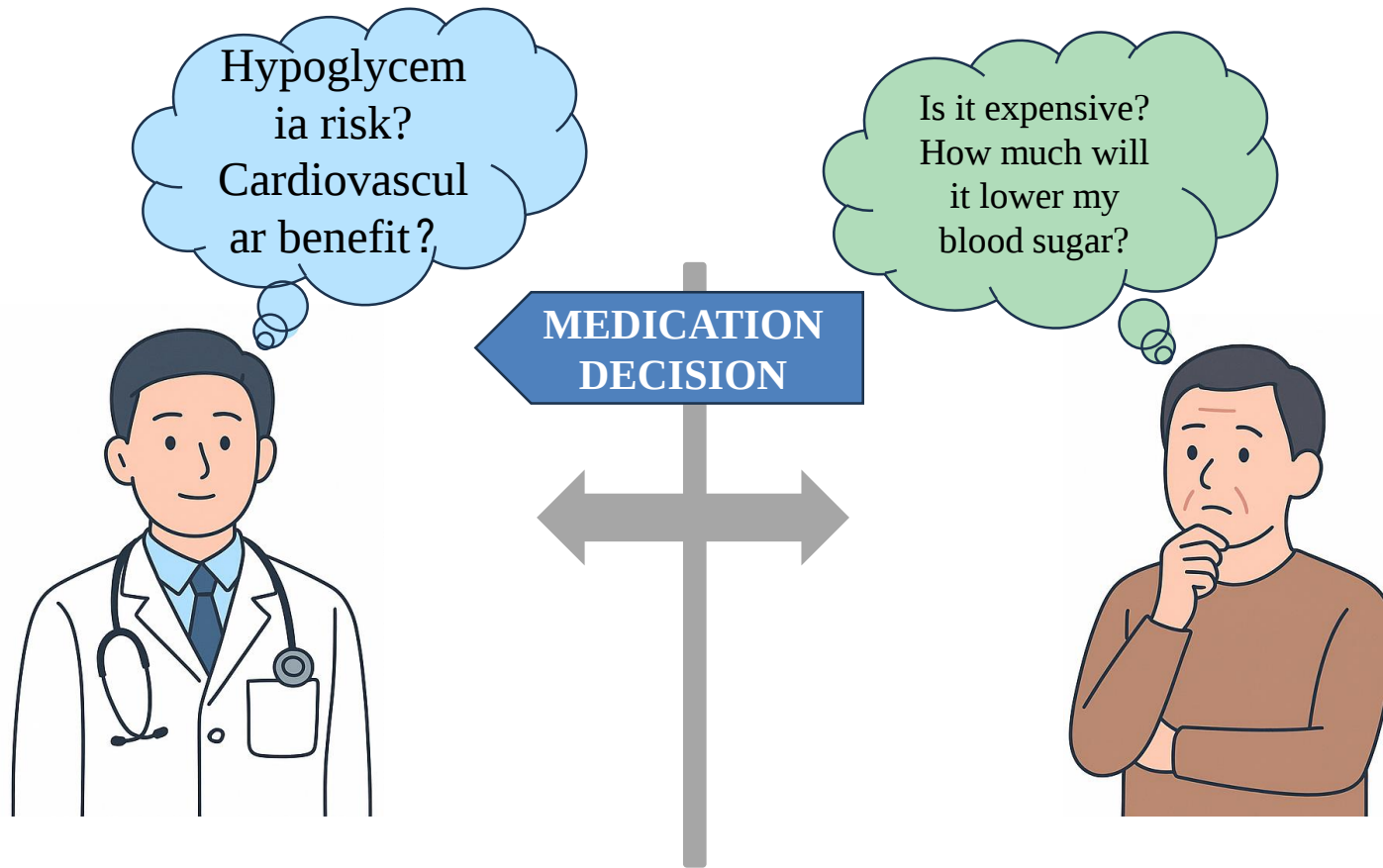


ISPOR 2025 | May 2025

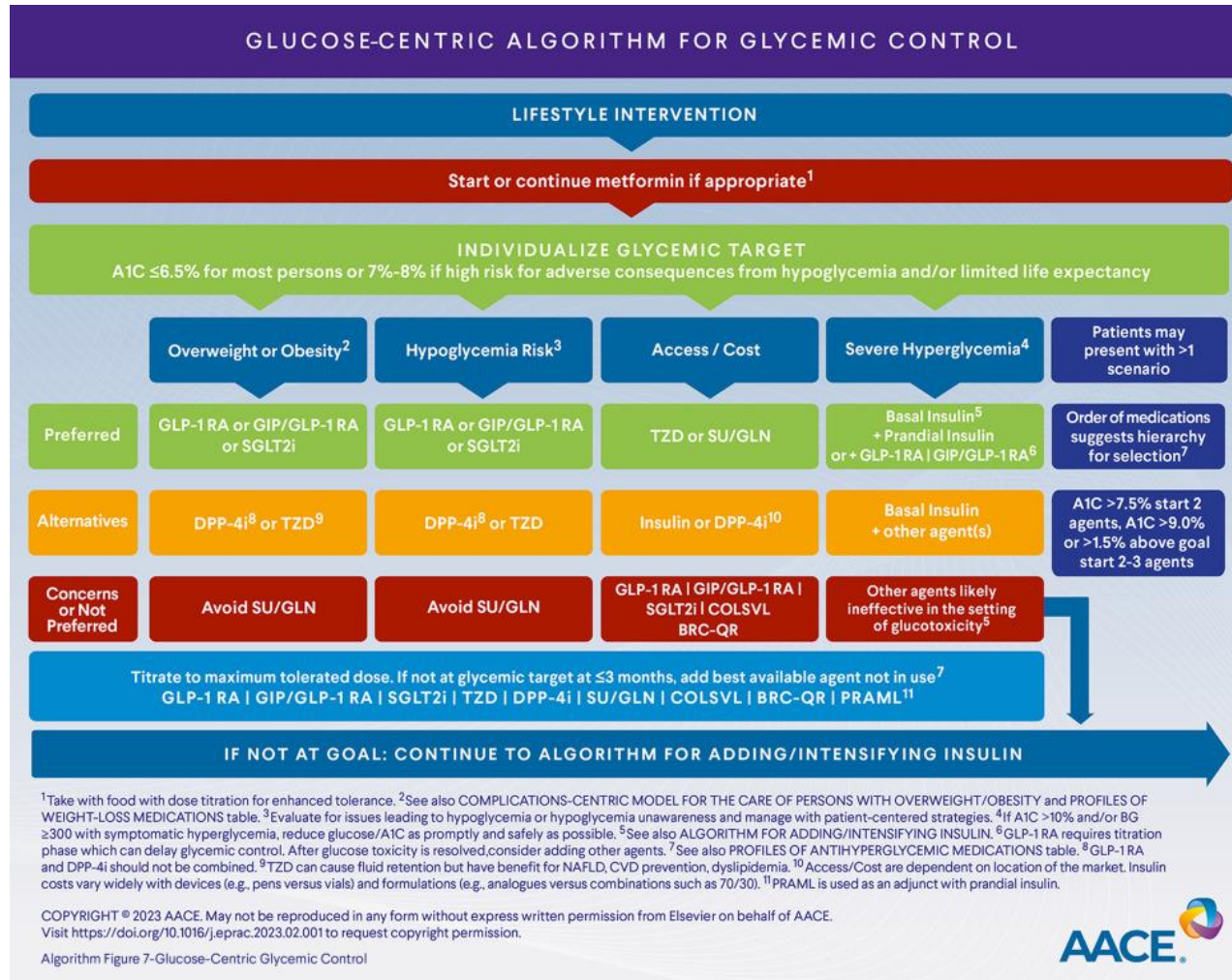


The Challenge of Shared Decision-Making: Are Physician and Patient Preferences Truly Aligned?



- Contemporary care stresses a *patient-centred* approach.
- Guidelines advocate *shared decision-making*, yet in reality—
 - Are doctors' and patients' priorities aligned?
 - How does any mismatch affect adherence, satisfaction, and outcomes?

Second-line Anti-hyperglycaemic Medicine: A “Perfect Stage” for Preference Divergence



- Metformin is the usual first-line, yet ~50 % need add-on drugs within three years.
- Second-line agents vary widely in efficacy, safety, and cost.
- Patients’ day-to-day concerns may differ from physicians’ clinical goals.
- Physician-patient preference gaps can skew therapeutic choices.

Purpose



- Understanding and addressing these preference differences is essential for achieving truly patient-centered care
- Evidence suggests that alignment in preferences between patients and physicians can improve treatment adherence and satisfaction, ultimately leading to better health outcomes

The present study conducted a discrete choice experiment (DCE) **to quantify patients and physicians' medication preferences** when selecting second line anti-hyperglycemic medications. This is the first DCE study in type 2 diabetes specifically designed to explore differences in preferences between patients and physicians. Findings from this study **may contribute to the shared decision-making process** and **may support the development of patient-centered decision aid tools** for patients with type 2 diabetes

Sample & Data Collection

- A **discrete-choice experiment (DCE)** was used to elicit medication-preference data from patients and physicians.
- **Patient data** were obtained via a multistage, stratified-cluster sample: one province representing eastern, central and western China was selected; within each province one provincial capital (economically developed) and one non-capital city (less developed) were chosen; finally, 1–2 hospitals and 2–3 primary-care facilities were randomly selected in each city, yielding 28 institutions in six cities for face-to-face surveys.
- **Physician data** were collected with an online questionnaire distributed through professional networks in the same provinces and regions as the patient sample, ensuring comparability between the two groups.

Attribute Development

- A preliminary list of **13 candidate attributes** was generated through a review of the published literature.
- Multiple rounds of prioritisation were performed using three criteria—**relevance to the research question, relevance to the decision context, and inter-attribute correlation.**
- A stakeholder interview with **five endocrinologists and three diabetes-nurse managers** refined the attribute list.
- A **best–worst scaling (BWS) pilot involving 362 T2DM patients** supplied quantitative evidence and narrowed the list to **11 attributes.**
- A **focus-group discussion with six Shanghai-based endocrinologists** finalised the 7 key attributes included in the DCE.

