGS Nights	**PHHM Nights**	**P-value**
# Randomized Nights with Complete Insulin Data	640*	648	
Total Basal Insulin Units *[median (IQR)]*	7.0 (4.8, 10.0)	7.2 (5.3, 9.8)	0.37
Nights with Automatic Boluses *[n(%)]*	NA	506 (78%)	NA
Total Automatic Boluses Insulin Units† *[median (IQR)]*	NA	1.2 (0.4, 2.5)	NA
Number of Automatic Boluses† *[median (IQR)]*	NA	17 (9, 34)	NA
Nights with Manual Boluses *[n(%)]*	158 (25%)	109 (17%)	test not done §
Total Manual Boluses Insulin Units‡ *[median (IQR)]*	2.2 (1.3, 4.8)	1.3 (0.6, 2.9)	test not done §
Number of Manual Boluses‡ *[median (IQR)]*	1 (1, 1)	1 (1, 1)	NA
Nights with Both Automatic and Manual Boluses *[n(%)]*	NA	85 (13%)	NA
Total Automatic Boluses Insulin Units• *[median (IQR)]*	NA	1.8 (0.9, 3.0)	NA
Number of Automatic Boluses• *[median (IQR)]*	NA	21 (12, 36)	NA
Total Manual Boluses Insulin Units• *[median (IQR)]*	NA	1.2 (0.6, 2.8)	NA
Number of Manual Boluses• *[median (IQR)]*	NA	1 (1, 1)	NA
Total Basal and Boluses Insulin Units *[median (IQR)]*	7.5 (5.2, 10.8)	8.4 (6.0, 12.0)	<0.001

* One night excluded from all insulin analyses due to missing basal data.
† Among nights with automatic boluses only.
‡ Among nights with manual boluses only.
• Among nights with both automatic and manual boluses only.
§ Test not of interest and not done.

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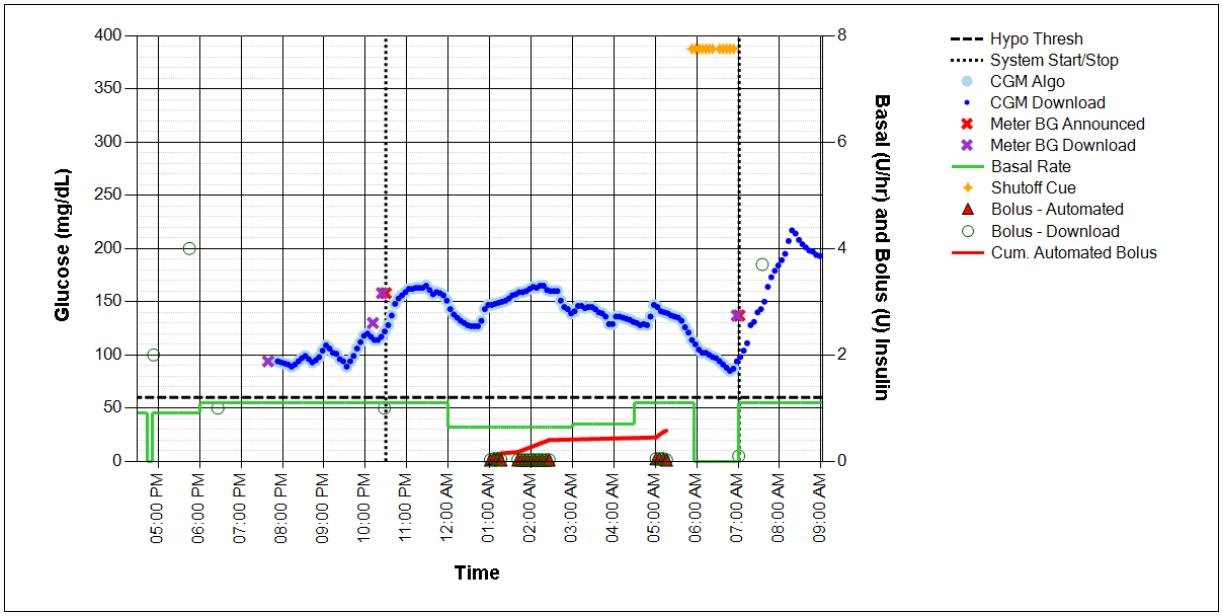
Supplementary Figure S5. Representative session plot from a night that included both automated correction boluses and automated predictive low-glucose suspend



