Supplementary Material
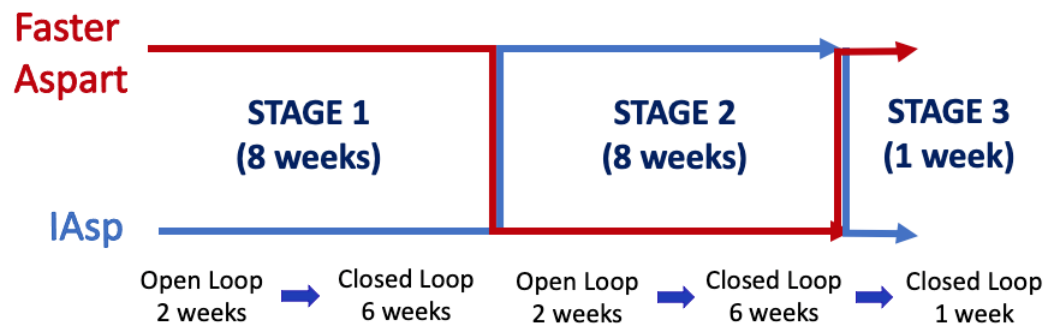

Supplementary Figure S1: Study Design

CONSORT Flow Diagram

Enrolment

Assessed for eligibility (n = 25)

Allocation

Randomized (n = 25)

Crossover

Stage 1

Faster aspart (n = 13)
♦ Completed intervention (n = 13)

IAsp (n = 12)
♦ Completed intervention (n = 12)

Stage 2

Faster aspart (n = 12)
♦ Completed intervention (n = 12)

IAsp (n = 13)
♦ Completed intervention (n = 13)

Stage 3

Faster aspart (n = 13)
♦ Completed intervention (n = 13)

IAsp (n = 12)
♦ Completed intervention (n = 12)