TABLE 3 | Results of counting and CLM.

Attributes	Total counts				Individual proportion				– SD	CLM	
	Most important	Least important	BW scores	Standardized BW	Most important	Least important	BW scores	Standardized BW		Coefficient	Rank
Efficacy	1356	14	1342	0.741	3.746	0.039	3.707	0.741	0.290	2.851***	1
Cardiovascular health	769	57	712	0.393	2.124	0.157	1.967	0.393	0.332	1.743***	2
Hypoglycemic events	439	131	308	0.170	1.213	0.362	0.851	0.170	0.350	1.031***	3
Gastrointestinal side effects	243	177	66	0.036	0.671	0.489	0.182	0.036	0.283	0.729***	4
UTI and genital infection side effects	290	152	138	0.076	0.801	0.420	0.381	0.076	0.280	0.716***	5
Edema	106	368	–262	–0.145	0.293	1.017	–0.724	–0.145	0.310	0.092	6
Out-of-pocket cost	328	625	–297	–0.164	0.906	1.727	–0.820	–0.164	0.580	0.000 (ref.)	7
Weight change	184	501	–317	–0.175	0.508	1.384	–0.876	–0.175	0.412	–0.003	8
Bone fracture	86	453	–367	–0.203	0.238	1.251	–1.014	–0.203	0.322	–0.111*	9
Mode of administration	96	708	–612	–0.338	0.265	1.956	–1.691	–0.338	0.336	–0.478***	10
Dosing frequency	85	796	–711	–0.393	0.235	2.199	–1.964	–0.393	0.351	–0.629***	11

***p < 0.01, **p < 0.05, *p < 0.1. Abbreviations: UTI, urinary tract infection; BW, best-worst; SD, standard deviation; CLM, conditional logit model.

Table 1. Attributes and levels in the discrete-choice experiment survey

Attributes	Levels	Description	Some corresponding medications
Treatment efficacy/reduction in HbA1c	Highest/2.5%	Different diabetes drugs have different efficacies for reducing the HbA1c	Insulin
	High/1.5%		Insulin, GLP-1 RA, SGLT-2i
	Intermediate/1.0%		Sulfonylureas, nateglinide, biguanides
	Poor/0.5%		TZD, alpha-glucosidase inhibitor, DPP-4i
Hypoglycemic risk	0%	The likelihood that patients will experience mild or moderate hypoglycemic events within the first 6 months of use	TZD, alpha-glucosidase inhibitor
	5%		Nateglinide
	15%		Sulfonylureas
	30%		Insulin
Gastrointestinal adverse events	0%	The likelihood that the medication will cause any mild or moderate GI adverse events (which may include diarrhoea, vomiting and/or nausea) within the first 6 months of use.	DPP-4i, SGLT-2i
	10%		Meglitinide
	20%		alpha-glucosidase inhibitor
	40%		GLP-1 RA
Cardiovascular benefits	Yes		GLP-1 RA, SGLT-2i
	No		Others
Weight change	-2 kg	Medication-related weight changes that patients will experience within the first 6 months of use.	SGLT-2i, GLP-1 RA
	0 kg		DPP-4i, alpha-glucosidase inhibitor
	+1.5 kg		Sulfonylureas, nateglinide, TZD
	+3 kg		Insulin
Mode of administration	Injection	--	Insulin, most GLP-1 RA
	Pill		Others
Out-of-pocket cost*	¥0	Patients' monthly out-of-pocket cost.	Sulfonylureas, glucosidase
	¥50		TZD, nateglinide
	¥100		alpha-glucosidase inhibitor
	¥200		DPP-4i, SGLT-2i
	¥400		Most insulin
	¥600		Some insulin, GLP-1 RA

Experimental Design & Statistical Analysis

- A D-optimal algorithm generated **48 choice tasks**, arranged into **8 blocks of 6 tasks**. The design balanced efficient parameter estimation with respondent burden. Each participant was randomly assigned to one block and asked to choose **one preferred option from two hypothetical medication profiles** per task.
- DCE data were analysed with **conditional logit (CLM)** and **mixed logit (MIXL)** models; the best-fitting model was chosen by BIC and AIC. The cost attribute was treated as a continuous fixed variable to derive marginal **willingness-to-pay (mWTP)** estimates.
- Preference heterogeneity was examined via **latent class analysis (LCA)**, which identified the optimal number of classes and estimated class-specific preference weights. All analyses were conducted in Stata 17.0.