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Supplementary Table S6. Additional Efficacy and Safety Night-Level Secondary Outcomes*

	PLGS Nights	**PHHM Nights**	**P-value**
# Randomized Nights	641	648	
Hours of Glucose Readings			
median	8.0	8.3	
% Morning with blood glucose†			
<60 mg/dL *n(%)*	2 (<1%)	3 (<1%)	
60 to 69 mg/dL *n(%)*	5 (<1%)	5 (<1%)	
70 to 180 mg/dL *n(%)*	421 (66%)	542 (84%)	
181 to 250 mg/dL *n(%)*	158 (25%)	83 (13%)	
>250 mg/dL *n(%)*	54 (8%)	15 (2%)	
% Nights with blood ketone ≥0.6 mmol/L *n(%)*	3 (<1%)	0 (0%)	NA‡
Cumulative Sensor Metrics			
% of nights with glucose level <50 mg/dL for a cumulative duration of			
>5 min *n(%)*	21 (3%)	29 (4%)	0.20
>60 min *n(%)*	3 (<1%)	6 (<1%)	NA‡
>120 min *n(%)*	1 (<1%)	4 (<1%)	NA‡
>180 min *n(%)*	1 (<1%)	2 (<1%)	NA‡
% of nights with glucose level <60 mg/dL for a cumulative duration of			
>5 min *n(%)*	64 (10%)	63 (10%)	0.93
>60 min *n(%)*	19 (3%)	21 (3%)	0.67
>120 min *n(%)*	2 (<1%)	6 (<1%)	NA‡
>180 min *n(%)*	1 (<1%)	5 (<1%)	NA‡
% of nights with glucose level <70 mg/dL for a cumulative duration of			

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	PLGS Nights	**PHHM Nights**	**P-value**
>5 min *n(%)*	113 (18%)	113 (17%)	0.94
>60 min *n(%)*	52 (8%)	55 (8%)	0.72
>120 min *n(%)*	16 (2%)	21 (3%)	0.25
>180 min *n(%)*	4 (<1%)	9 (1%)	0.002
% of nights with glucose level >180 mg/dL for a cumulative duration of			
>5 min *n(%)*	418 (65%)	402 (62%)	0.01
>60 min *n(%)*	323 (50%)	284 (44%)	0.002
>120 min *n(%)*	254 (40%)	197 (30%)	<0.001
>180 min *n(%)*	201 (31%)	152 (23%)	<0.001
% of nights with glucose level >250 mg/dL for a cumulative duration of			
>5 min *n(%)*	163 (25%)	103 (16%)	<0.001
>60 min *n(%)*	92 (14%)	44 (7%)	<0.001
>120 min *n(%)*	74 (12%)	31 (5%)	<0.001
>180 min *n(%)*	48 (7%)	19 (3%)	<0.001
% of nights with glucose level >300 mg/dL for a cumulative duration of			
>5 min *n(%)*	40 (6%)	26 (4%)	0.02
>60 min *n(%)*	29 (5%)	11 (2%)	<0.001
>120 min *n(%)*	17 (3%)	6 (<1%)	<0.001
>180 min *n(%)*	9 (1%)	2 (<1%)	NA‡
Consecutive Sensor Metrics			
% of nights with glucose level <50 mg/dL consecutively for a duration of			
>10 min *n(%)*	20 (3%)	28 (4%)	0.18
>25 min *n(%)*	12 (2%)	16 (2%)	0.30

