SID
Società Italiana di Diabetologia
fondata nel 1964

# SCHOOL

## SISTEMI AID IN GRAVIDANZA


# AID: una soluzione per tutti

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*Bologna, 30 Giugno2026*

# *Dichiarazione Conflitto d'Interessi*

La sottoscritta Dott.ssa Cristina Bianchi

DICHIARA

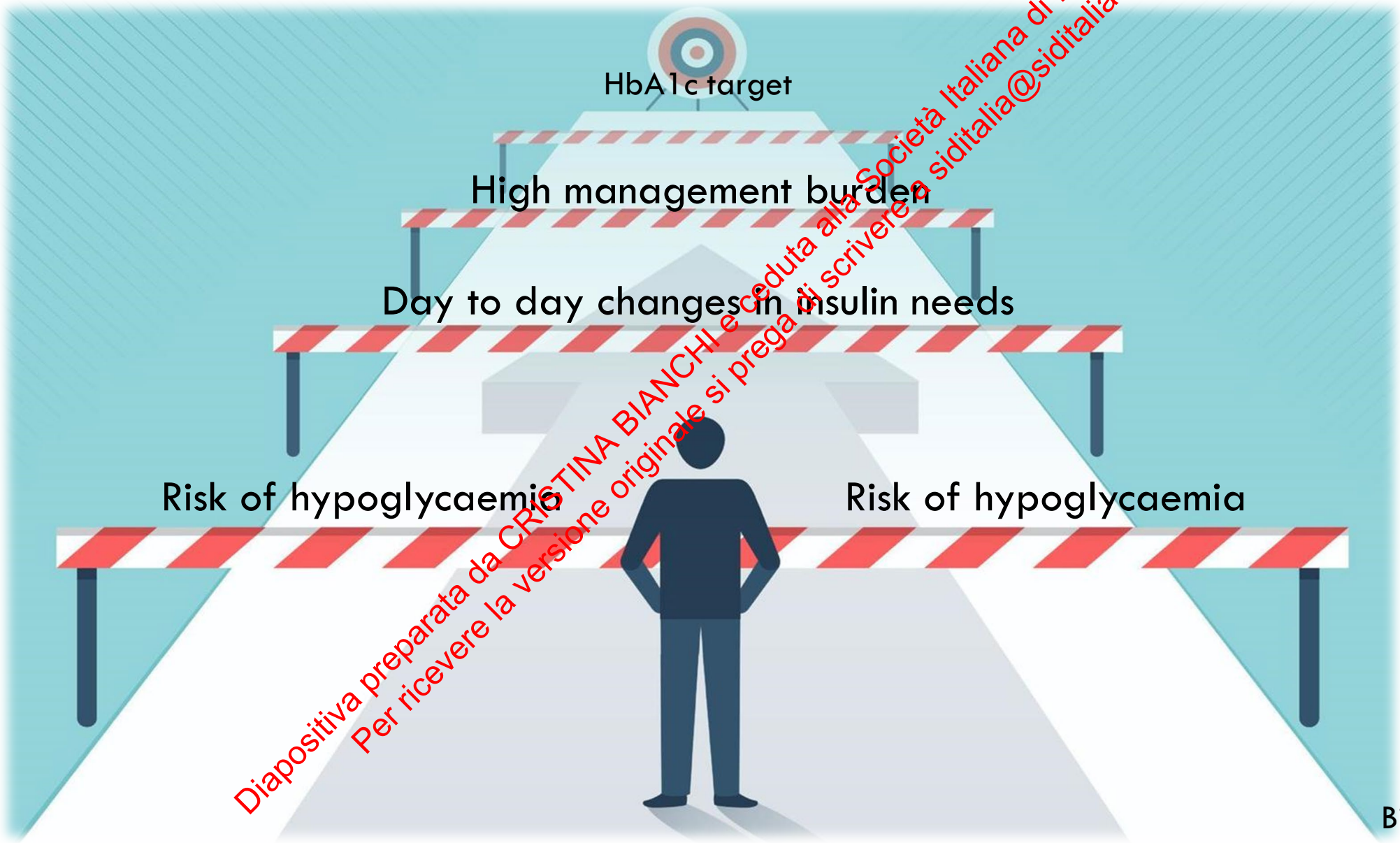
di aver ricevuto negli ultimi due anni compensi o finanziamenti dalle seguenti Aziende Farmaceutiche e/o Diagnostiche:

- Novonordisk
- Lilly

Dichiara altresì il proprio impegno ad astenersi, nell'ambito dell'evento, dal nominare, in qualsivoglia modo o forma, aziende farmaceutiche e/o denominazione commerciale e di non fare pubblicità di qualsiasi tipo relativamente a specifici prodotti di interesse sanitario (farmaci, strumenti, dispositivi medico-chirurgici, ecc.)

Cristina Bianchi, MD PhD

# Barriers to achieve good glycaemic control






Bianchi C. 2025

# Timeline of development of the artificial pancreas system


**1920s**
Insulin discovered

**1980s**
1st commercialized SubQ insulin pump

**2006**
Sensor augmented pump (SAP)

**2013 / 2015**
LGS / PLGS SAP


**2014**
1st major dual hormone HCL study

**2019**
Commercialized HCL (Control IQ)

**2020**
1st CE mark in dual hormone system (Inreda APS)

**1960s**
1st IV Insulin pump

**1999**
1st CGM

**Late 2000s**
Labtop based closed-loop studies

**2013**
1st smartphone based HCL study

**2016**
Commercialized HCL (Minimed 670G)

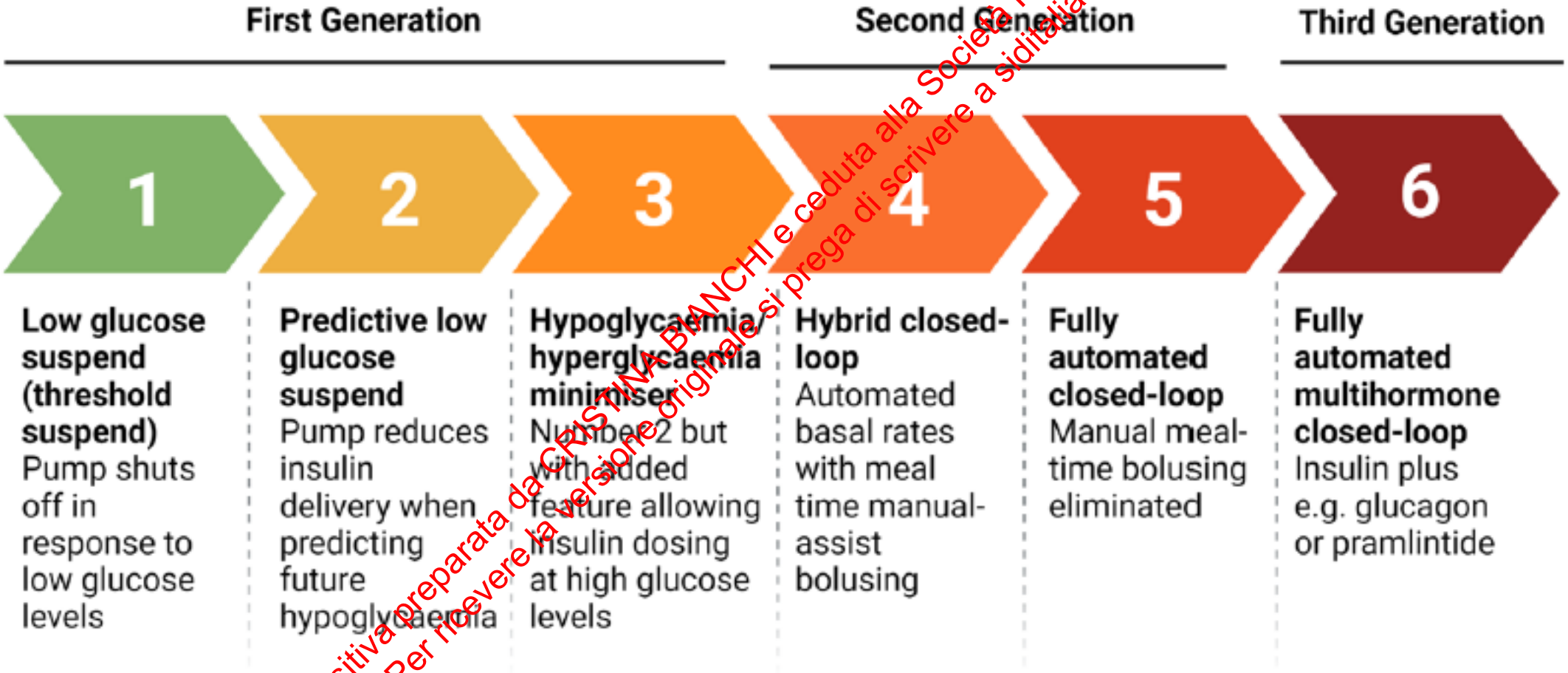
**2020**
Commercialized HCL (CamAPS FX)

**2020**
Commercialized AHCL (Minimed 780G)



Moon SJ. Diabetes Metab J 2021;45:813-839

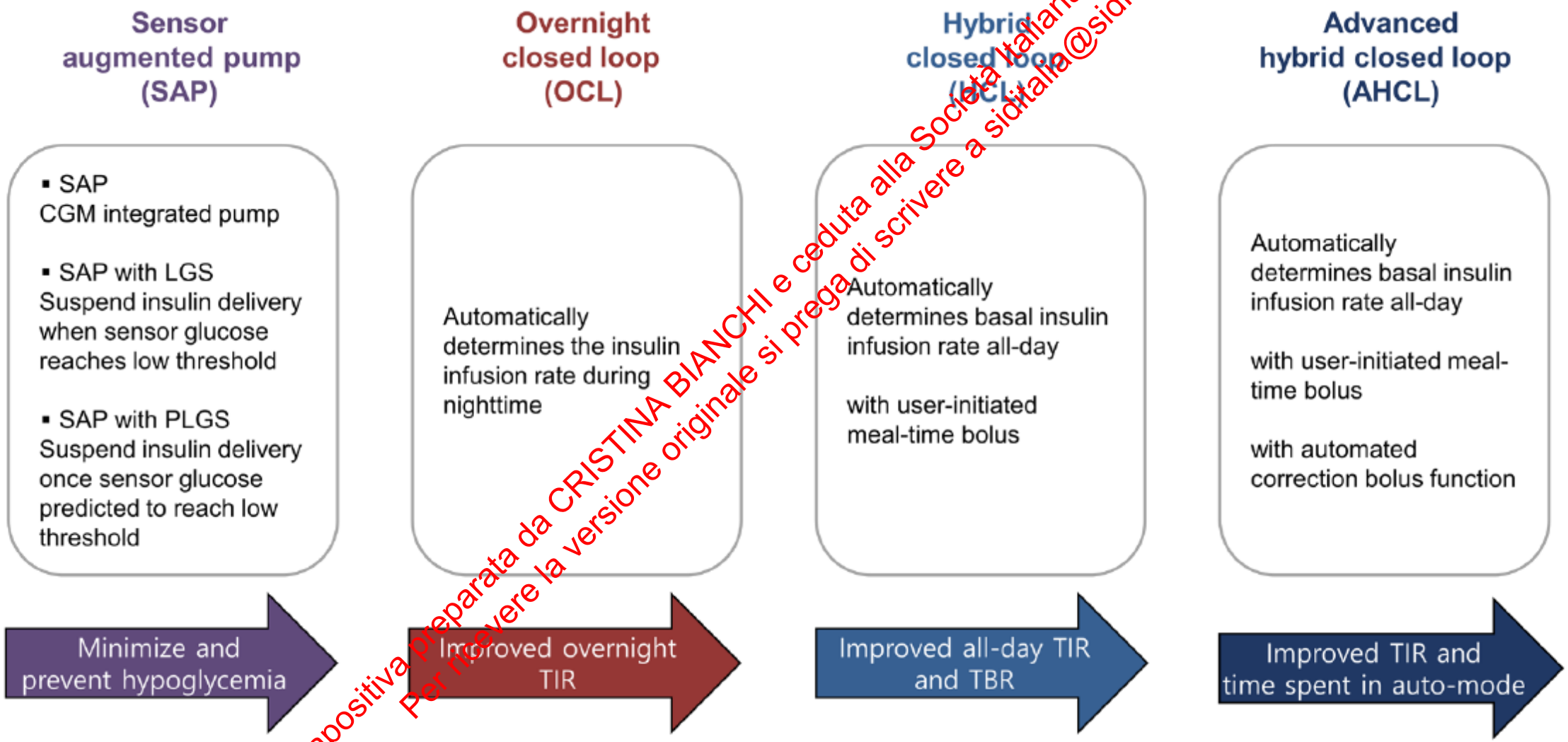
# Developmental stages of artificial pancreas device systems originally described by JDRF