Results –Characteristics



Table 2. Demographic characteristics: physicians

Characteristics (N=186)	Category	Count	Percentage
Gender	Male	80	43.01%
	Female	106	56.99%
Age	18–29 years	10	5.38%
	30–39 years	99	53.23%
	40–49 years	48	25.81%
	50–59 years	29	15.59%
	60–69 years	10	5.38%
Professional Title	Resident Physician	36	19.35%
	Attending Physician	82	44.09%
	Associate Chief Physician	50	26.88%
	Chief Physician	18	9.68%
Duration of Work in Diabetes Care	Less than 1 year	8	4.30%
	1-3 years	30	16.13%
	4-6 years	38	20.43%
	7-10 years	37	19.89%
	More than 10 years	73	39.25%
Type of Healthcare Institution	General Hospital	98	52.69%
	Specialized Hospital	22	11.83%
	Traditional Chinese Medicine Hospital	10	5.38%
	Community Health Center	39	20.97%
	Township Health Center	4	2.15%
	Village Clinic	11	5.91%
	Others	2	1.08%
Hospital Grade	Tertiary Grade A	71	54.62%
	Tertiary Grade B	17	13.08%
	Secondary Grade A	34	26.15%
	Secondary Grade B	1	0.77%
	Others	7	5.38%

Results –Characteristics



Table 3. Demographic characteristics: patients

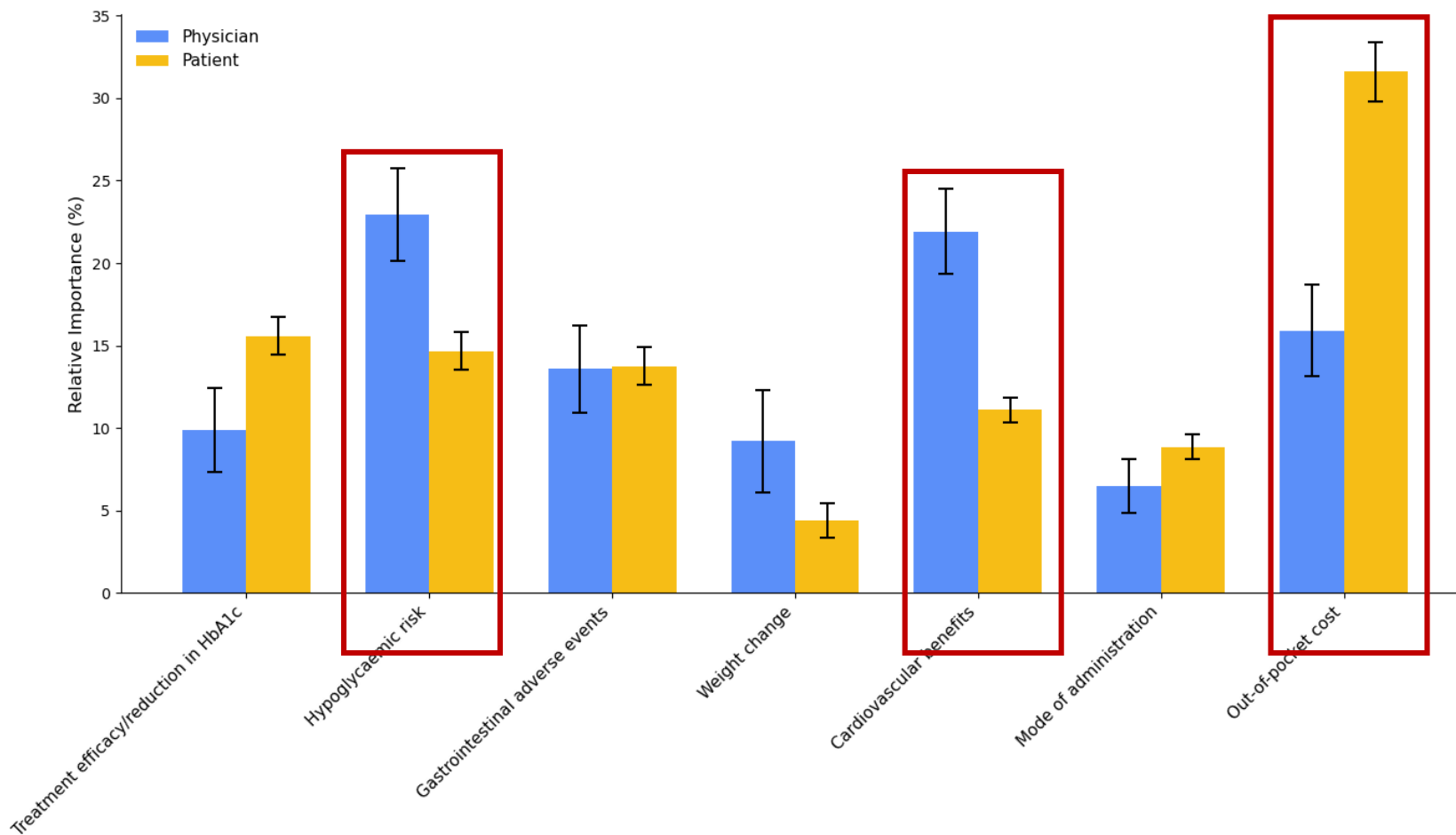
Characteristics (N=1784)	Category	Count	Percentage	Characteristics (N=1784)	Category	Count	Percentage
Gender	Male	908	50.90%	Medical Insurance Type	Urban Employee Medical Insurance	796	44.62%
	Female	876	49.10%		Urban-Rural Resident (New Rural Cooperative) Insurance	963	53.98%
Age	18–29 years	15	0.84%	Annual Household Income	Commercial Medical Insurance	17	0.95%
	30–39 years	91	5.10%		Uninsured	19	1.07%
	40–49 years	201	11.27%		Less than ¥20,000	414	23.21%
	50–59 years	503	28.20%		¥20,000–¥40,000	580	32.51%
	More than 60 years	974	54.60%		¥50,000–¥70,000	315	17.66%
Height (cm)		164.4±8.07			¥80,000–¥100,000	368	20.63%
Weight (kg)		64.2±11.2			¥110,000–¥130,000	47	2.63%
BMI		23.8±4.8			¥140,000–¥160,000	24	1.35%
Inpatient Status	Yes	520	29.15%		¥170,000–¥200,000	14	0.78%
	No	1264	70.85%		More than ¥200,000	22	1.23%
Place of Residence	Urban areas	1103	61.83%	Duration Since Diagnosis	Less than 3 years	296	16.59%
	Rural areas	681	38.17%		3-5 years	361	20.24%
Marital Status	Married	1632	91.48%		5-10 years	476	26.68%
	Unmarried	30	1.68%	Fasting blood glucose	More than 10 years	651	36.49%
	Divorced	18	1.01%		More than 7.0	1145	64.18%
	Widowed	104	5.83%		6.1-7.0	420	23.54%
Education Level	Elementary School or Below	442	24.78%		Less than 6.1	81	4.54%
	Junior High School	570	31.95%		Not clear	138	7.74%
	Senior High School	359	20.12%	Monthly out-of-pocket cost for anti-hyperglycemic medications	¥0-¥50	165	9.25%
	Technical School	106	5.94%		¥50-¥100	311	17.43%
	College	151	8.46%		¥100-¥200	364	20.40%
	Bachelor's Degree or Above	156	8.74%		¥200-¥400	470	26.35%
					¥400-¥600	242	13.57%
					More than ¥600	121	6.78%
					Not taking medication	111	6.22%