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	PLGS Nights	**PHHM Nights**	**P-value**
>30 min *n(%)*	9 (1%)	14 (2%)	0.11
>60 min *n(%)*	3 (<1%)	6 (<1%)	NA‡
>120 min *n(%)*	1 (<1%)	4 (<1%)	NA‡
% of nights with glucose level <60 mg/dL consecutively for a duration of			
>10 min *n(%)*	58 (9%)	57 (9%)	0.86
>25 min *n(%)*	35 (5%)	43 (7%)	0.30
>30 min *n(%)*	32 (5%)	38 (6%)	0.38
>60 min *n(%)*	17 (3%)	16 (2%)	0.73
>120 min *n(%)*	1 (<1%)	4 (<1%)	NA‡
% of nights with glucose level <70 mg/dL consecutively for a duration of			
>10 min *n(%)*	105 (16%)	108 (17%)	0.74
>25 min *n(%)*	84 (13%)	84 (13%)	0.99
>30 min *n(%)*	76 (12%)	76 (12%)	0.97
>60 min *n(%)*	51 (8%)	46 (7%)	0.51
>120 min *n(%)*	13 (2%)	15 (2%)	0.49
% of nights with glucose level >180 mg/dL consecutively for a duration of			
>30 min *n(%)*	366 (57%)	337 (52%)	0.004
>60 min *n(%)*	316 (49%)	273 (42%)	<0.001
>120 min *n(%)*	224 (35%)	176 (27%)	<0.001
% of nights with glucose level >250 mg/dL consecutively for a duration of			
>30 min *n(%)*	116 (18%)	66 (10%)	<0.001
>60 min *n(%)*	84 (13%)	42 (6%)	<0.001
>120 min *n(%)*	64 (10%)	24 (4%)	<0.001

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	PLGS Nights	**PHHM Nights**	**P-value**
% of nights with glucose level >300 mg/dL consecutively for a duration of			
>30 min *n(%)*	32 (5%)	16 (2%)	<0.001
>60 min *n(%)*	25 (4%)	11 (2%)	<0.001
>120 min *n(%)*	14 (2%)	4 (<1%)	NA‡

*Glucose results from CGM unless specified as blood glucose.

†One PLGS night without morning blood glucose data

‡Too few events for formal statistical comparison

To convert glucose to mmol/L, multiply by 0.0555.

