

Background

- In people with type 1 diabetes (PWT1D) the use of automated insulin delivery systems (AID) is associated with reduced HbA1c, improved time in range and reduced risk of hypoglycemia.
- Despite such benefits some PWT1D remain on multiple daily insulin injections (MDI) with or without the use of a continuous glucose monitoring system (CGM).
- There is also emerging evidence that disparities in the use of diabetes technology among people with PWT1D can persist despite equal access to healthcare.

Objective

- The objective of the present study was to assess glycemic control, the use of diabetes technology, and barriers to its adoption in a predominantly minority population.

Methods

- We administered a questionnaire to 284 established people with T1D (PWT1D) capturing information about demographics, diabetes control and answers to 19 questions addressing barriers to the use of technology (Table 1). Patients were identified as White Non-Hispanic (WNH), White-Hispanic (WH) and Black (B).

Table 1. Barriers to the adoption of diabetes technology.

1. Cost of supplies	
2. Cost of device	
3. Insurance coverage	
4. Hassle of wearing devices all of the time	
5. Do not like having diabetes devices on my body	
6. Do not like how diabetes devices look on my body	
7. Nervous that the device might not work	
8. Do not want to take more time from my day to manage diabetes	
9. Nervous to rely on technology	
10. Worries about what others will think of me	
11. I do not like diabetes devices because people notice them and ask	
12. Too busy to learn how to use a new technology or device	
13. My diabetes care team has never talked with me about diabetes	
14. Do not understand what to do with the information or features of	
15. Not able to get my diabetes care team to write me a prescription	
16. Not enough support from my family	
17. Not enough support from my diabetes care team in using devices	
18. Do not want to have more information about my diabetes	
19. My family does not think diabetes devices are important for taking care of my diabetes	

Y, yes; n, no.

- Data are expressed as mean \pm SD. A two-sided $p=0.05$ was considered statistically significant.

Results

- 58.8% of the population was WH followed by WNH and B, 28.4% and 11.8% respectively.
- Diabetes control assessed by HbA1c level was better in WNH compared to B, but this was not explained by disparities in device use, as the proportion of individuals using each technology was comparable across groups, despite variations in access to private insurance (Table 2).

Table 2. Characteristics of the patients

	All	WNH	WH	B	p value
N. (%)	211	60 (28.4)	124 (58.8)	25 (11.8)	n.a
Age, years	41.1 \pm 15.0	44.2 \pm 13.6	39.9 \pm 15.2	38.4 \pm 16.1	n.s
Female - n. (%)	87 (41.2%)	20 (41.7%)	53 (49.1%)	12 (52.2%)	n.s
Diabetes duration > 5 years - n. (%)	189 (90.4)	55 (91.7%)	111 (91.0%)	21 (84.0%)	n.s
HbA1c	7.4 \pm 1.2	7.1 \pm 1.0	7.4 \pm 1.2	7.8 \pm 1.2	WNH vs B, $p=0.03$ WNH vs H, n.s H vs B, n.s
Diabetes device - n. (%)					
CGM	54 (25.6)	14 (23.3)	33 (26.6)	7 (28.0)	n.s
Insulin pump	5 (2.4)	1 (1.7)	4 (3.2)	0	n.s
CIP	17 (8.1)	3 (5.0)	11 (8.9)	3 (12.0)	n.s
CIP+CGM	12 (5.7)	2 (3.3)	7 (5.6)	3 (12.0)	n.s
Insulin pump+CGM*	126 (59.7)	39 (65.0)	71 (57.3)	14 (56.0)	n.s
None	9 (4.3)	3 (5.0)	5 (4.0)	1 (4.0)	n.s
Insurance*, ****					
Private	160 (75.8)	57(95.0)	87 (73.7)	15 (68.2)	WNH vs H, $p<0.001$ WNH vs B, $p=0.003$ H vs B, n.s
Medicare	24 (11.4)	2 (3.3)	18 (15.3)	3 (13.6)	n.s
Medicaid	16 (7.6)	1(1.7)	11 (9.3)	4 (18.2)	n.s
None	2 (0.9)	0	2(1.7)	0	n.s

WNH, White Non-Hispanic; WH, White Hispanic; B, Black; n.a, not applicable; n.s, not significant; CGM, continuous glucose monitor; CIP, connected insulin pen.