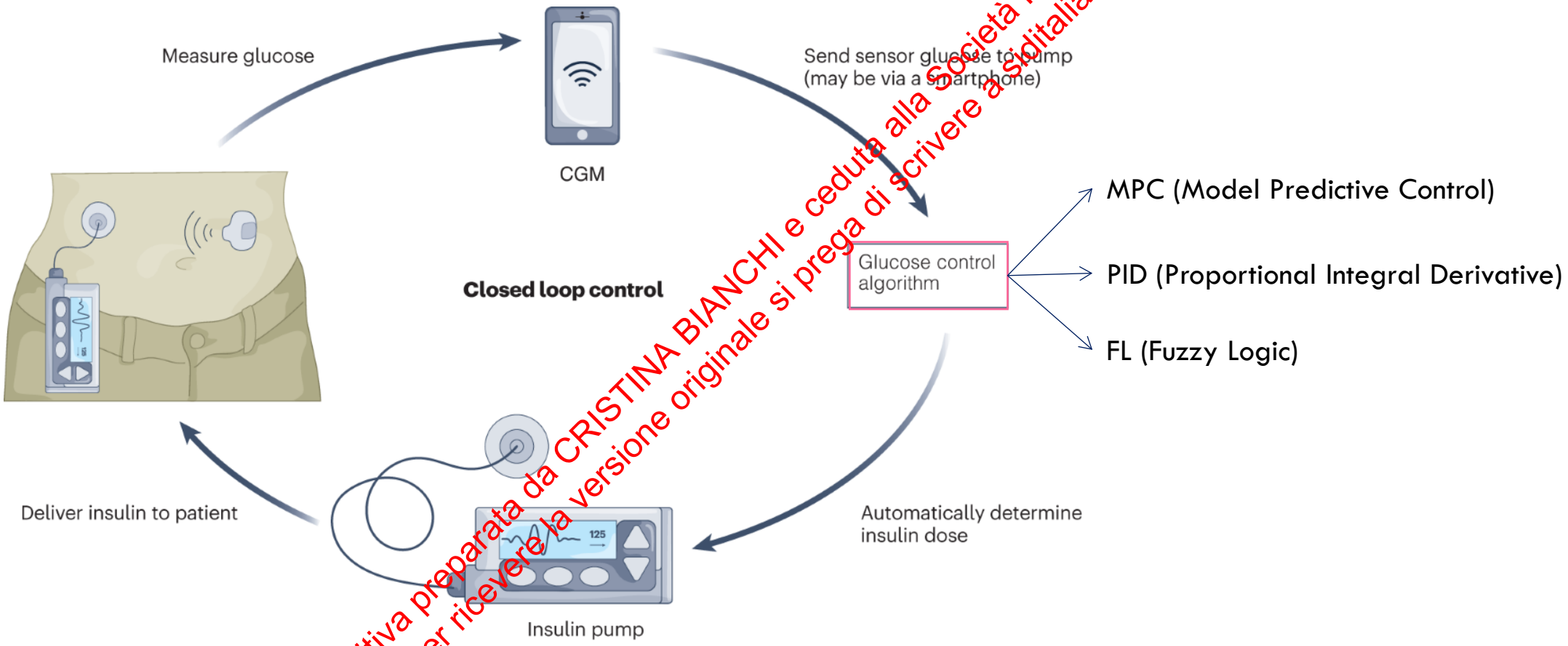

Lakshman R. Endocr Connect 2023;12(8):e230132

# Key features of SAP and artificial pancreas systems

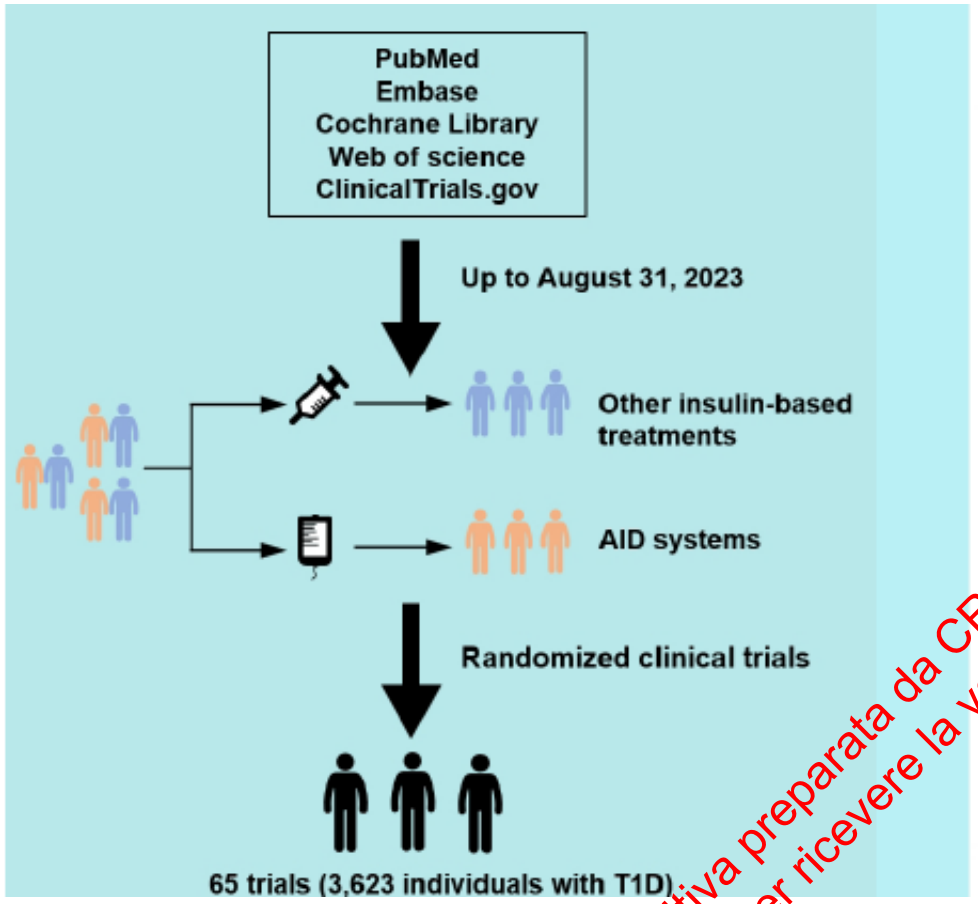


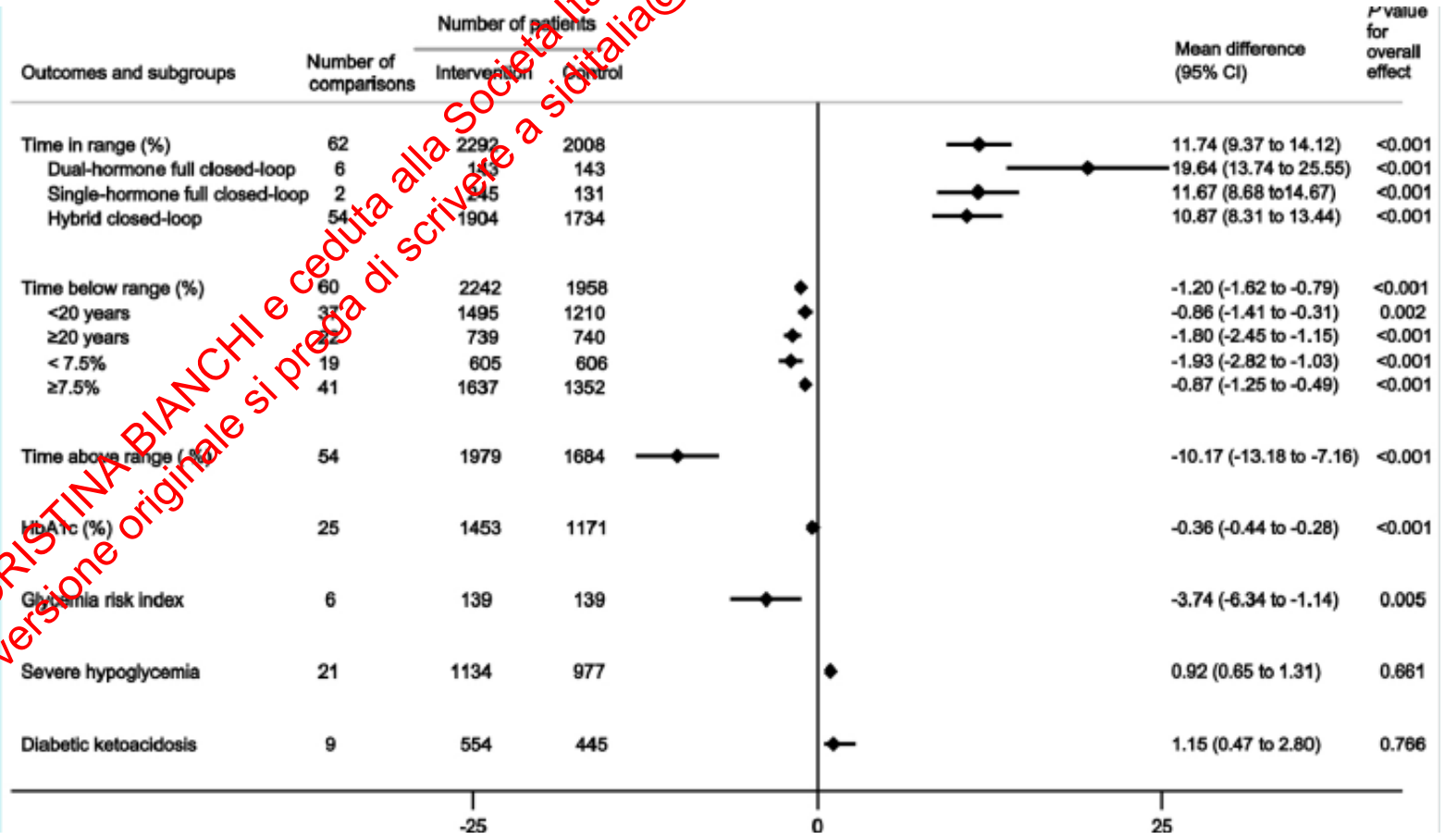

Moon SJ. Diabetes Metab J 2021;45:813-839

# Advanced Hybrid Closed-Loop



# Automated insulin delivery systems in Type 1 Diabetes: a meta-analysis



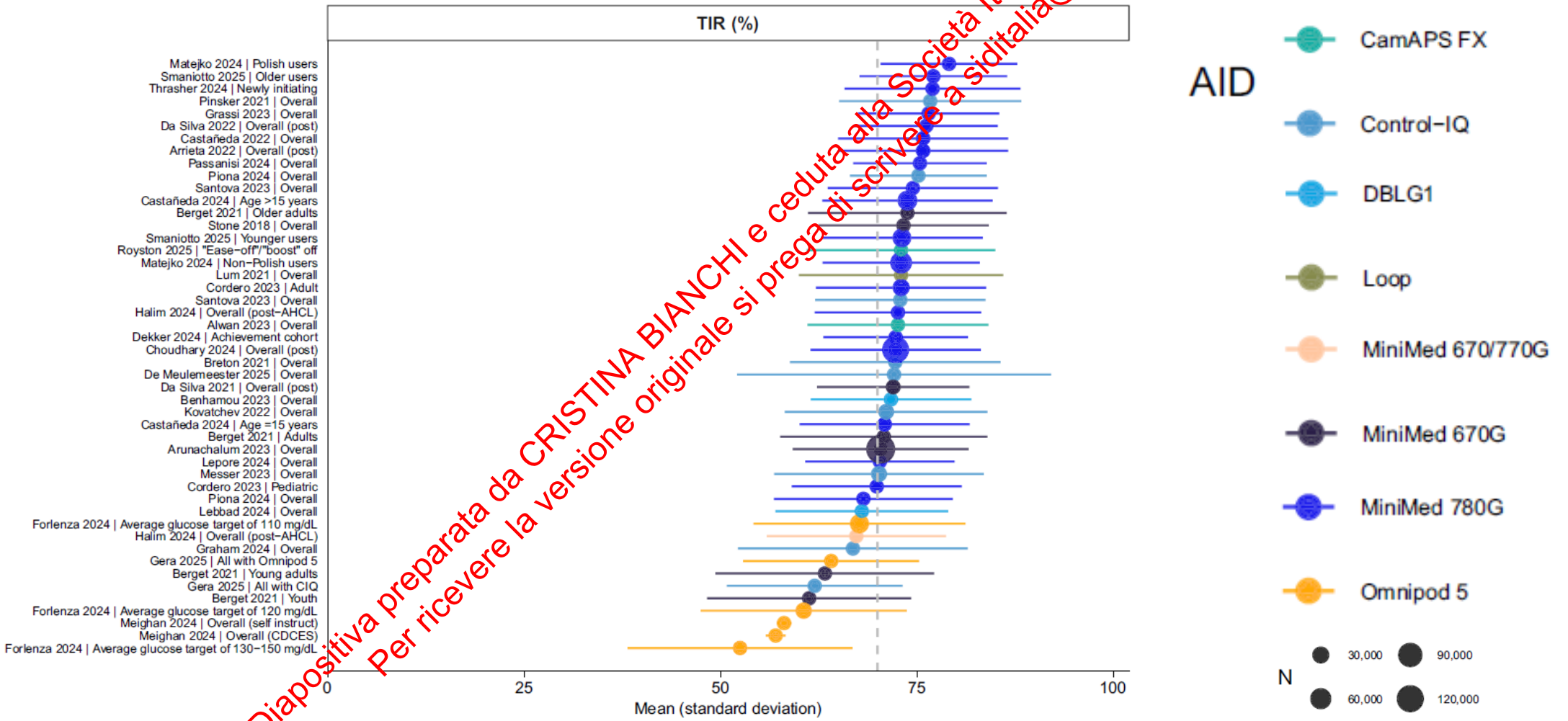






Fan W. Diabetes Metab J 2025;49:235-251

# Automated insulin delivery systems in Type 1 Diabetes: a meta-analysis of of real-world evidence

34 studies with 635463 users; MiniMed 780G (16), Control-IQ (9), MiniMed 670G (6), and other systems (≤3 studies each)