Analysis

Analysed (n = 25)
♦ Excluded from analysis (n = 0)
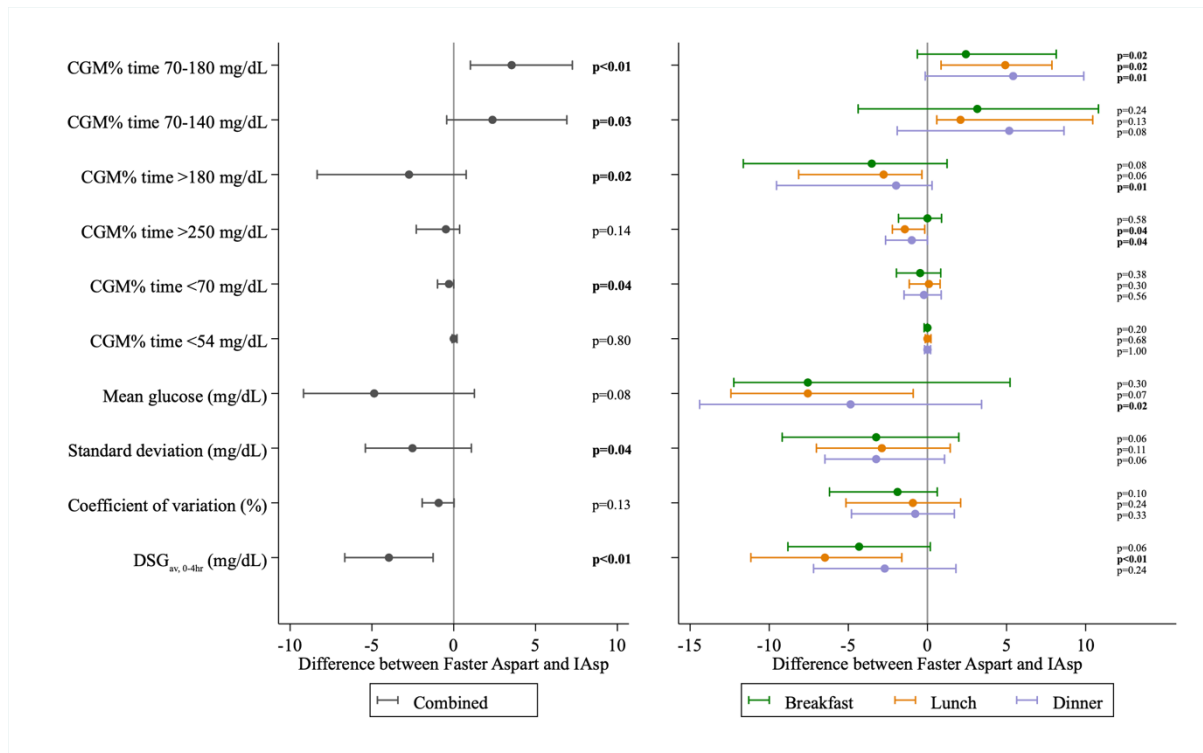
Supplementary Figure S2: CONSORT participant flow diagram
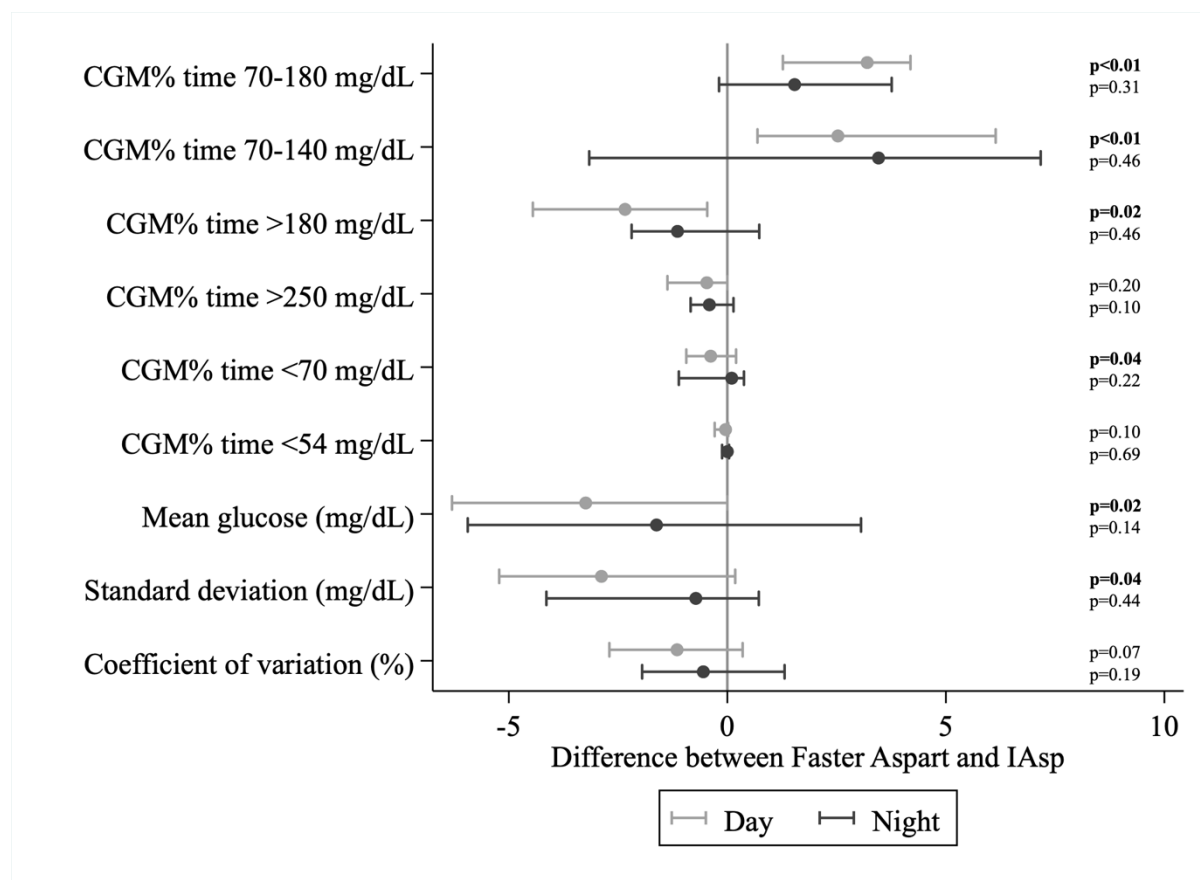
Supplementary Figure S3: Analysis of CGM outcomes by day (06:00-23:59) vs. night (00:00-05:59)