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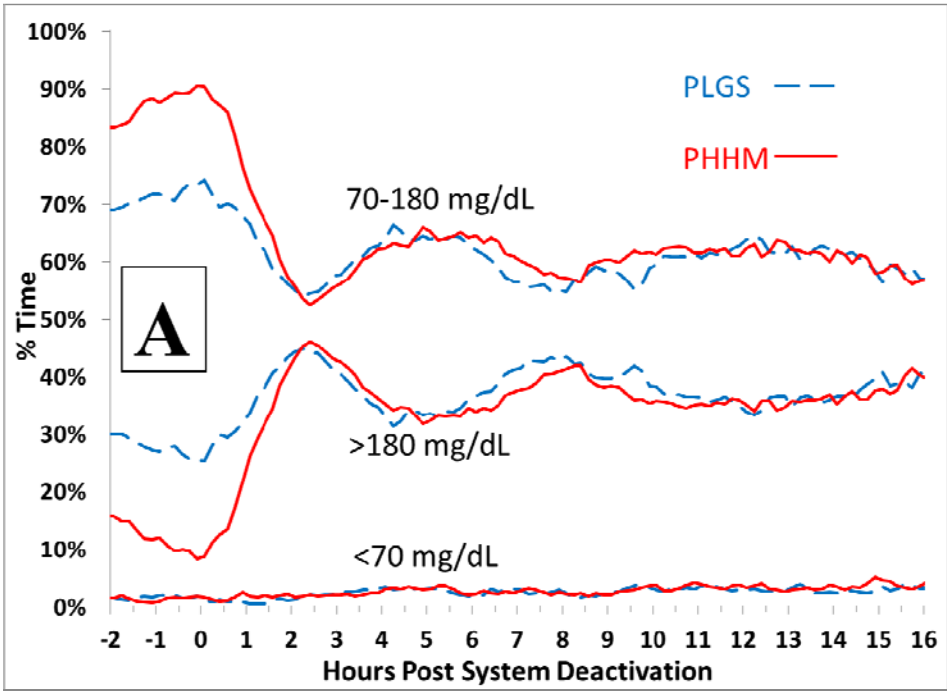
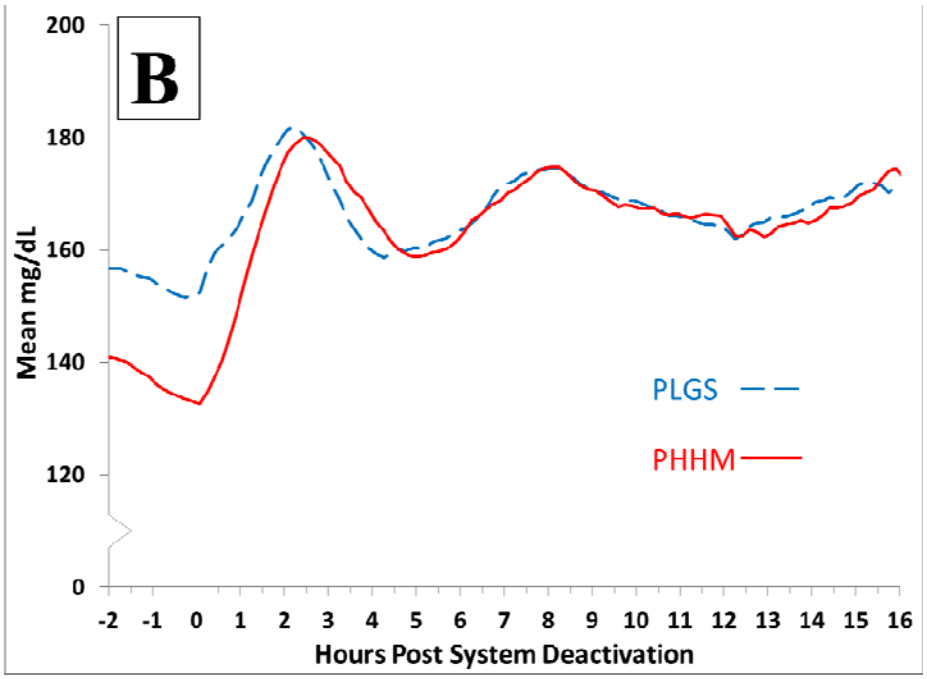
Supplementary Figure S7. Percent Time Glucose in Range 70 to 180, Below 70, and Above 180 mg/dL (A) and Mean Glucose (B) after System Deactivation for the Two Treatment Arms





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Supplementary Table S8. System Performance Metrics (N=30 Participants)

	PLGS Nights	**PHHM Nights**	**All Nights**
% Time CGM device functional while controller was active (i.e. readings available in post-hoc device download)	92%	91%	91%
% of available CGM readings obtained by controller			
within 10 minutes of CGM reading	93%	92%	92%
within 20 minutes of CGM reading	97%	97%	97%
% Automatic Bolus Requests Successfully Delivered	NA	95%	NA
% Nights with an Automatic Bolus and a subsequent CGM reading <60 mg/dL *n(%)*	NA	6 (9%)	NA
Among PLGS nights with CGM >140 mg/dL, % algorithm would have recommended an Automatic Bolus within the prior 2 hr *n(%)*	78 (79%)	NA	NA
Among PLGS nights when algorithm would have recommended an Automatic Bolus, % with CGM >140 mg/dL within 2 hr of first recommendation *n(%)*	434 (91%)	NA	NA

To convert glucose to mmol/L, multiply by 0.055

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