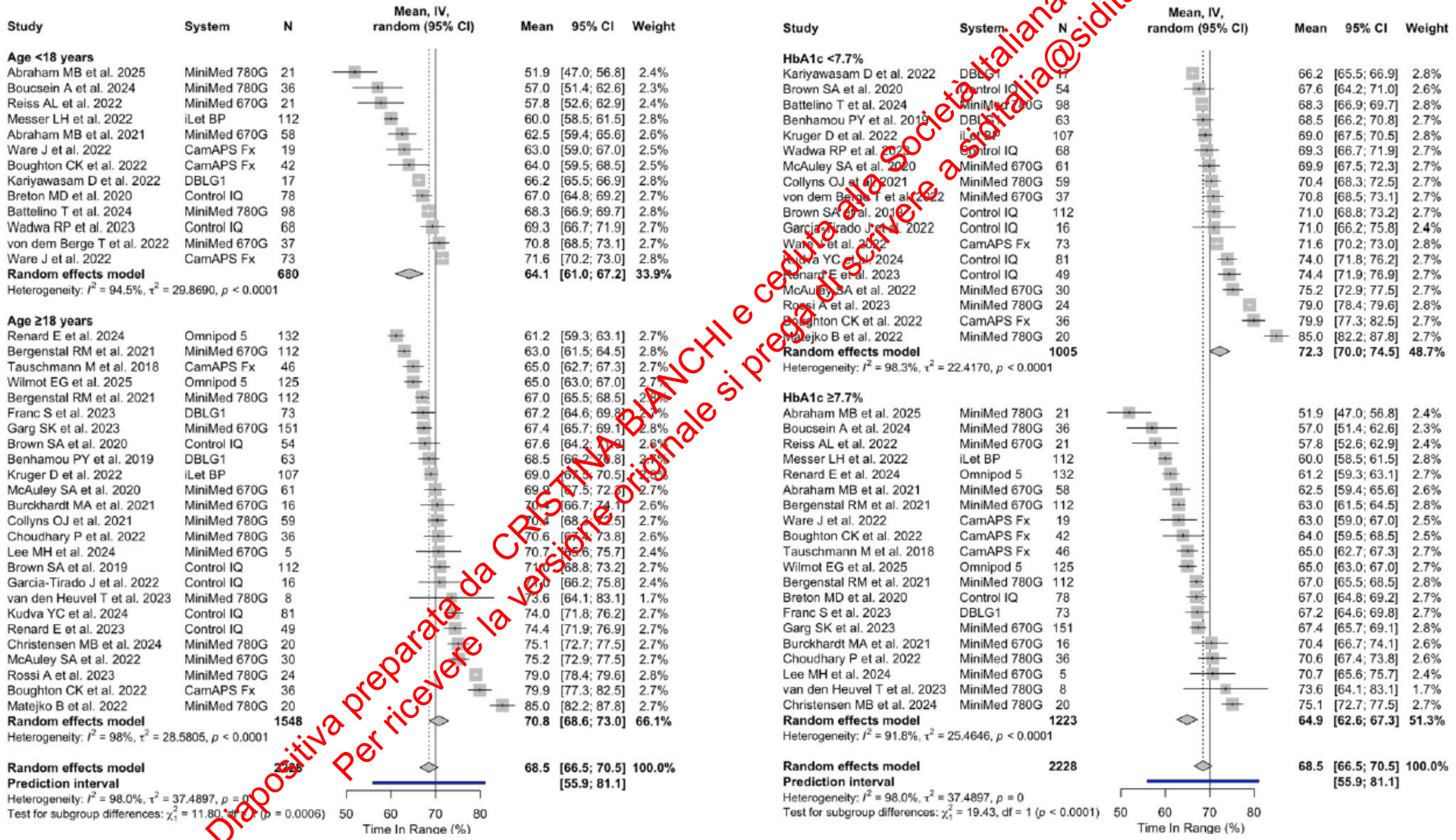





Pöhlmann J. Diabetes Obes Metab 2026 Jan;28 Suppl 1(Suppl 1):13-34

# Automated insulin delivery systems in Type 1 Diabetes

37 studies 2228 involving subjects treated with seven different HCL systems
(CamAPS Fx, Control IQ, DBLG1, iLet BP, MiniMed 670G, MiniMed 780G and Omnipod 5)






Di Molfetta S. Diabetes Obes Metab 2026 Jan;28 Suppl 1(Suppl 1):3-12

# AID systems in Type 1 Diabetes: quality of life

Multicenter longitudinal real-life study

257 people with type 1 diabetes on insulin pump (>65% PLGS) + CGM

Hybrid closed loop (t:slim X2 with Control-IQ)

Follow-up: 6 mounths

| Variables | Adolescents *n* = 55 T0 | M6 | Δ M6 – M0 | Adults *n* = 202 T0 | M6 | Δ M6 – M0 |
|---|---|---|---|---|---|---|
| **PAID score** (Diabetes distress) | 33.2 ± 18.6 | 34.6 ± 23.5 | 1.4 ± 19.4 | 46.9 ± 18.8 | 39.9 ± 20.8 | −6.9 ± 18.1** |
| **ADDQOL score** (Quality of life) | 1.1 ± 1.0 | 1.3 ± 1.1 | 0.2 ± 0.8 | 0.6 ± 1.0 | 0.9 ± 1.0 | 0.3 ± 0.9** |
| **PSS score** (Stress) | 17.2 ± 7.0 | 17.1 ± 7.0 | −0.1 ± 5.5 | 17.4 ± 6.6 | 15.8 ± 6.8 | −1.6 ± 5.8** |
| **GAD 7 score** (Anxiety) | 6.7 ± 5.3 | 6.1 ± 5.4 | −0.6 ± 3.5 | 6.5 ± 5.1 | 5.9 ± 5.1 | −0.6 ± 4.3* |
| **FSS score** (Fatigue) | 30.8 ± 11.9 | 31.0 ± 10.5 | 0.1 ± 11.0 | 34.3 ± 14.8 | 34.4 ± 15.5 | 0.1 ± 14.0 |
| **HFS II score** (Fear of hypoglycemia) | 8.2 ± 3.0 | 6.9 ± 3.5 | −1.2 ± 3.7* | 6.2 ± 2.8 | 5.2 ± 3.2 | −1.0 ± 3.0** |
| **Godin score** (Physical activity) | 37.3 ± 27.6 | 43.4 ± 25.5 | 6.0 ± 18.9* | 24.1 ± 17.9 | 26.5 ± 20.3 | 2.4 ± 19.2 |
| **PSQI score** (Sleep) | 6.5 ± 3.4 | 6.1 ± 3.3 | −0.3 ± 2.5 | 6.4 ± 3.2 | 6.2 ± 3.2 | −0.3 ± 2.6 |
| **QSP9 score (Depression)** | 7.5 ± 5.3 | 7.6 ± 5.7 | 0.1 ± 4.0 | 6.2 ± 5.0 | 5.7 ± 4.8 | −0.5 ± 3.8 |

* p<0,05; **p<0,001



Reznik Y. Diabetes Obes Metab 2024 May;26(5):1962-1966

# Type 1 Diabetes and AID use at different stages of life

Children/adolescents

Pregnancy

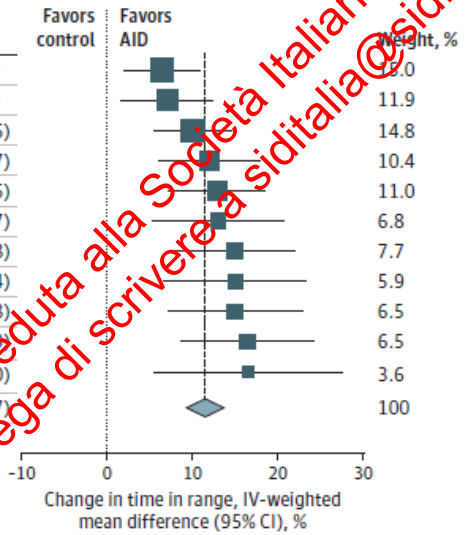
Elderly

# AID use in children and adolescents with Type 1 Diabetes: a meta-analysis

*Time in range*

| Source | Experimental Mean (SD) | Experimental Total No. | Control Mean (SD) | Control Total No. | IV-weighted mean difference (95% CI), % |
|---|---|---|---|---|---|
| Abraham et al,[41] 2021 | 62.50 (12.00) | 58 | 56.10 (12.20) | 53 | 6.40 (1.89 to 10.91) |
| Ware et al,[29] 2022 | 54.00 (17.00) | 57 | 47.00 (12.00) | 62 | 7.00 (1.67 to 12.33) |
| Messer et al,[45] 2022 | 60.00 (8.00) | 112 | 50.00 (16.00) | 53 | 10.00 (5.44 to 14.56) |
| Breton et al,[8] 2020 | 67.00 (10.00) | 78 | 55.00 (13.00) | 22 | 12.00 (6.13 to 17.87) |
| Tauschmann et al,[28] 2018 | 14.70 (8.00) | 11 | 1.80 (5.50) | 12 | 12.90 (7.24 to 18.56) |
| Isganaitis et al,[44] 2021 | 64.00 (8.00) | 31 | 51.00 (15.00) | 17 | 13.00 (5.33 to 20.67) |
| Garg et al,[43] 2023 (high $HbA_{1c}$) | 57.00 (7.40) | 21 | 42.10 (15.50) | 23 | 14.90 (7.82 to 21.98) |
| Burnside et al,[42] 2022 | 67.50 (11.50) | 20 | 52.50 (17.60) | 27 | 15.00 (6.66 to 23.34) |
| Boughton et al,[7] 2022 | 64.00 (15.00) | 42 | 49.00 (18.00) | 30 | 15.00 (7.12 to 22.88) |
| Reiss et al,[46] 2022 | 18.15 (13.01) | 21 | 1.72 (12.99) | 21 | 16.43 (8.57 to 24.28) |
| Garg et al,[43] 2023 (low $HbA_{1c}$) | 67.20 (7.10) | 7 | 50.70 (14.10) | 8 | 16.50 (5.40 to 27.60) |
| Total | | 458 | | 328 | 11.48 (9.29 to 13.67) |

Heterogeneity: $\tau^2 = 3.04$; $\chi^2_{10} = 12.95$ ($P = .23$); $I^2 = 23\%$

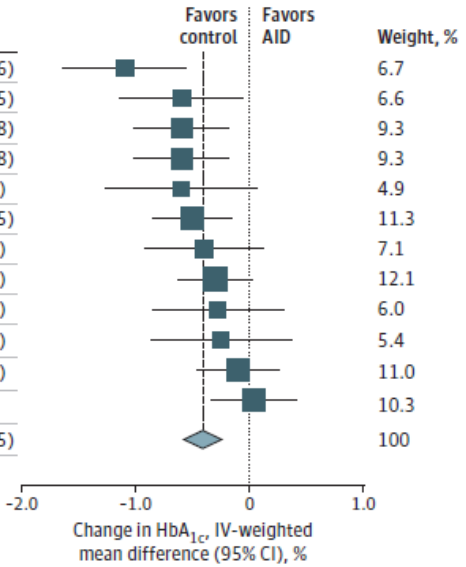



Use of AID systems by youth with Type 1 Diabetes was associated with clinically meaningful improvements in multiple measures of glucose management, including the risk of both hyperglycemia and hypoglycemia.

*HbA1c*

| Source | Experimental Mean (SD) | Experimental Total No. | Control Mean (SD) | Control Total No. | IV-weighted mean difference (95% CI), % |
|---|---|---|---|---|---|
| Boughton et al,[7] 2022 | 6.90 (1.00) | 47 | 8.00 (1.40) | 36 | -1.10 (-1.64 to -0.56) |
| Burnside et al,[42] 2022 | 7.00(0.90) | 20 | 7.60 (1.00) | 27 | -0.60 (-1.15 to -0.05) |
| Breton et al,[8] 2020 | 7.00 (0.80) | 78 | 7.60 (0.90) | 22 | -0.60 (-1.02 to -0.18) |
| McVean et al,[9] 2023 | 6.50 (0.70) | 59 | 7.10 (1.30) | 46 | -0.60 (-1.02 to -0.18) |
| Garg et al,[43] 2023 (low $HbA_{1c}$) | 7.40 (0.50) | 7 | 8.00 (0.80) | 8 | -0.60 (-1.27 to 0.07) |
| Ware et al,[29] 2022 | 7.60 (1.10) | 57 | 8.10 (0.80) | 62 | -0.50 (-0.85 to -0.15) |
| Garg et al,[43] 2023 (high $HbA_{1c}$) | 8.00 (0.70) | 23 | 8.40 (1.00) | 21 | -0.40 (-0.91 to 0.11) |
| Messer et al,[45] 2022 | 7.50 (0.70) | 112 | 7.80 (1.10) | 53 | -0.30 (-0.62 to 0.02) |
| Isganaitis et al,[44] 2021 | 7.56 (0.78) | 31 | 7.84 (1.07) | 17 | -0.28 (-0.86 to 0.30) |
| Reiss et al,[46] 2022 | -0.57(1.15) | 21 | -0.32 (0.89) | 21 | -0.25 (-0.87 to 0.37) |
| Abraham et al,[41] 2021 | 7.50 (1.10) | 58 | 7.60 (0.80) | 53 | -0.10 (-0.46 to 0.26) |
| Tauschmann et al,[28] 2018 | -0.06 (0.50) | 11 | -0.10 (0.40) | 11 | 0.04 (-0.34 to 0.42) |
| Total | | 524 | | 377 | -0.41 (-0.58 to -0.25) |

Heterogeneity: $\tau^2 = 0.0328$; $\chi^2_{11} = 18.09$ ($P = .08$); $I^2 = 39\%$




de Visser HS. JAMA Pediatr 2025 Nov 1;179(11):1162-1171

# Type 1 Diabetes and AID use at different stages of life

Children/adolescents

Pregnancy

Elderly

# Challenges of AID in pregnancy

Implementing AID use during pregnancy requires unique configurations including:

- ability to safely achieve the tighter pregnancy TIR before conception and throughout gestation,
- algorithm adaptability to changes in insulin sensitivity throughout gestation,
- assertive postprandial insulin delivery, including a mechanism to respond to changes in glycemia postprandially,
- more aggressive glucose targets without an increased risk of maternal hypoglycemia,
- ability to rapidly adapt to changes in insulin requirements postpartum (through setting adjustments and algorithm adaptation)
- user-friendly, regardless of an individual's health care status or literacy, to maximize benefits and reduce risks throughout gestation.