Forest plot of differences in CGM metrics between faster aspart and IAsp groups; presented by time of day (Day, grey; Night, black).

Lines represent median difference and 95% CI

Supplementary Figure S4: Analysis of CGM outcomes over the 4-hour postprandial period

Forest plot of differences in CGM metrics between faster aspart and IAsp groups; presented as combined all meals (Grey line); and individual meal periods (Breakfast, green; Lunch, orange; Dinner, purple).

Lines represent median difference and 95% CI

$\Delta SG_{av,0-4hr}$ was calculated as $AUC_{glucose,0-4hr}/4hr - SG_{pre-meal}$, where $AUC_{glucose,0-4hr}$ was the area under the glucose concentration-time profile between 0 and 4 hours, and $SG_{pre-meal}$ was the sensor glucose concentration immediately before meal commencement.
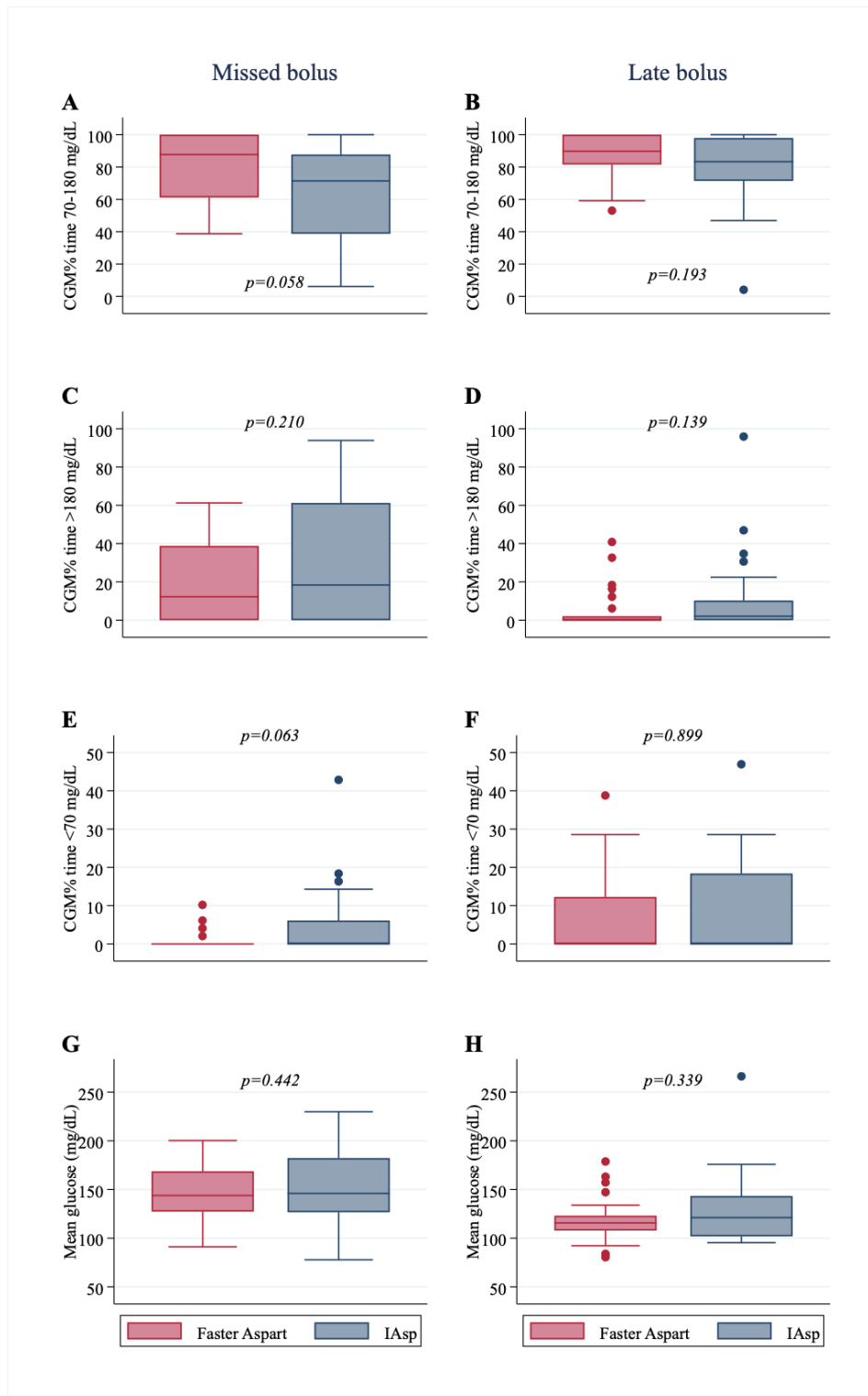
Supplementary Figure S5: CGM metrics over 4-hours following a standardized missed and late meal bolus