Results – Physicians’ and Patients’ Preferences for Anti-hyperglycemic Medication in Type 2 Diabetes



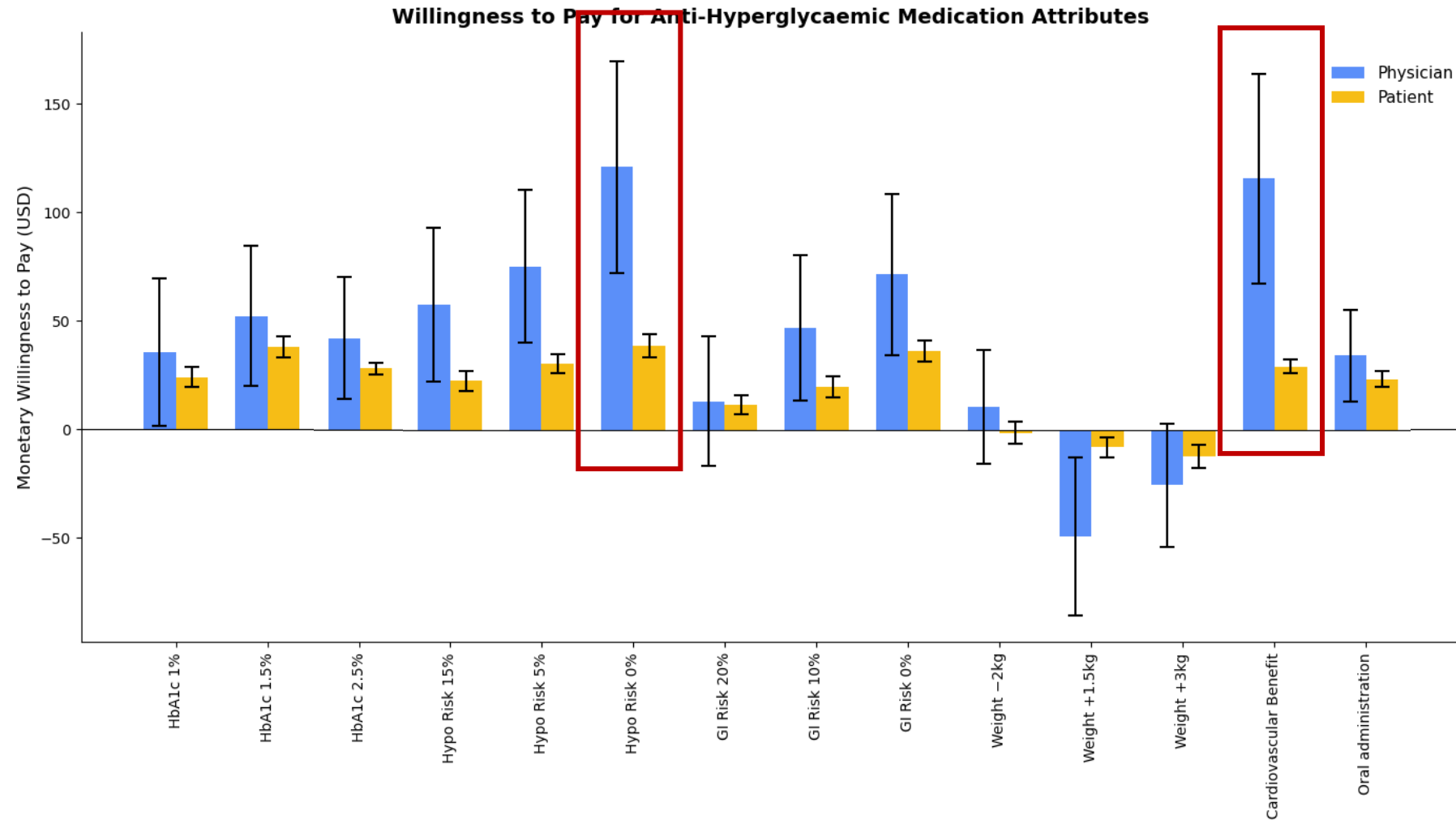
Attributes	Levels	Physicians		Patients	
		Estimate ± SE	SD	Estimate ± SE	SD
Treatment efficacy/reduction in HbA1c	0.5% (ref.)				
	1%	0.29* ± 0.13	0.30 ± 0.28	0.69** ± 0.07	0.84** ± 0.13
	1.50%	0.42** ± 0.11	0.05 ± 0.29	1.08** ± 0.09	0.86** ± 0.13
	2.50%	0.35** ± 0.13	0.53** ± 0.19	1.18** ± 0.09	0.64** ± 0.15
Hypoglycemic risk	30% (ref.)				
	15%	0.47** ± 0.12	0.52* ± 0.21	0.65** ± 0.07	0.00 ± 0.13
	5%	0.61** ± 0.12	0.02 ± 0.16	0.88** ± 0.07	0.46* ± 0.20
	0%	0.98** ± 0.12	0.38 ± 0.20	1.11** ± 0.09	0.35 ± 0.26
Gastrointestinal adverse events	40% (ref.)				
	20%	0.11 ± 0.12	0.06 ± 0.20	0.34** ± 0.06	0.12 ± 0.17
	10%	0.38** ± 0.12	0.13 ± 0.26	0.57** ± 0.08	0.86** ± 0.14
	0%	0.58** ± 0.11	0.06 ± 0.30	1.04** ± 0.09	1.13** ± 0.12
Weight change	No change (ref.)				
	-2 kg	0.09 ± 0.11	0.25 ± 0.26	-0.03 ± 0.07	0.34 ± 0.22
	+1.5 kg	-0.40** ± 0.13	0.50* ± 0.19	-0.22** ± 0.07	0.51** ± 0.18
	+3 kg	-0.20 ± 0.11	0.08 ± 0.25	-0.34** ± 0.08	1.07** ± 0.12
Cardiovascular benefits	No (ref.)				
	Yes	0.94** ± 0.11	0.95** ± 0.12	0.84** ± 0.06	0.71** ± 0.08
Mode of administration	injection (ref.)				
	Pill	0.28** ± 0.07	0.32* ± 0.13	0.67** ± 0.06	1.25** ± 0.09
Out-of-pocket cost#	Increase ¥ 1	-0.001** ± 0.00		-0.004** ± 0.00	