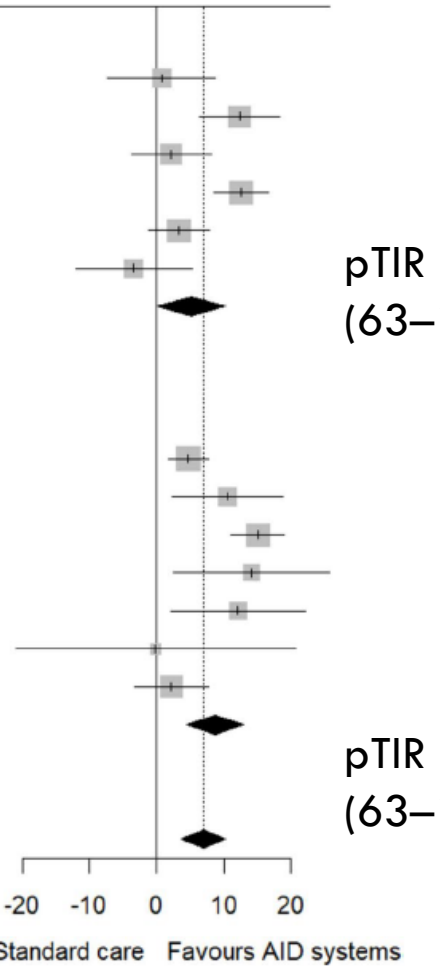


Jacobs PG. Diabetes Technol Ther 2025;27(S3):S60-S71

# AID use in pregnant women with Type 1 Diabetes: a meta-analysis

33 studies
involving 450 partecipants

| Study or Subgroup | Total | AID systems Mean | SD | Total | Standard care Mean | SD | Mean Difference IV, Random, 95% CI |
|---|---|---|---|---|---|---|---|
| **Randomized controlled trials** | | | | | | | |
| Murphy 2011 | 12 | 77.25 | 8.86 | 12 | 76.50 | 11.00 | 0.75 [-7.24; 8.74] |
| Stewart 2016 | 17 | 70.50 | 8.86 | 17 | 58.15 | 8.86 | 12.35 [ 6.39; 18.31] |
| Stewart 2018 | 17 | 62.30 | 8.86 | 17 | 60.10 | 8.86 | 2.20 [-3.76; 8.16] |
| Lee 2023 | 61 | 68.20 | 10.50 | 63 | 55.60 | 12.30 | 12.60 [ 8.54; 16.66] |
| Benhalima 2024 | 46 | 66.50 | 10.00 | 49 | 63.20 | 12.40 | 3.30 [-1.22; 7.82] |
| Polsky 2024 | 12 | 60.10 | 11.08 | 12 | 63.46 | 10.73 | -3.36 [-12.09; 5.37] |
| **Total (95% CI)** | **165** | | | **170** | | | **5.19 [ 0.06; 10.32]** |
| Heterogeneity: $Tau^2$ = 31.02; $Chi^2$ = 23.18, df = 5 (P = 0.0003); $I^2$ = 78.4% | | | | | | | |
| **Observational studies** | | | | | | | |
| Albert 2023 | 6 | 66.25 | 2.73 | 6 | 61.50 | 2.34 | 4.75 [ 1.87; 7.63] |
| Dodesini 2023 | 8 | 64.99 | 9.21 | 8 | 54.40 | 7.70 | 10.59 [ 2.27; 18.91] |
| Guibert 2023 | 13 | 60.33 | 5.78 | 13 | 45.25 | 6.27 | 15.08 [ 11.10; 19.06] |
| Levy 2023 | 10 | 78.60 | 9.20 | 10 | 64.50 | 16.30 | 14.10 [ 2.50; 25.70] |
| Fresa 2024 | 6 | 79.91 | 3.59 | 6 | 67.75 | 11.31 | 12.16 [ 2.07; 22.25] |
| Nandam 2024 | 6 | 67.90 | 15.70 | 2 | 68.10 | 12.00 | -0.20 [-21.04; 20.64] |
| Quirós 2024 | 59 | 66.73 | 13.03 | 53 | 64.53 | 16.00 | 2.20 [ -3.24; 7.64] |
| **Total (95% CI)** | **108** | | | **98** | | | **8.71 [ 4.51; 12.90]** |
| Heterogeneity: $Tau^2$ = 16.99; $Chi^2$ = 24.08, df = 6 (P = 0.0005); $I^2$ = 75.1% | | | | | | | |
| **Total (95% CI)** | **273** | | | **268** | | | **7.01 [ 3.72; 10.30]** |
| Heterogeneity: $Tau^2$ = 23.54; $Chi^2$ = 47.83, df = 12 (P < 0.0001); $I^2$ = 74.9% | | | | | | | |
| Test for subgroup differences: $Chi^2$ = 1.08, df = 1 (P = 0.2980) | | | | | | | |




pTIR
(63–140 mg/dl)

pTIR
(63–140 mg/dl)



Stamati A. Acta Diabetologica 2025; 62:441–452

# AID use in pregnant women with Type 1 Diabetes

## - *The CIRCUIT Randomized Clinical Trial* -

Multicenter open-label randomised trial

Since June 2021
Up to July 2024

94 pregnant women with Type 1 diabetes before 14 weeks' gestation

AID system (Tandem with Control IQ)

Pre-trial insulin delivery method + CGM

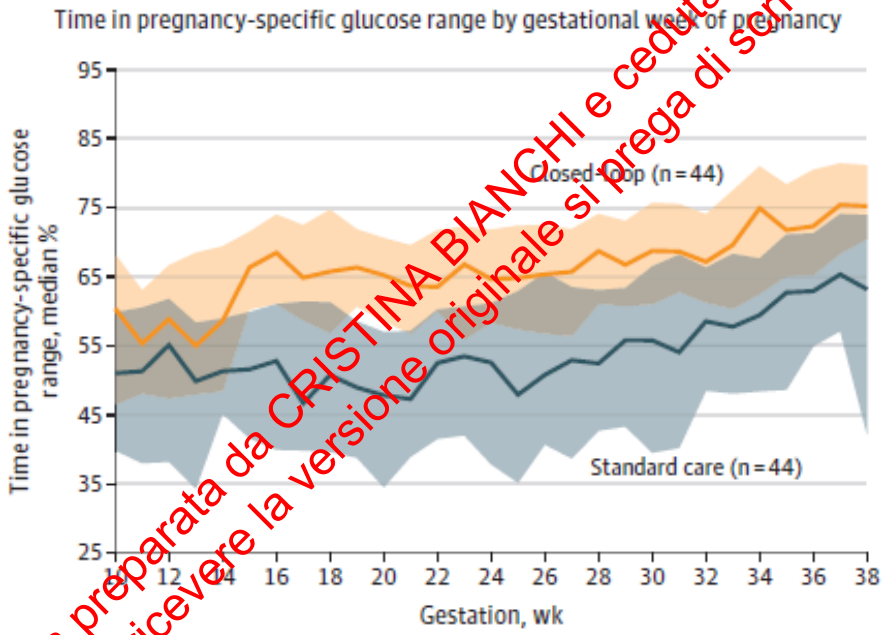
Follow-up: until 6 weeks postpartum

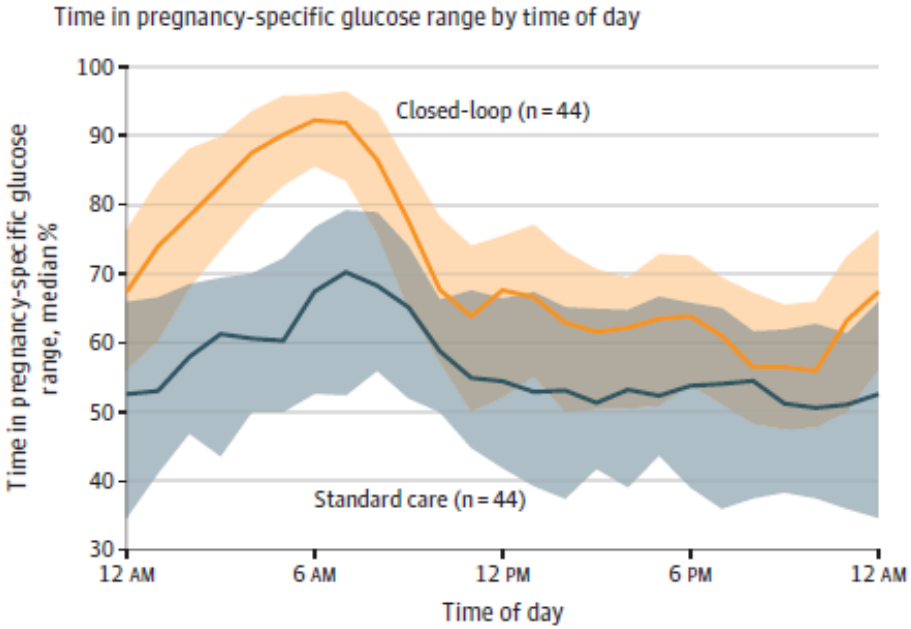
Mean percentage of time in pregnancy-specific glucose range

| | |
|---|---|
| Closed-loop system | 65.4% |
| Standard care | 50.3% |

The closed-loop system significantly increased time in the pregnancy-specific glucose range by 3 hours per day:

Mean adjusted difference, 12.5%
(95% CI, 9.5% to 15.6%); $P < .001$




Donovan LE. JAMA 2025 Dec 23;334(24):2176-2185

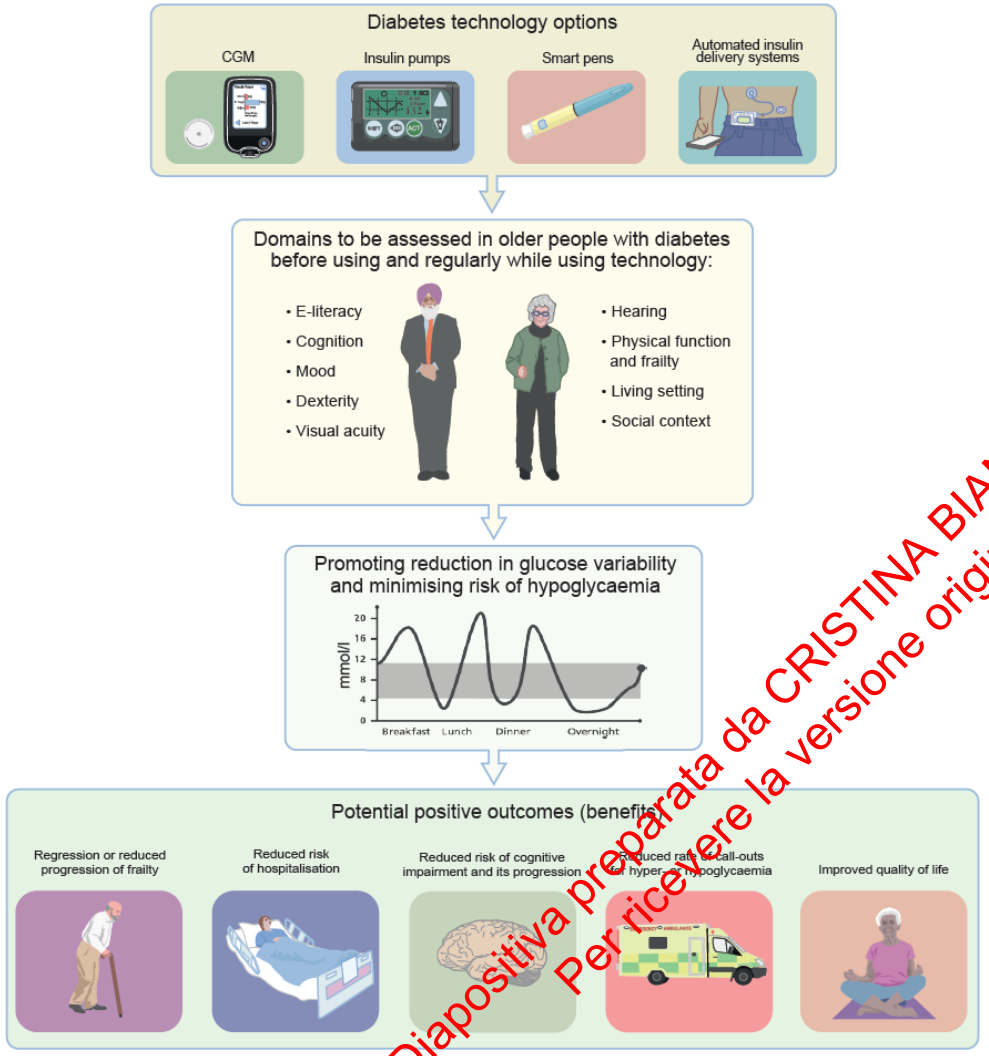
# Type 1 Diabetes and AID use at different stages of life

Children/adolescents ✓

Pregnancy ✓

Elderly

# Benefits of technology in older people with diabetes and key barriers to its use







Maltese G. Diabetologia 2024; 67:2085–2102

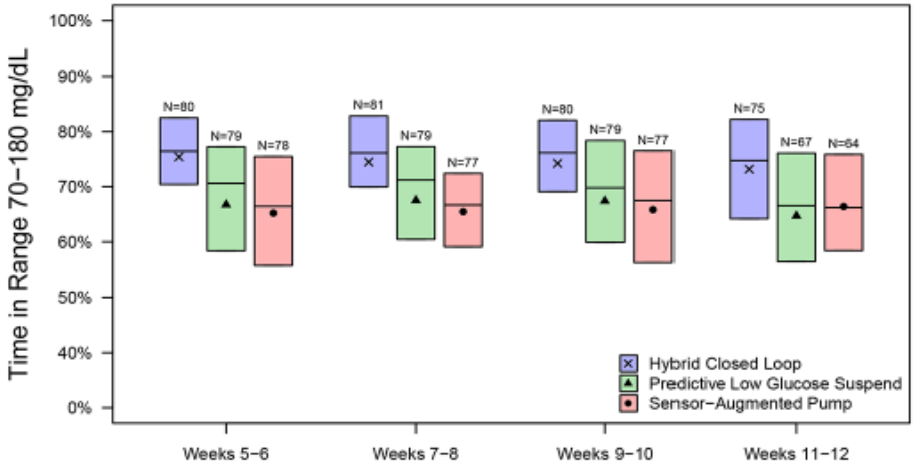
# AID in older adults with Type 1 Diabetes