*2 missing information about ethnicity, **30 missing information about sex,*** 2 missing values about diabetes duration ****9 missing information about insurance type.

The Kruskal-Wallis test was used to compare differences in age and HbA1c values; the Fisher's exact tests was used to compare differences in the percentages of female, diabetes duration, diabetes device use and insurance type.

- The top 5 barriers in the CGM users included non-modifiable barriers such as insurance coverage, cost of supplies and cost of device, but being “Nervous that the device might not work”, a modifiable barrier, was also present in the WNH, WH, and B groups. “Nervous to rely on technology”, a modifiable barrier, was reported more frequently by the CGM users compared to ADI users in all groups combined and in the WH group, and “Do not understand what to do with the information or features of the devices” was reported more frequently by CGM users compared to AID users in all group combined and also in the WNH group (Table 3).

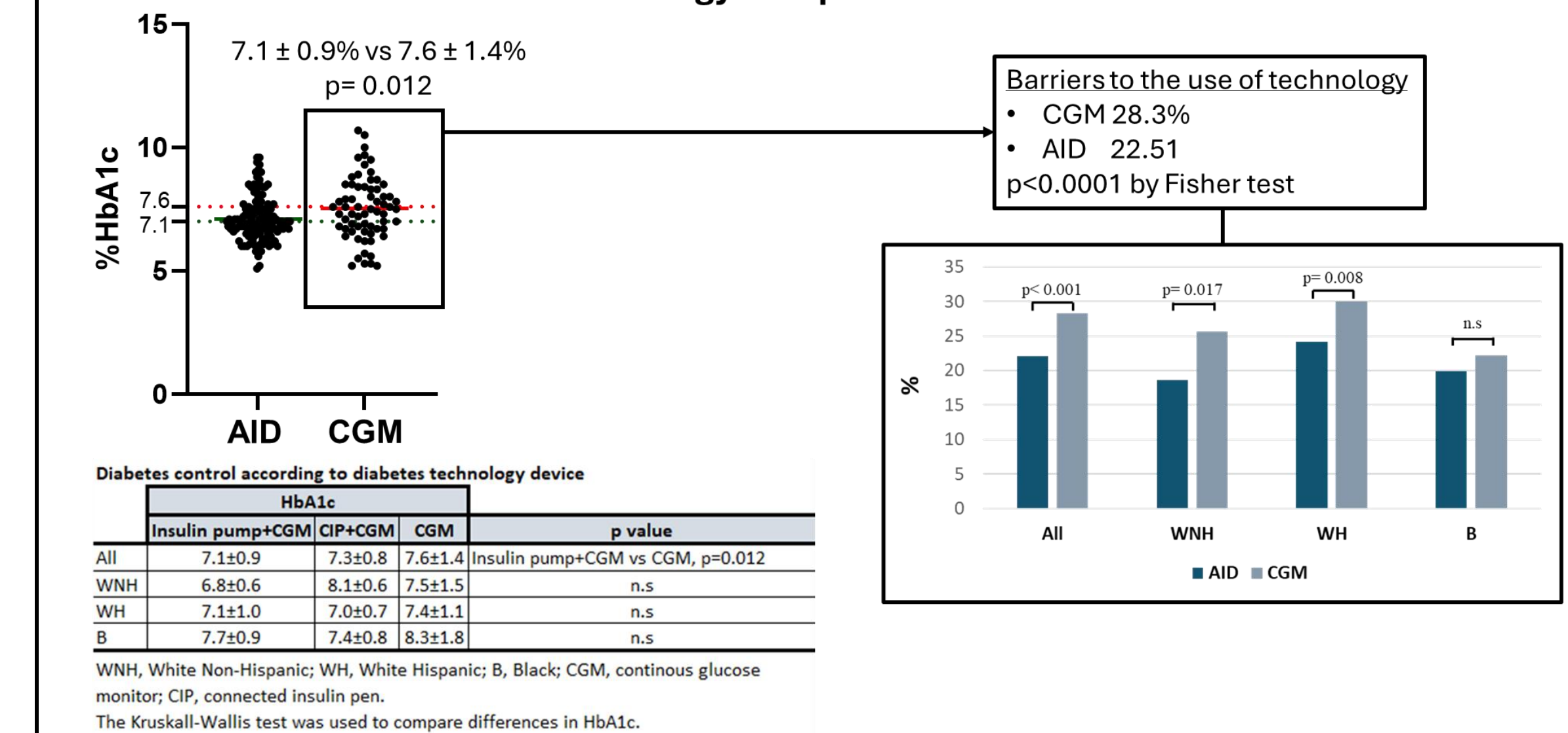
Table 3. Diabetes device barriers questionnaire