Results - Relative Important Score



Attribute (Medication Attribute)	Physicia n Rank	Patient Rank
Efficacy (HbA1c reduction)	5	2
Hypoglycemia risk	1	3
Gastrointestinal adverse events	4	4
Weight change	6	7
Cardiovascular benefit	2	5
Mode of administration	7	6
Out-of-pocket cost	3	1

Results – Physicians' and Patients' willingness to pay for Anti-Hyperglycemic Medication in Type 2 Diabetes



Results – Latent Class Analysis of Physicians' Preferences

Attributes	Levels	Class1	Class2	Class3	Class4	Class5	Class6
Treatment efficacy/reduction in HbA1c	0.5% (ref.)						
	1%	-0.50	1.27	0.41	1.09	4.89	-4.35
	1.50%	0.25	-2.37	0.36	0.73	-24.73	-3.59
	2.50%	0.82	4.82	1.21	0.10	13.09	-4.47
Hypoglycaemic risk	30% (ref.)						
	15%	-1.57	1.52	2.91	0.81	13.44	-0.74
	5%	-0.80	0.99	2.56	0.85	-34.06	4.13
	0%	0.16	1.07	2.94	1.16	-12.38	0.32
Gastrointestinal adverse events	40% (ref.)						
	20%	-0.10	9.68	-0.14	0.19	17.76	0.38
	10%	-0.53	7.14	-0.29	1.18	-12.48	6.49
	0%	-0.13	9.92	0.13	1.00	-3.22	4.65
Weight change	No change (ref.)						
	-2 kg	0.59	-2.96	1.59	-0.57	24.29	0.57
	+1.5 kg	-0.43	-8.68	0.64	-0.16	2.83	-5.69
	+3 kg	-0.16	-3.72	1.80	-0.72	35.70	-6.40
Cardiovascular benefits	No (ref.)						
	Yes	-0.16	7.64	0.95	0.75	24.49	2.09
Mode of administration	Injection (ref.)						
	Pill	0.47	2.34	0.53	0.23	-12.89	1.54
Out-of-pocket cost#	0 USD (ref.)						
	84.2 USD	-2.40	-3.60	0.60	-0.60	-1.20	-0.60