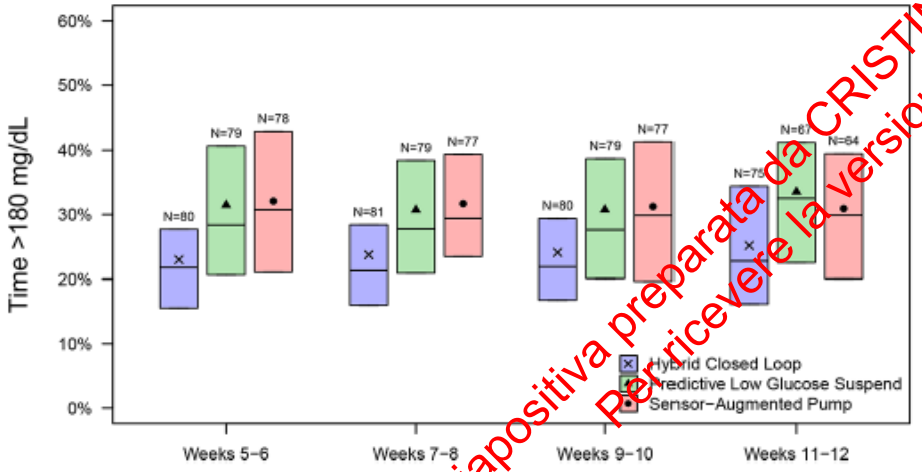
Multicenter randomized crossover trial

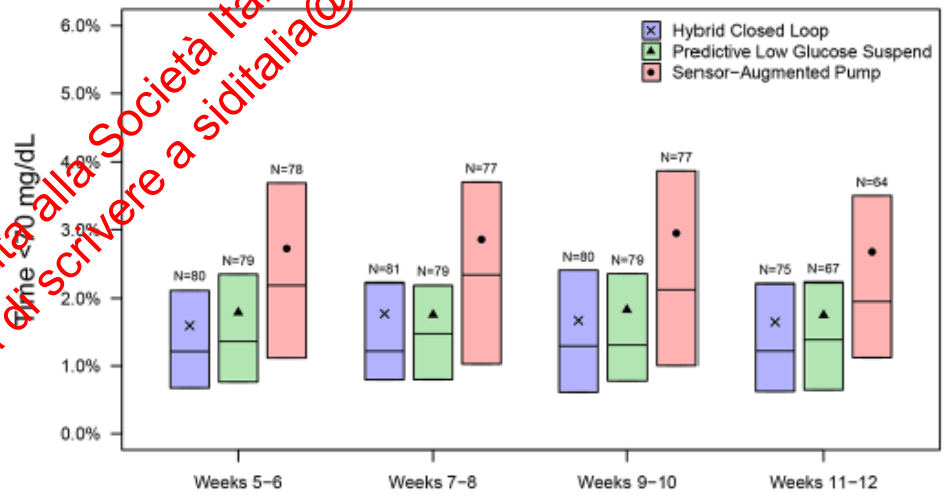
Since Sept. 2020
Up to Dec. 2022

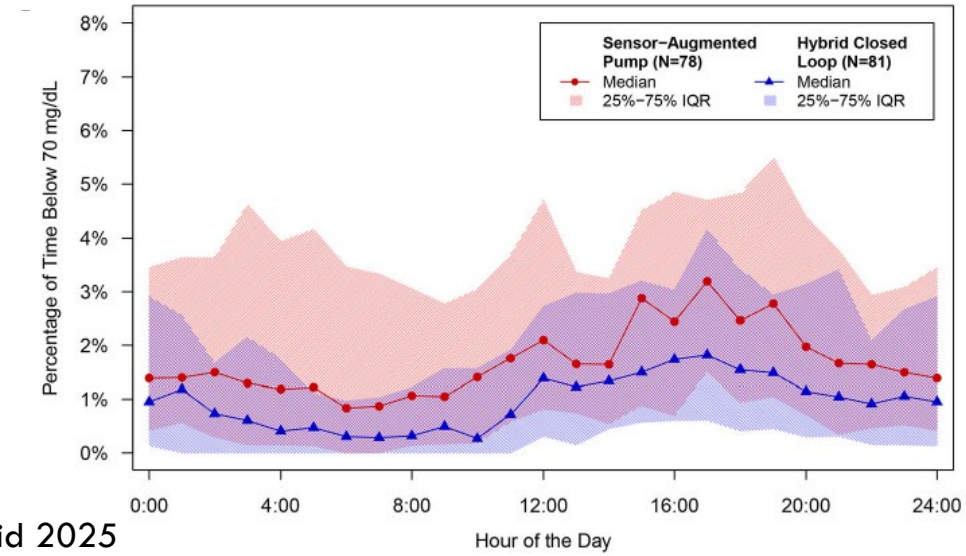
82 adults (65–86 years) with type 1 diabetes → Three 12-week periods

- Hybrid closed loop (HCL - t:slim X2 with Control-IQ)
- Predictive low glucose suspend (PLGS- t:slim pump X2 with Basal-IQ)
- Sensor-augmented pump (SAP - t:slim X2 pump + CGM without automation)




Kudva YC. NEJM Evid 2025

# Type 1 Diabetes and AID use at different stages of life

Children/adolescents ✓

Pregnancy ✓

Elderly ✓

# AID systems use: different scenarios

Type 2 diabetes

Chronic kidney disease/dialysis

Awareness hypos

# AID system use in type 2 diabetes

## - *The 2IQP Study* -

Multicenter randomised trial

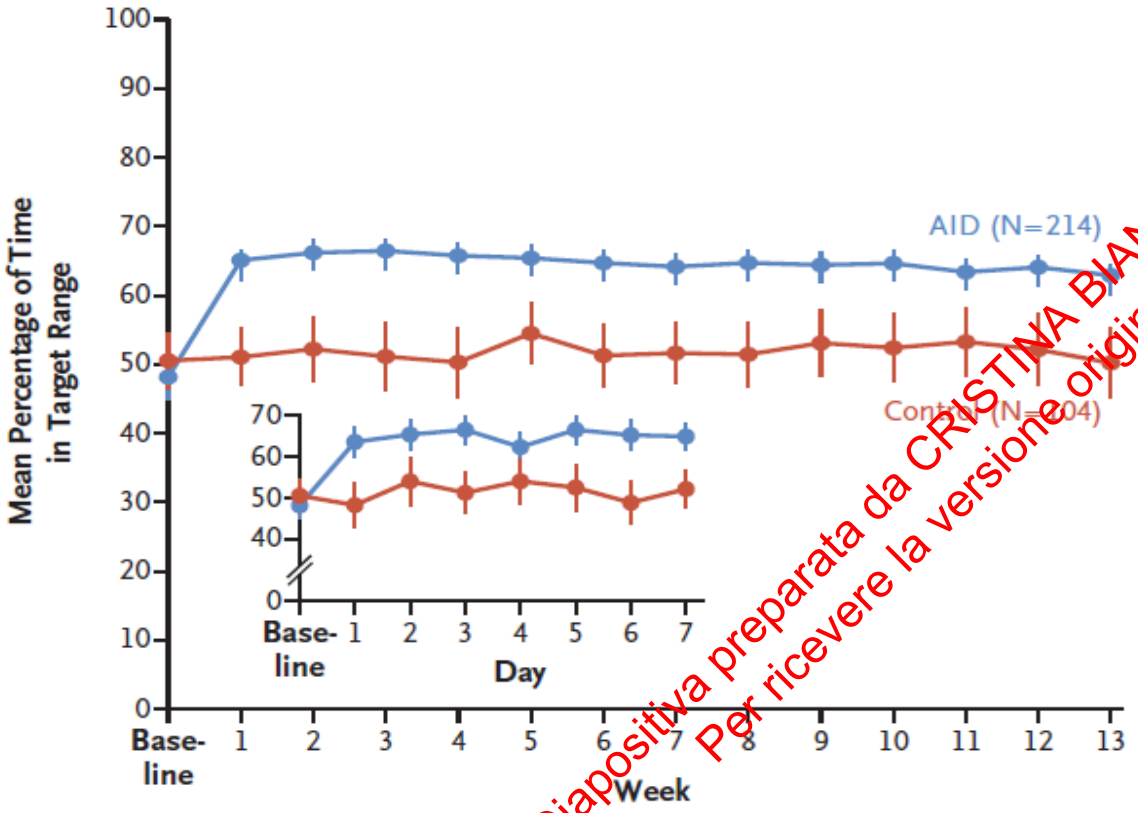
Since June 2023
Up to June 2024

319 individuals
with insulin-treated type 2 diabetes

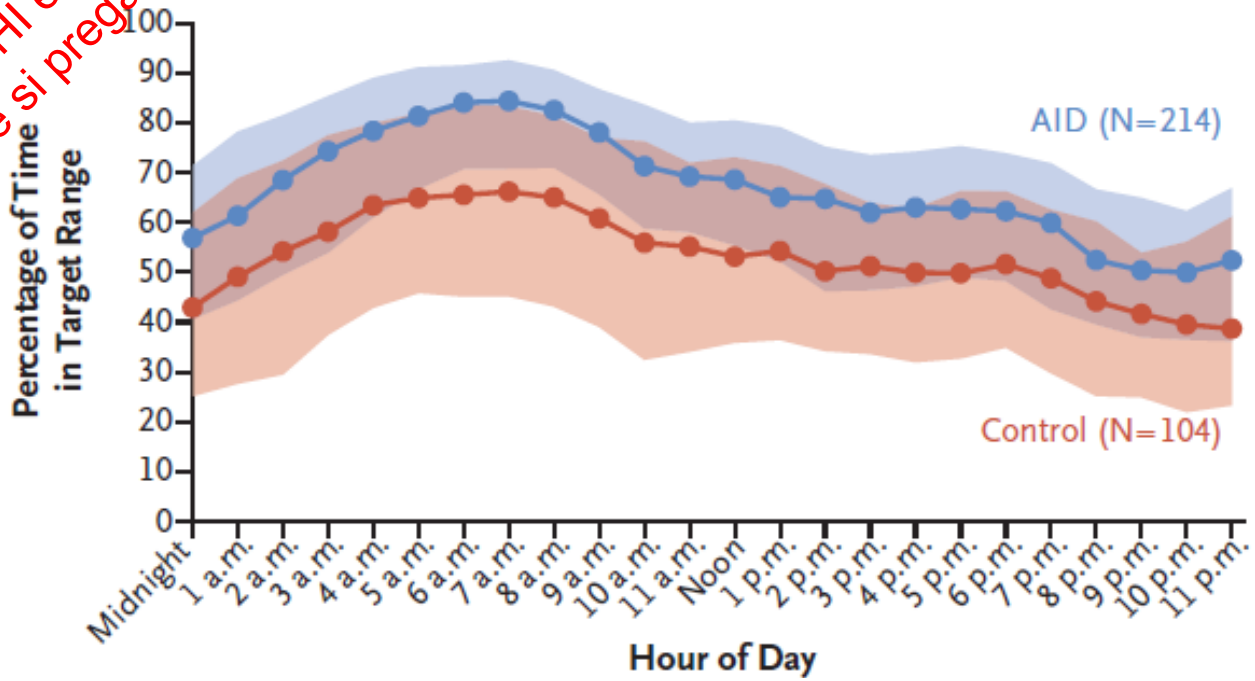
- AID system (Tandem with Control IQ)
- Pre-trial insulin delivery method + CGM

Follow-up:
13 weeks

Time in glucose target range (70 to 180 mg/dl) over 13 weeks




Time in glucose target range according to hour of day over 13 weeks




Kudva YC. N Engl J Med 2025;392:1801-12

# AID system use in type 2 diabetes

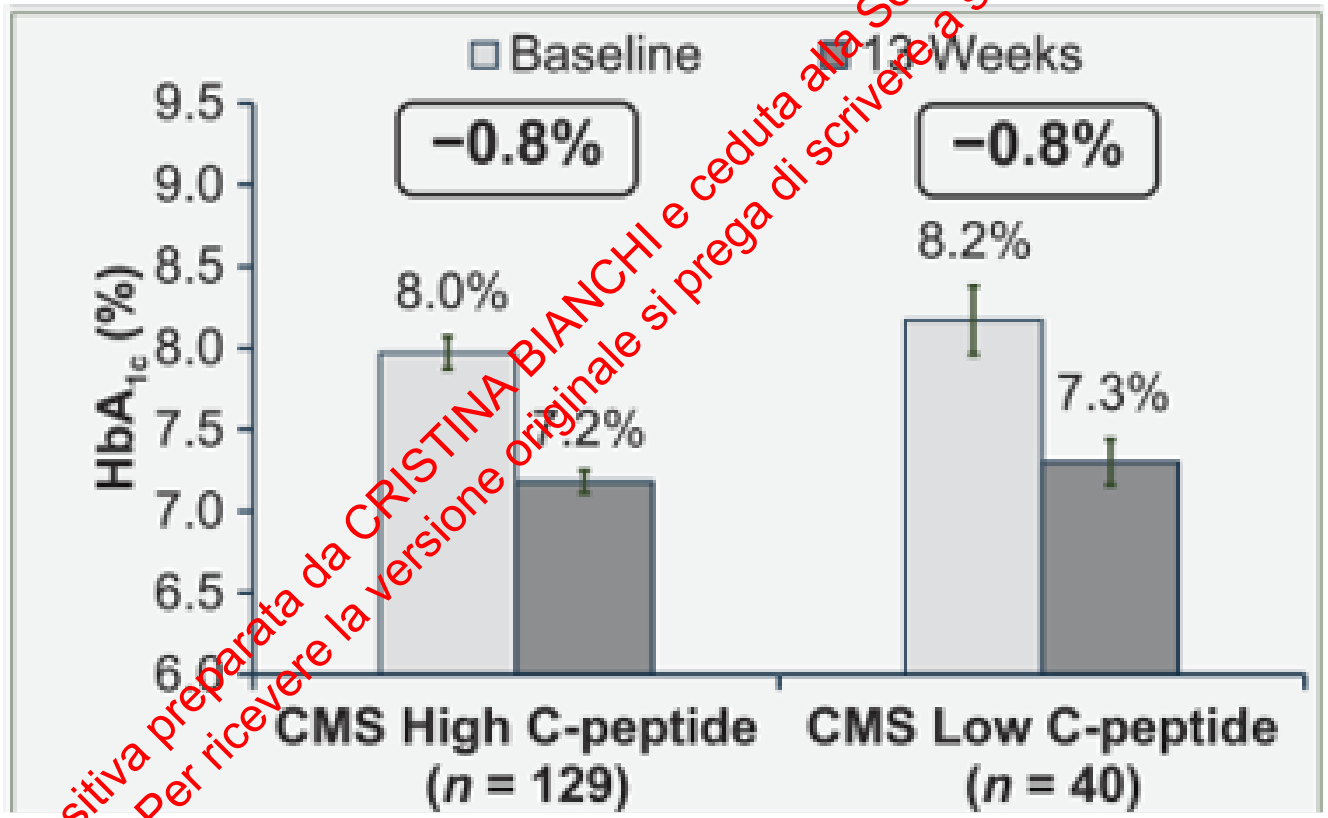
Multicenter randomised trial

Since June 2023
Up to June 2024

254 individuals
With type 2 diabetes
treated with AID system
(Tandem with Control IQ)