	All			WNH			WH			B		
	AID	CGM	p value	AID	CGM	p value	AID	CGM	p value	AID	CGM	p value
1. Insurance coverage	48.4	54.7	n.s	38.5	35.7	n.s	50.7	56.3	n.s	57.1	85.7	n.s
2. Cost of supplies	47.2	54.7	n.s	38.5	57.1	n.s	52.9	53.1	n.s	35.7	57.1	n.s
3. Nervous that the device might not work	42.9	51.9	n.s	38.5	42.9	n.s	47.9	57.6	n.s	28.6	42.9	n.s
4. Cost of device	42.4	47.2	n.s	25.0	50.0	n.s	48.6	46.9	n.s	28.6	42.9	n.s
5. Do not like having diabetes devices on my body	41.3	47.2	n.s	43.6	57.1	n.s	42.3	46.9	n.s	35.7	28.6	n.s
7. Do not like how diabetes devices look on my body	36.5	40.4	n.s	33.3	35.7	n.s	40.8	41.9	n.s	28.6	42.9	n.s
8. Do not want to take more time from my day to manage diabetes	36.5	37.7	n.s	20.5	42.9	n.s	43.7	37.5	n.s	42.9	28.6	n.s
6. Hassle of wearing devices all of the time	40.5	37.0	n.s	53.8	50.0	n.s	39.4	33.3	n.s	7.1	28.6	n.s
9. Nervous to rely on technology	16.7	35.2	0.010	23.1	28.6	n.s	16.9	36.4	0.044	0.0	42.9	n.s
11. Do not want to have more information about my diabetes	13.5	20.8	n.s	5.1	7.1	n.s	16.9	28.1	n.s	14.3	14.3	n.s
13. My diabetes care team has never talked with me about diabetes technology options	7.3	17.0	n.s	0.0	7.1	n.s	8.5	21.9	n.s	14.3	14.3	n.s
14. Do not understand what to do with the information or features of the devices	6.3	17.0	0.041	0.0	21.4	0.016	7.0	18.8	n.s	21.4	0.0	n.s
17. Not able to get my diabetes care team to write me a prescription	5.0	13.5	n.s	2.6	14.3	n.s	4.2	12.9	n.s	7.1	14.3	n.s
10. I do not like diabetes devices because people notice them and ask questions about them	13.5	13.0	n.s	10.3	7.1	n.s	14.3	18.2	n.s	14.3	0.0	n.s
15. Not enough support from my diabetes care team in using devices	5.6	11.5	n.s	0.0	7.1	n.s	7.0	12.9	n.s	14.3	14.3	n.s
16. Not enough support from my family	4.8	11.5	n.s	5.1	0.0	n.s	4.2	16.1	n.s	7.1	14.3	n.s
18. Too busy to learn how to use a new technology or device	3.2	11.1	n.s	2.6	7.1	n.s	2.8	12.1	n.s	7.1	14.3	n.s
19. My family does not think diabetes devices are important for taking care of my diabetes	2.4	9.4	n.s	0.0	7.1	n.s	1.4	12.5	0.032	14.3	0.0	n.s
12. Worries about what others will think of me	8.7	7.4	n.s	10.3	7.1	n.s	9.9	6.1	n.s	0.0	14.3	n.s

WNH, White Non-Hispanic; WH, Hispanic; B, Black; CGM, continuous glucose monitor. Values are reported as % yes. Barriers were sorted by ALL - CGM from the most to the less frequent.

Highlighted are the top 5 responses for the CGM group.

Figure 1. AID users have better glycemic control and fewer barriers to the use of technology compared to CGM users



Conclusions

- In a largely Hispanic population, the use of CGM is associated with worse glycemic control compared to AID.
- This group also presented a higher number of barriers in the use of technology despite being already on CGM.
- Strategies to address modifiable barriers such as the rely on the use of technology are needed.