Boxplots represent CGM metrics: % time 70-180mg/dL (A and B); % time >180mg/dL (C and D); % time <70mg/dL (E and F); mean sensor glucose (mg/dL) (G and H).
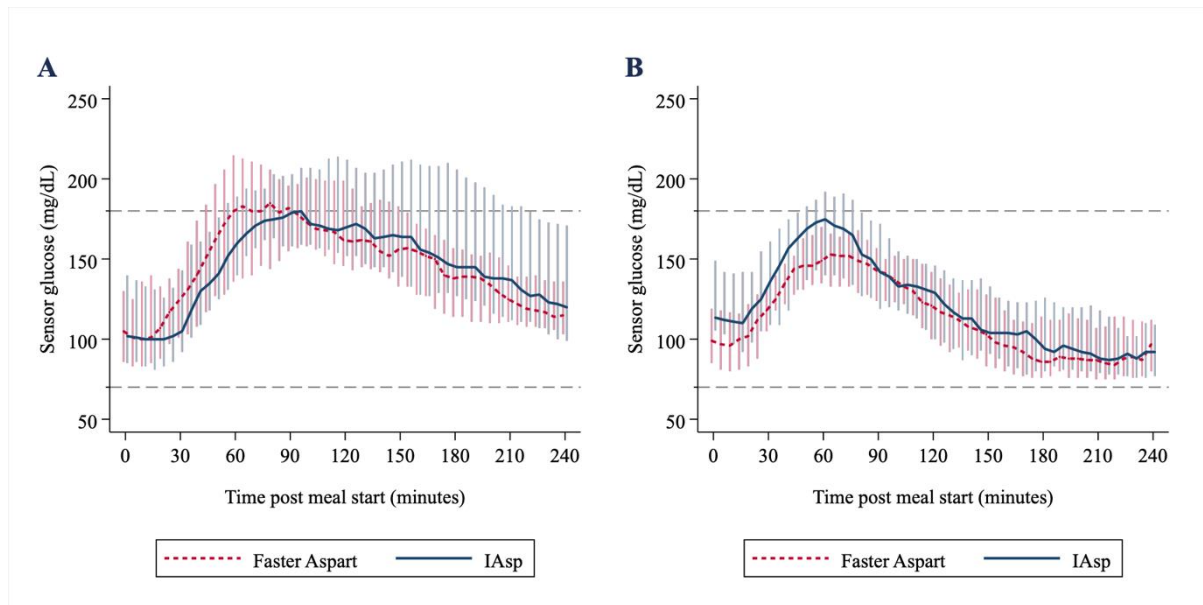
Supplementary Figure S6: Sensor glucose over 4-hours following a standardized (A) missed and (B) late meal bolus

Faster aspart (red) and IAsp (blue) lines represent median values; and vertical bars represent IQRs.