→ high C-peptide
→ low C-peptide

Follow-up:
13 weeks



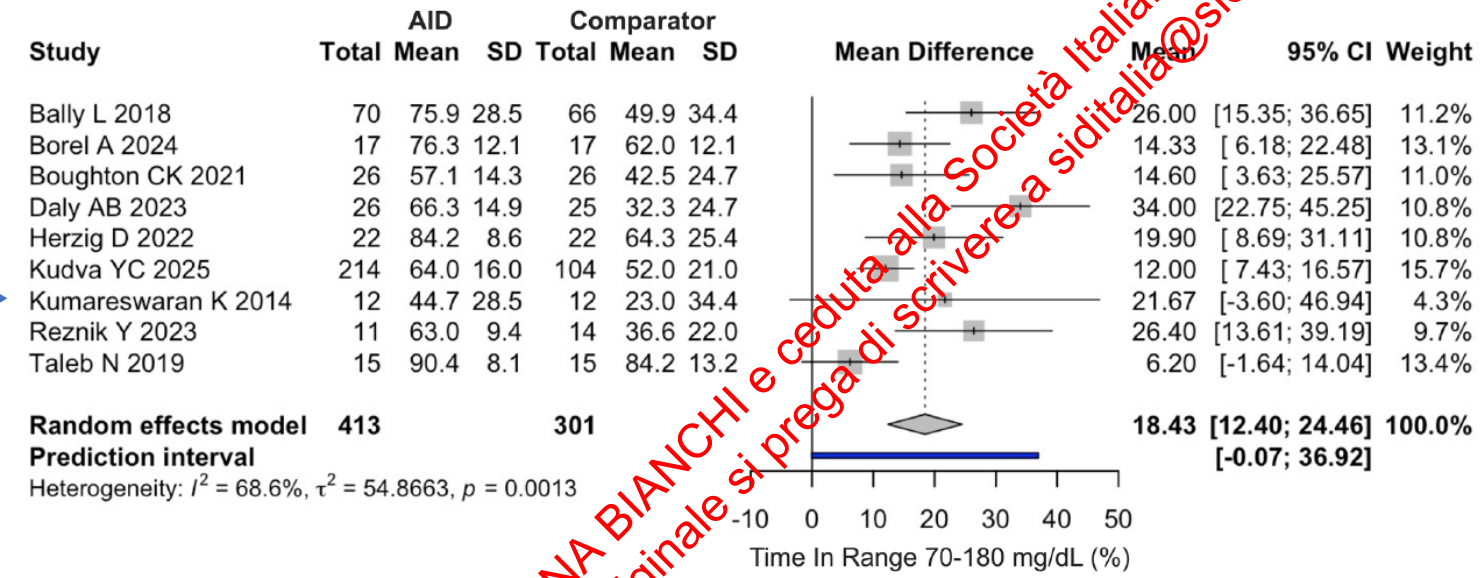



Hirsch IB. Diabetes Care. 2025 Dec 1;48(12):2061-2066

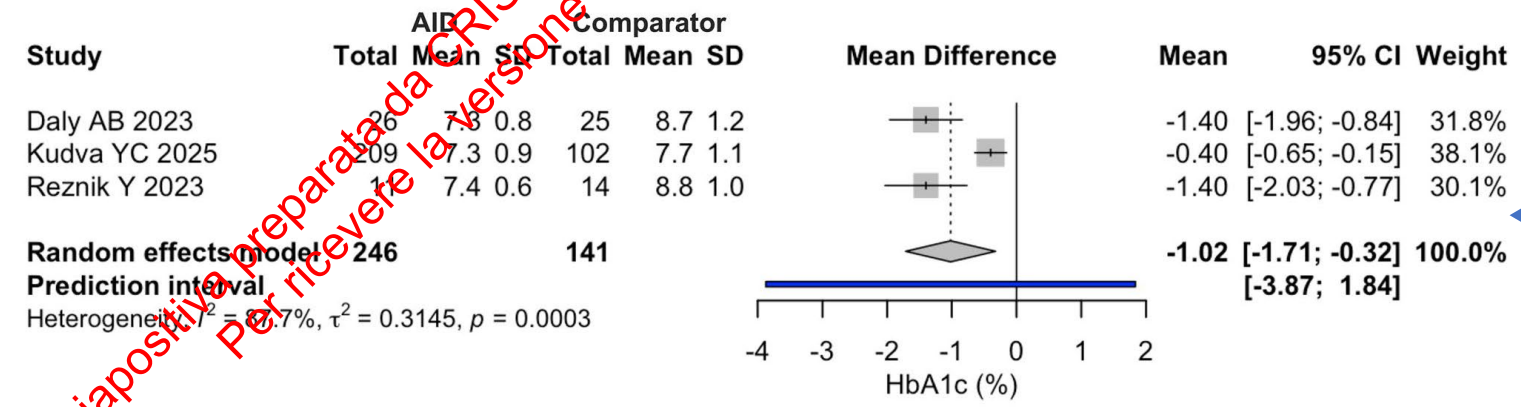
# AID system use in type 2 diabetes: a meta-analysis of RCT

9 studies, accounting for 714 adults with type 2 diabetes

*Time in range*




*HbA1c*






Di Molfetta S. Diabetes, Obesity and Metabolism 2026; 0:1–10

# AID systems use: different scenarios

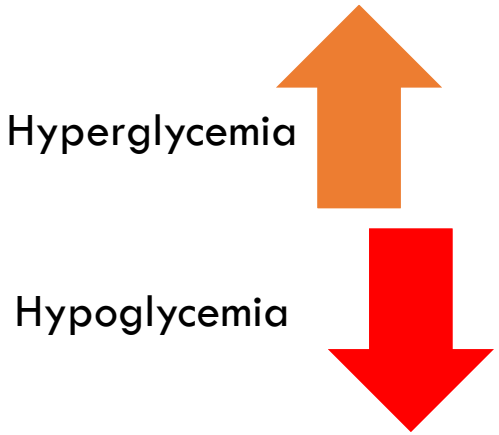
Type 2 diabetes

Chronic kidney disease/dialysis

Awareness hypos

# Use of AID systems in end stage kidney disease/haemodialysis:

*mitigating features of AID against pathophysiological challenges of diabetes management in ESKD*




- Glucose concentration of the dialysate
- Insulin resistance
- Impaired beta-cell secretion

- Decreased gluconeogenesis
- Impaired insulin clearance and degradation
- Impaired counterregulatory hormonal response
- Nutritional deprivation

Glycemic variability

| Pathophysiological challenges in ESKD | AID mitigating feature |
|---|---|
| • Increased risk of hypoglycemia | • Automatic suspension of insulin delivery upon detection of impending hypoglycaemia<br>• Low glucose alarms helpful in nocturnal hypoglycemia or cases of impaired hypoglycemia awareness<br>• Algorithms can be adjusted to prevent hypoglycemia on dialysis days by altering glucose target or by using 'activity/exercise mode' |
| • Impaired insulin clearance | • Most systems allow adjustment of active insulin time |
| • Increased insulin resistance<br>• High glucose variability | • Automatic adjustment of basal insulin and correction bolus delivery factor at every few minutes based on CGM and pump data.<br>• Healthcare professionals can access AID data illuminating discernible patterns in insulin requirements glucose variability, allowing for meaningful intervention thereby reducing the risk of clinical inertia due to the complexity of glycemic profile |

Abbreviations: ESKD = End stage kidney disease, AID = Automated insulin delivery, CGM = Continuous glucose monitor.

Pavlou P. Expert Rev Endocrinol Metab 2026 Mar;21(2):111-121

# AID system in patients with diabetes and CKD/hemodialysis

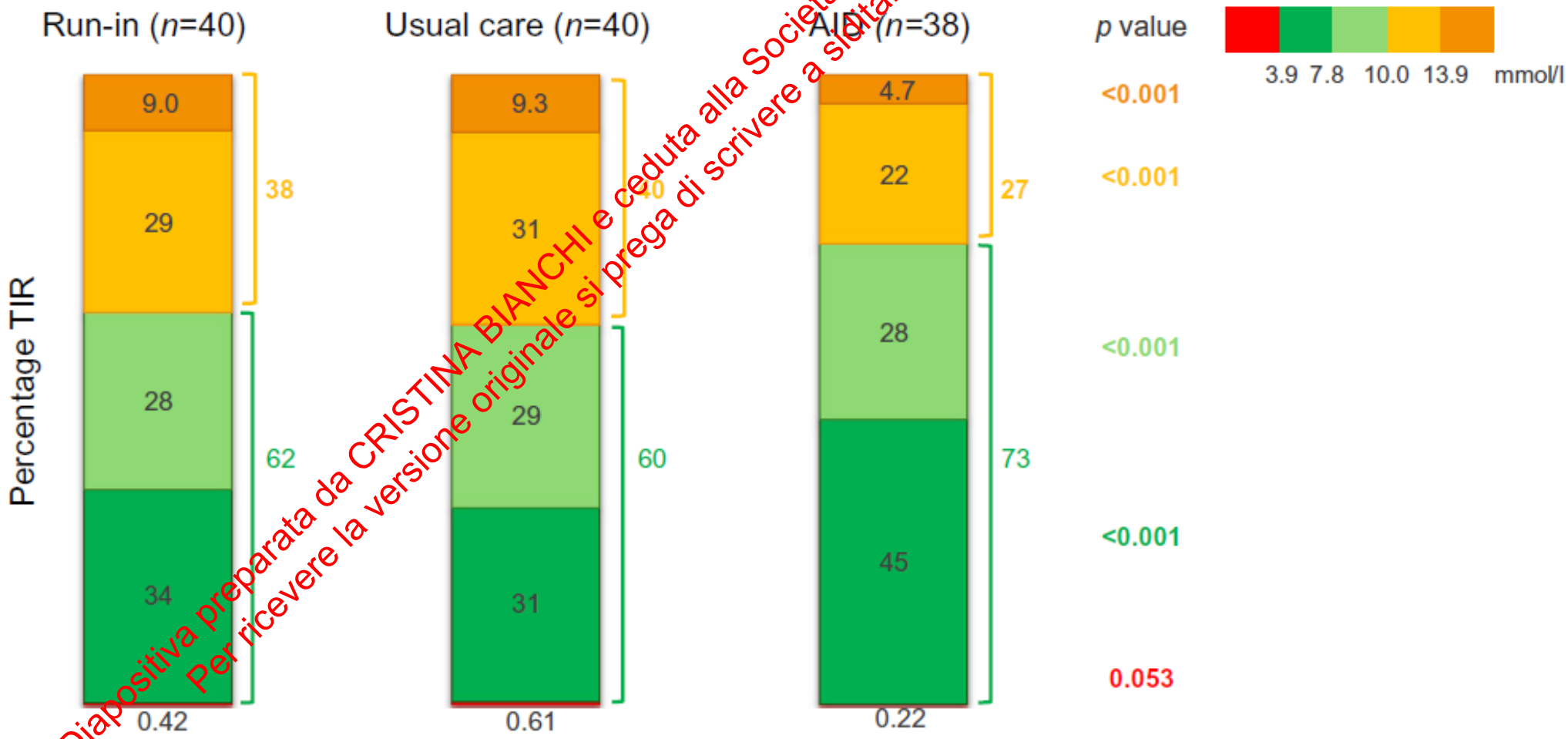
Randomised crossover trial

40 individuals (24 type 1 diabetes, 16 type 2 diabetes) with advanced CKD/ hemodialysis

AID followed by usual care with CGM

reverse sequence

each for 8 weeks






Lu JC. Diabetologia 11 May 2026

# Use of AID systems in end stage kidney disease/haemodialysis

| Study (Year) | Design/Setting | Population | AID System/Algorithm | Comparator | Follow-up Duration | Key Glycemic Outcomes | Hypoglycemia Findings | Notes |
|---|---|---|---|---|---|---|---|---|
| Chaudhry et al. 2024 | Single-center case series | 4 adults with T1D on HD | Medtronic MiniMed 780 G SmartGuard | Pre-AID baseline | 4.5 months (2–9 months) | ↑TIR; ↓time above range | No change in TBR; no severe hypoglycemia | Feasibility of AID in HD; real-world outpatient use First evidence in T1D |
| Pavlou et al. 2025 | Real-world multi-center case series | 9 adults with T1D on HD | Omnipod 5 SmartAdjust & Medtronic 780G SmartGuard | Pre-AID baseline | 7 months (1.5–25 months) | TIR ↑ 39.7 → 59.8%; ↓GV; ↓HbA1c | No significant TBR change | First real-world evidence of significant benefit with AID in a T1D dialysis population |
| Boughton et al. 2021 | RCT open label 2-center crossover trial | 26 adults with T2D on HD (outpatient) | Cambridge fully closed-loop | Standard insulin therapy | 2 × 20 days (crossover) | TIR ↑ 37.7 → 52.8%; ↓mean glucose | ↓TBR ($p = 0.04$); no severe events | Only RCT; robust evidence of benefit |
| Bally et al. 2019 | Post-hoc inpatient analysis of open label RCT | 17 adults with T2D on HD (in hospital) | Fully closed-loop insulin delivery | Conventional insulin therapy | 8 days | ↑TIR +37.6%; ↓GV (28.4 vs 32.3%) | No increase in hypoglycemia | Post-hoc analysis of a short-term inpatient study; improved stability |

Note: ↑ indicates increase; ↓ indicates decrease.
Abbreviations: TIR = Time in Range; TBR = Time Below Range; GV = Glucose Variability; HD = Hemodialysis; ESKD = End Stage Kidney Disease RCT = Randomized Controlled Trial.