Class1: 13%

Cost-sensitive; also cares about hypoglycemia risk and GI AEs

Class2: 21%

GI/weight/CV-focused; relatively insensitive to hypoglycemia risk

Class3: 15%

Hypoglycemia-averse; prefers oral administration

Class4: 27%

Overall **low preference intensity**; less differentiated decision-making

Class5: 11%

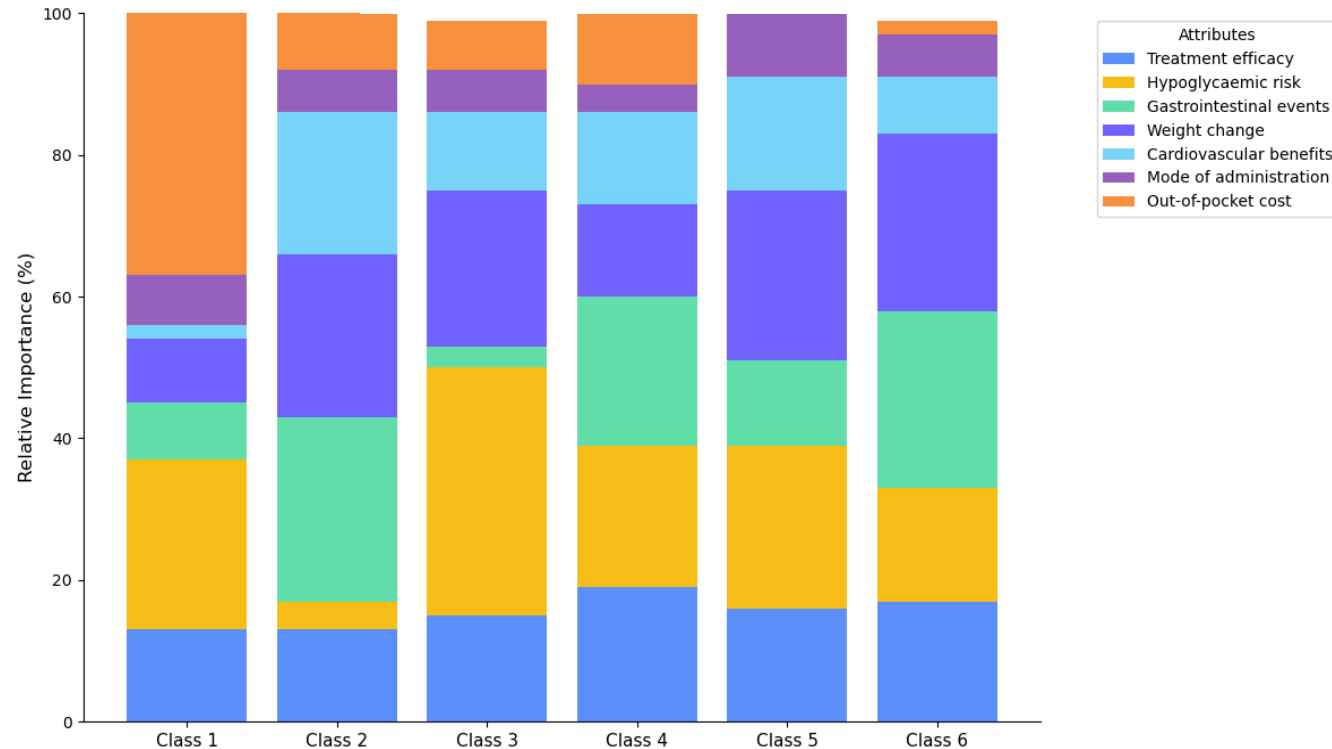
Cost & AE avoidant; avoids both hypoglycemia and GI AEs

Class6: 13%

Efficacy-driven; also considers hypo/GI risks and weight change

Variable	Class1	Class2	Class3	Class4	Class5	Class6
Age	0.182	0.235	0.137	0.168	0.119	0
Sex	-1.238	-1.634	-2.339	-1.126	-2.625	0
Professional Title	-0.534	-0.12	-0.246	0.042	0.044	0
Years of Professional Experience	0.031	-0.926	-0.559	-0.635	-0.649	0

Results – Latent Class Analysis of Physicians' Preferences



Class1: 13%

Cost-sensitive; also cares about hypoglycemia risk and GI AEs

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Sex	-1.238	-1.634	-2.339	-1.126	-2.625	0
Professional Title	-0.534	-0.12	-0.246	0.042	0.044	0
Years of Professional Experience	0.031	-0.926	-0.559	-0.635	-0.649	0