Baseline characteristics	n = 25
Age (years)	48 (37, 57)
Sex (male)	13 (52%)
BMI (kg/m^2)	28 (26, 30)
Duration of diabetes (years)	26 (13, 38)
Duration of insulin pump therapy (years)	8 (3, 15)
HbA$_{1c}$ (%)	7.0 (6.6, 7.2)
HbA$_{1c}$ (mmol/mol)	53 (49, 55)
eGFR (mL/min/1.73m^2)	90 (80, 90)
Total daily insulin dose (units/day)	44 (35, 62)
Insulin requirements (units/kg)	0.5 (0.4, 0.7)
Insulin formulation used at study entry. Aspart | Faster aspart | Lispro	17 (68%) | 5 (20%) | 3 (12%)
Hypoglycemia awareness (Gold Score)	2 (2, 3)
History of microvascular complications	7 (28%)
History of macrovascular complications	1 (4%)

Supplementary Table S1: Clinical Characteristics of Study Participants.
Continuous data are presented as median (IQR). Categorical data are presented as
frequency (%). BMI, body mass index.

	Faster aspart (*n* = 25)	IAsp (*n* = 25)	Difference (95% CI)	*p* value
Missed meal bolus				
% time 70-180mg/dL	87.8 (61.2, 100.0)	71.4 (38.8, 87.8)	18.4 (-6.1, 32.7)	0.06
% time 70-140mg/dL	53.1 (26.5, 59.2)	42.9 (14.3, 55.1)	2.0 (-6.1, 18.4)	0.37
% time >180mg/dL	12.2 (0.0, 38.8)	18.4 (0.0, 61.2)	0.0 (-24.5, 6.1)	0.20
% time >250mg/dL	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	1
% time <70mg/dL	0.0 (0.0, 0.0)	0.0 (0.0, 6.1)	0.0 (0.0, 0.0)	0.06
% time <54mg/dL	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	1
Mean glucose (mg/dL)	143.8 (127.3, 168.7)	146.0 (126.7, 182.2)	-10.1 (-31.9, 24.8)	0.44
Glucose SD (mg/dL)	31.7 (23.9, 39.4)	30.0 (21.4, 41.9)	-0.5 (-6.3, 6.7)	0.77
Glucose CV (%)	22.0 (17.1, 25.9)	22.8 (15.9, 24.5)	3.0 (-3.2, 5.7)	0.51
Late meal bolus				
% time 70-180mg/dL	89.8 (81.6, 100.0)	83.3 (71.4, 98.0)	2.0 (-6.1, 18.4)	0.19
% time 70-140mg/dL	67.4 (57.1, 77.6)	53.1 (42.9, 79.6)	18.4 (-6.1, 24.5)	0.14
% time >180mg/dL	0.0 (0.0, 2.0)	2.0 (0.0, 10.2)	0.0 (-6.3, 0.0)	0.14
% time >250mg/dL	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.50

% time <70mg/dL	0.0 (0.0, 12.2)	0.0 (0.0, 18.4)	0.0 (-6.1, 8.2)	0.90
% time <54mg/dL	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.69
Mean glucose (mg/dL)	115.7 (107.8, 122.9)	121.1 (101.9, 143.3)	-7.2 (-29.7, 13.9)	0.34
Glucose SD (mg/dL)	30.1 (20.7, 32.6)	34.4 (21.6, 43.2)	-5.9 (-13.1, 3.6)	0.11
Glucose CV (%)	24.8 (20.4, 28.7)	26.0 (19.6, 34.8)	-4.1 (-6.2, 4.6)	0.31

Supplementary Table S2: CGM outcomes following a missed and late meal bolus

Results presented as median (IQR), median difference (95% CI), analysis using sign rank test