Pavlou P. Expert Rev Endocrinol Metab 2026 Mar;21(2):111-121

# AID system in patients with type 1 DM and CKD on hemodialysis

Real-world data

9 individuals with type 1 diabetes and ESKD on hemodialysis using AID systems

- 2 with MiniMed 780G
- 1 with Tandem Control IQ
- 6 with Omnipod 5

Follow-up: 7 months

| | Mean pre-AID (±SD) | Mean post-AID (±SD) | Difference post-AID (Δ) | *P*-value |
|---|---|---|---|---|
| TIR (%) | 39.7 (±17.1) | 59.8 (±18.1) | 20.1 | 0.001 |
| Time in very high range (%) | 30.4 (±19.5) | 14.3 (±12.3) | −16.1 | 0.01 |
| TBR (%) | 4 (±5.4) | 1.4 (±1.3) | −2.6 | 0.1 |
| Mean BG (mmol/L) | 13.1 (±2.4) | 9.8 (±1.9) | −3.3 | 0.0002 |
| GV (%)† | 39.8 (±3.8) | 33.8 (±6.5) | −6 | 0.01 |
| TDI (IU)‡ | 35.8 (±12.2) | 29.6 (±7.1) | −6.2 | 0.05 |
| Hemodialysis day TIR (%)§ | 32.7 (±17.7) | 62.3 (±14.9) | 29.6 | 0.002 |
| Hemodialysis day TDI (IU)¶ | 27.3 (±7.9) | 26.9 (±5.8) | −0.32 | 0.43 |
| HbA1c (mmol/mol)†† | 78.6 (±12.8) | 56.1 (±8.5) | −22.5 | 0.003 |
| Weight‡‡ | 74.8 (±19.6) | 71.8 (±15.9) | −2.5 | 0.23 |



Pavlou P. J Diabetes Investig 2025; 16: 2027-2032

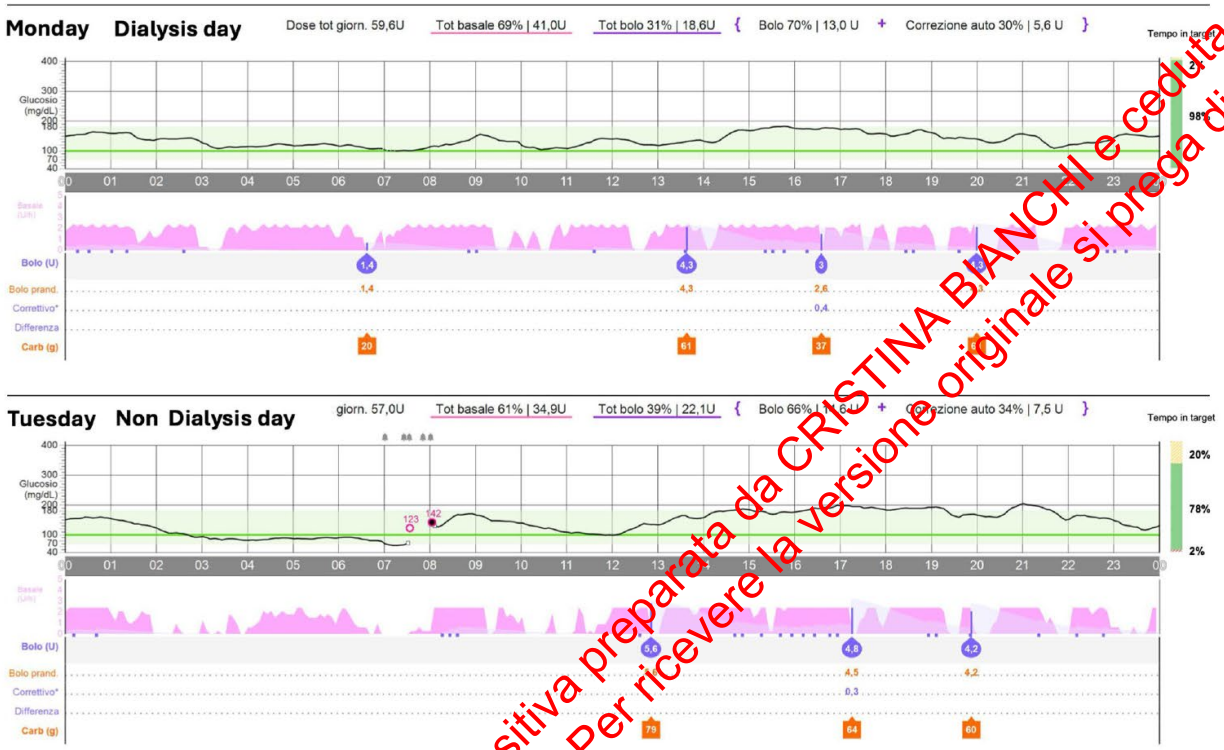
# AID systems in patients with diabetes undergoing dialysis

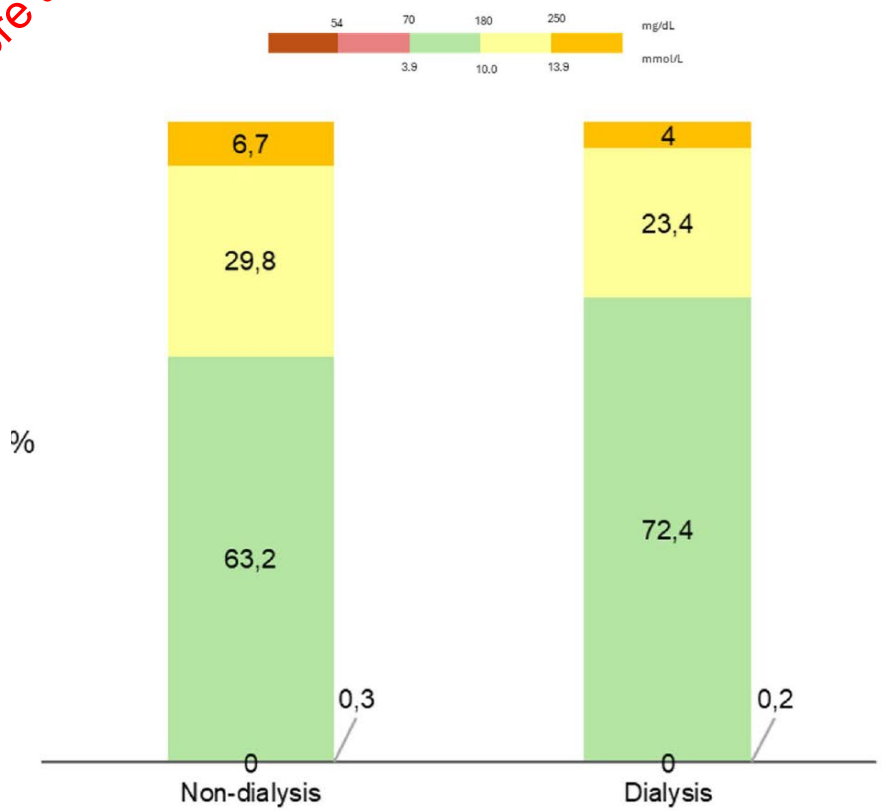
*- The AID-DIAL-CAL Study -*

Longitudinal retrospective
pilot real-world analysis

14 individuals
(2 type 1 diabetes, 12 type 2 diabetes)
on hemodialysis
in AID therapy (MiniMed 780G)

Follow-up:
3 - 12 months






Succurro E. Acta Diabetol 2026 Apr 15

# AID systems in patients with diabetes undergoing dialysis

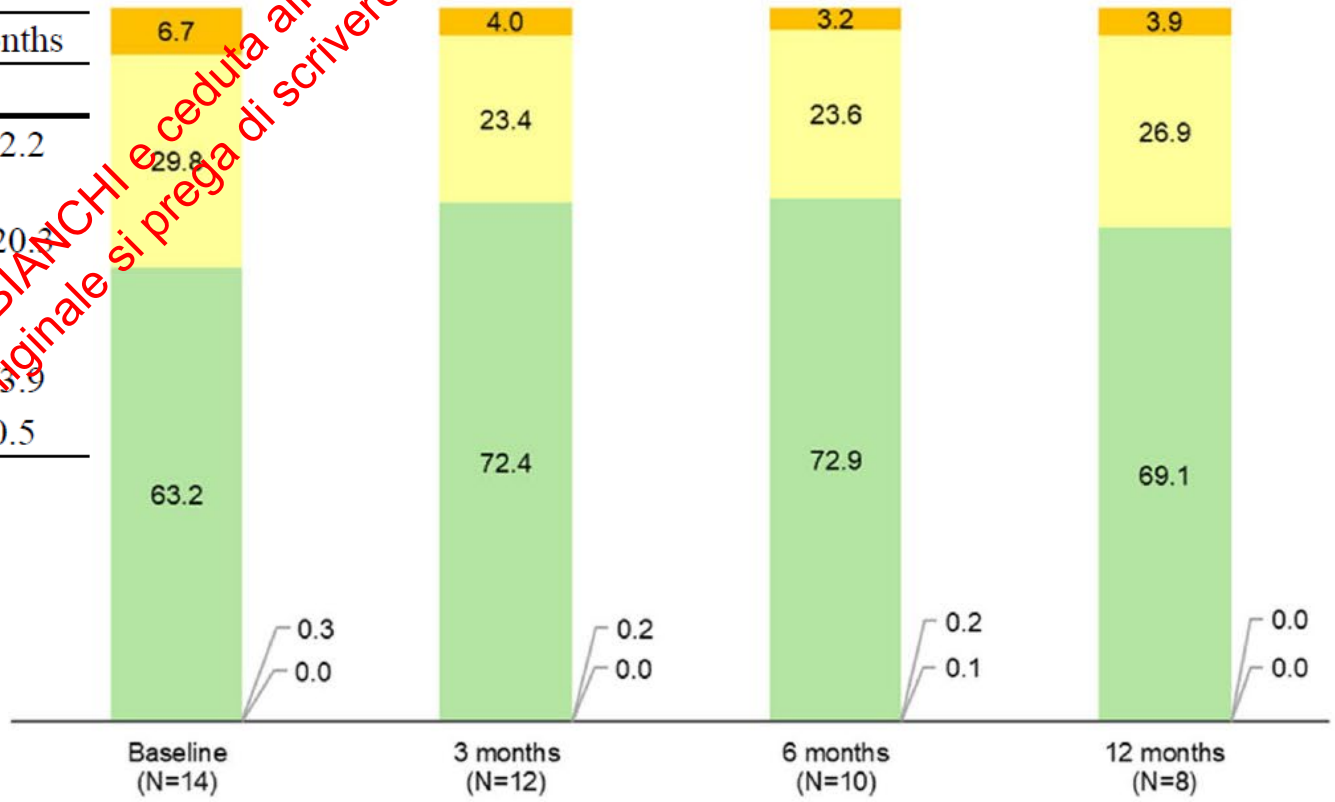
## - *The AID-DIAL-CAL Study* -

Longitudinal retrospective pilot real-world analysis

14 individuals
(2 type 1 diabetes, 12 type 2 diabetes)
on hemodialysis on hemodialysis
in AID therapy (MiniMed 780G)

Follow-up:
3 - 12 months

| | Baseline | 3-months | 6-months | 12-months |
|---|---|---|---|---|
| | *N* = 14 | *N* = 14 | *N* = 10 | *N* = 8 |
| Sensor use (%) | 81.3 ± 20.3 | 93.7 ± 4.9 | 88.8 ± 12.6 | 95.5 ± 2.2 |
| Mean sensor glucose (mg/dl) | 169.9 ± 19.1 | 156.9 ± 21.3 | 158 ± 10.7 | 161 ± 20.3 |
| CV (%) | 26.6 ± 5 | 26.5 ± 3.9 | 28.8 ± 6.5 | 25.5 ± 3.9 |
| GMI (%) | 7.4 ± 0.5 | 7.1 ± 0.5 | 7.1 ± 0.3 | 7.2 ± 0.5 |




Succurro E. Acta Diabetol 2026 Apr 15

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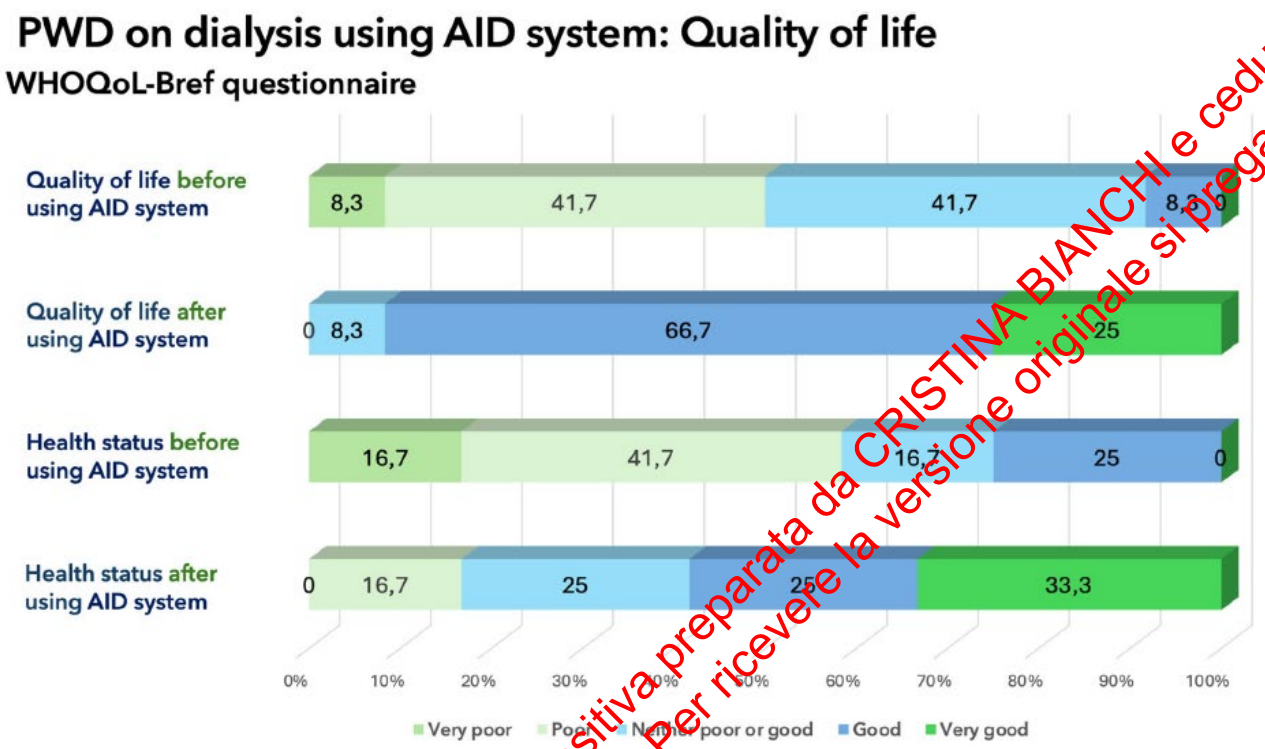
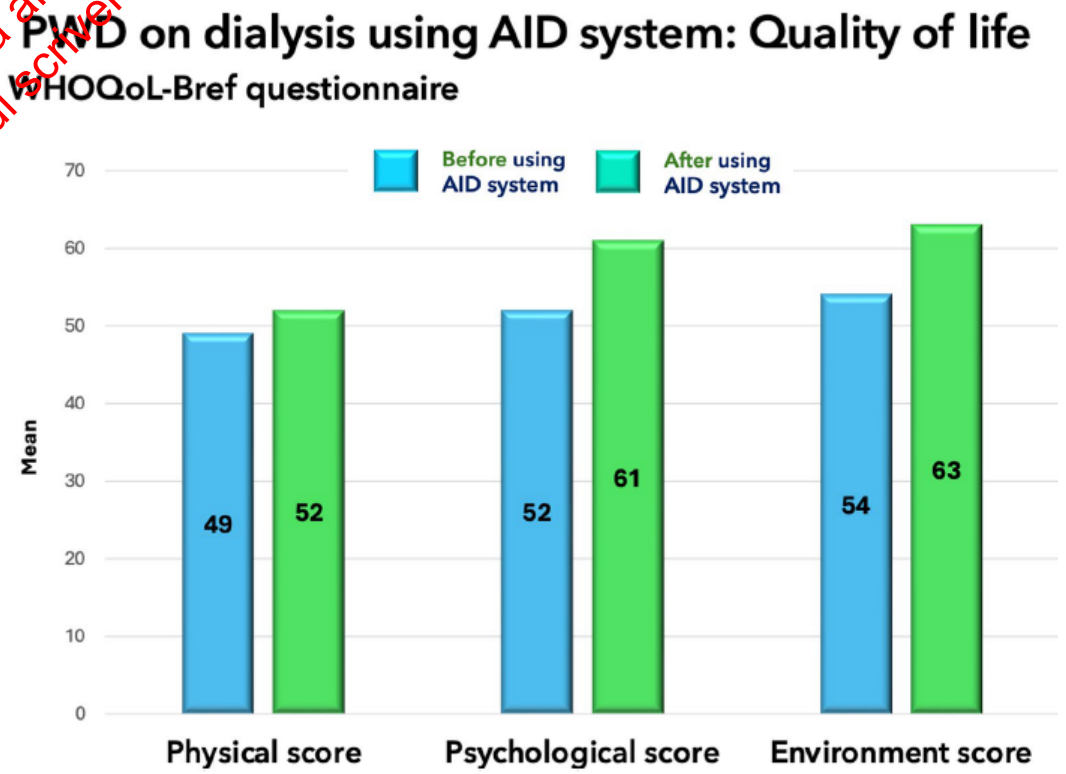





Succurro E. Acta Diabetol 2026 Apr 15

# AID systems use: different scenarios

Type 2 diabetes ✓

Chronic kidney disease/dialysis ✓

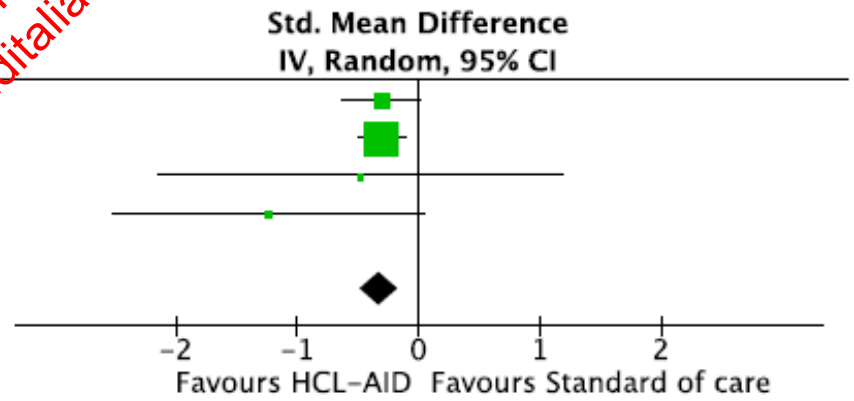
Awareness hypos

# AID and hypoglycaemia awareness in type 1 diabetes: a metanalysis

*Observational studies*

| Study or Subgroup | HCL-AID Mean | HCL-AID SD | HCL-AID Total | Standard of care Mean | Standard of care SD | Standard of care Total | Weight | Std. Mean Difference IV, Random, 95% CI |
|---|---|---|---|---|---|---|---|---|
| Beato-Vibora et al. 2024 | 1.74 | 1.6 | 75 | 2.27 | 1.88 | 75 | 25.9% | -0.30 [-0.63, 0.02] |
| Crabtree et al. 2023 | 1.9 | 1.2 | 207 | 2.3 | 1.4 | 208 | 71.5% | -0.31 [-0.50, -0.11] |
| Malone et al. 2021 | 4.5 | 1.05 | 3 | 5.17 | 1.17 | 3 | 1.0% | -0.48 [-2.18, 1.18] |
| Nattero-Chávez et al.2023 | 1.9 | 1.6 | 6 | 3.6 | 0.8 | 6 | 1.6% | -1.24 [-2.52, 0.04] |
| **Total (95% CI)** | | | **291** | | | **292** | **100.0%** | **-0.32 [-0.49, -0.16]** |

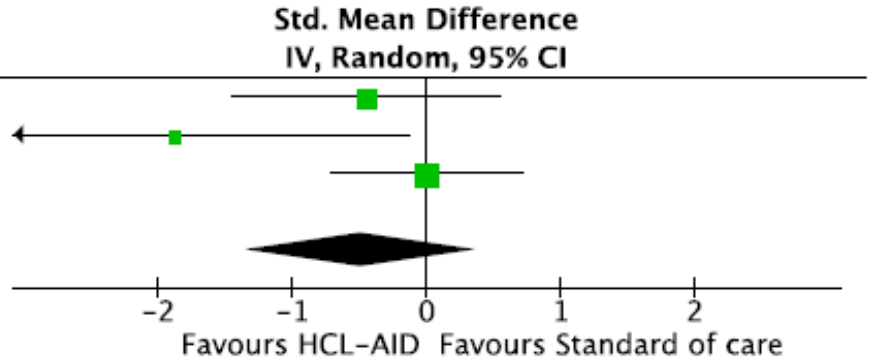
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.04$, df = 3 (P = 0.56); $I^2 = 0\%$
Test for overall effect: Z = 3.86 (P = 0.0001)




*Randomised controlled studies*

| Study or Subgroup | HCL-AID Mean | HCL-AID SD | HCL-AID Total | Standard of care Mean | Standard of care SD | Standard of care Total | Weight | Std. Mean Difference IV, Random, 95% CI |
|---|---|---|---|---|---|---|---|---|
| Burckhardt et al. 2021 | 4 | 1.65 | 8 | 4.75 | 1.5 | 8 | 35.7% | -0.45 [-1.45, 0.55] |
| Lee et al. 2024 | 128 | 182.2 | 5 | 1,182 | 732.6 | 4 | 17.7% | -1.88 [-3.63, -0.13] |
| McAuley et al. 2022 | 2.5 | 1.9 | 15 | 2.5 | 1.9 | 15 | 46.6% | 0.00 [-0.72, 0.72] |
| **Total (95% CI)** | | | **28** | | | **27** | **100.0%** | **-0.49 [-1.35, 0.36]** |

Heterogeneity: $Tau^2 = 0.27$; $Chi^2 = 3.87$, df = 2 (P = 0.14); $I^2 = 48\%$
Test for overall effect: Z = 1.13 (P = 0.26)






Efthymiadis A. Journal of Diabetes & Metabolic Disorders 2024; 23:2251–2261

# AID systems use: different scenarios

Type 2 diabetes ✓

Chronic kidney disease/dialysis ✓

Awareness hypos ✓

# AID: other scenarios

Diabetes post-pancreasectomy/pancreatitis ✓

Cystic fibrosis ✓

Prolonged fasting/Ramadan ✓

Gastroparesis/enteral nutrition ✓

Intellectual diasability ✓

Hospitalization ✓

# AID: guidelines

**7.25a** AID systems are the preferred insulin delivery method over MDI, CSII, and sensor-augmented pumps in people with type 1 diabetes, **A** adults with type 2 diabetes, **A** children and adolescents with type 2 diabetes, **E** and those with other forms of insulin-deficient diabetes. **B**, **C**, **D**, **E** Choice of an AID system should be made based on the individual's circumstances, preferences, and needs. **E**

**7.25b** Consider AID systems for select people with type 2 diabetes treated with basal insulin not achieving individualized glycemic goals. **B** Choice of an AID system should be made basedon the individual's circumstances, preferences, and needs. **E**

**15.19** Automated insulin delivery (AID) systems with pregnancy-specific glucose targets are recommended for pregnant individuals with type 1 diabetes. **A**

**15.20** AID systems without pregnancy-specific glucose targets or a pregnancy-specific algorithm may be considered for select pregnant individuals with type 1 diabetes when used with assistive techniques and working with experienced health care teams. **B**

**7.3b** When prescribing an automated insulin delivery (AID) system, people with diabetes and their caregivers must receive education on how to use and troubleshoot the system. This education should occur at regular intervals as needed. Education should include utilization of the integrated system and its data, including uploading or sharing data to monitor and adjust therapy. **C**

**7.5** People with diabetes using CGM, continuous subcutaneous insulin infusion (CSII), and/or AID for diabetes management should have continued access to devices across third-party payors, regardless of age or A1C levels. **E**

**7.6** Children and adolescents should be supported at school in the use of diabetes technology, such as CGM systems, CSII, connected insulin pens, and AID systems. **E**

**7.7** For adults with diabetes using diabetes technology, reasonable accommodations in educational and work settings should include having sufficient time to manage their devices and respond to high and low glucose levels. **E**

**7.8** Consider early initiation, including at diagnosis, of CGM, CSII, and AID depending on a person's or caregiver's needs and preferences. **C**

**7.8a** There should be no requirement of C-peptide level, **B** the presence of islet autoantibodies, **B** or duration of insulin treatment **C** before initiation of CSII or AID.

**7.9** Standardized reports for all CGM, CSII, AID, and connected insulin devices with a minimum of a single-page report, such as the standardized CGM report and weekly summary, should be available and utilized. Options for daily and weekly reports and raw data should be available. **E**



ADA. Diabetes Care 2026; 49 (Suppl. 1): S150-S165 – S321-S,338

# AID systems are for everyone, but… is everyone for AID?

Despite the clinical benefits, several factors prevent universal adoption:

## Disparity in Access and Uptake

- Racial and socioeconomic divides
- Health literacy and language barriers
- Geographic inequities: living without specialized endocrinologists behind

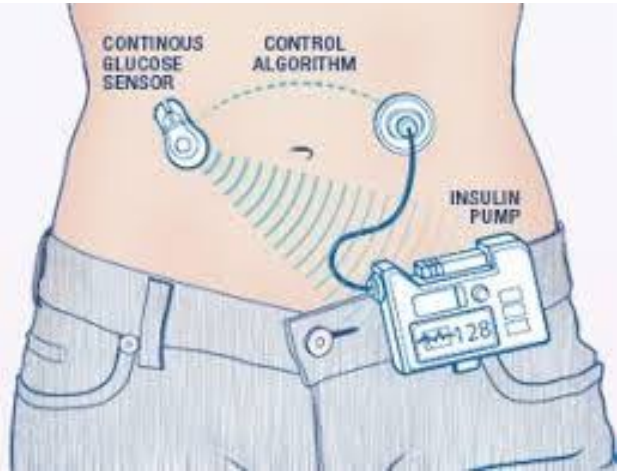
## Policy and Insurance Hurdles

- High costs and insurance coverage barriers
- Regulatory delays

## Psychological and lifestyle barriers

- Perceived workload for configuring, managing, and troubleshooting the technology
- Issues related to wearability of devices

# Conclusions: the *aid* of AID




- ✓ Technological advances are transforming the management of type 1 diabetes at all ages, including pregnancy.
- ✓ The automated nature of closed loop and its ability to adapt to real-time glucose levels may improve glucose control and quality of life across a range of populations, making it a viable choice for many, if not all.
- ✓ However, for optimal use of diabetes technology, it is essential to improve the knowledge and skills of both healthcare professionals and users.
- ✓ Inequities in diabetes technology access and utilization remain a critical public health barrier, directly widening the gap in health outcomes based on race, socioeconomic status, and geography.

unite for diabetes

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