Results – Latent Class Analysis of Patients’ Preferences

Attributes	Levels	Class1	Class2	Class3	Class4	Class5	Class6
Treatment efficacy/reduction in HbA1c	0.5% (ref.)						
	1%	0.52	1.02	0.01	0.51	11.36	1.84
	1.50%	0.73	1.75	0.05	0.52	14.85	2.90
	2.50%	0.94	1.99	-0.29	0.56	2.25	4.19
Hypoglycaemic risk	30% (ref.)						
	15%	1.04	-0.19	0.69	0.36	1.59	0.47
	5%	1.89	0.80	0.78	0.20	25.13	0.20
	0%	2.08	0.51	1.16	-0.16	2.48	0.36
Gastrointestinal adverse events	40% (ref.)						
	20%	0.95	0.83	0.04	-0.56	-39.26	0.90
	10%	1.15	0.06	0.47	-0.48	-24.67	1.17
	0%	2.44	1.46	0.45	-0.03	-31.23	1.01
Weight change	No change (ref.)						
	-2 kg	0.87	-0.78	0.48	-0.06	3.76	-1.02
	+1.5 kg	0.24	-0.29	0.07	-0.35	3.32	-1.35
	+3 kg	0.38	-0.39	0.12	-0.62	-2.42	-1.70
Cardiovascular benefits	No (ref.)						
	Yes	-0.28	1.84	0.97	0.49	-0.56	0.57
Mode of administration	Injection (ref.)						
	Pill	0.03	0.62	-0.10	0.31	30.49	0.83
Out-of-pocket cost#	0 USD (ref.)						
	84.2 USD	-0.60	-2.40	0.00	-7.80	9.60	-1.80

Variable	Class1	Class2	Class3	Class4	Class5	Class6
Age	0.033	0.019	-0.015	-0.005	-0.004	-
Sex	-0.456	-0.816	-0.417	-0.274	-0.51	-
Area	0.64	0.467	0.214	1.261	0.168	-
Education	-0.031	0.095	-0.028	-0.116	0.116	-
Income	-0.279	-0.265	0.227	-0.096	-0.111	-
Bmi	-0.169	-0.206	0.011	-0.071	-0.13	-

Class1: 16%

Hypoglycemia & GI-risk sensitive; indifferent to administration mode

Class2: 16%

Cost-centric; also values efficacy and cardiovascular benefit

Class3: 13%

Hypoglycemia-averse & CV-benefit seekers

Class4: 31%

Highly cost-averse (largest segment); decisions driven by financial burden

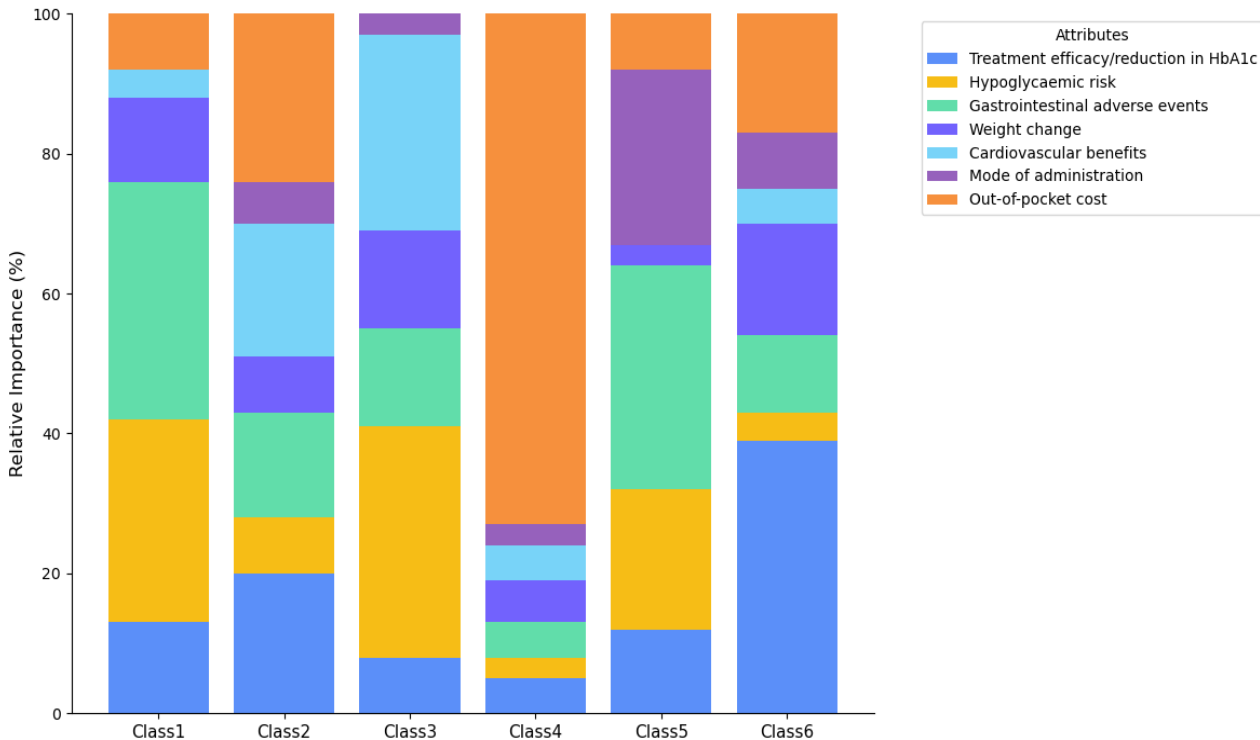
Class5: 11%

GI-AE avoidant; also mindful of hypoglycemia risk and administration mode

Class6: 14%

Efficacy-focused; places top priority on HbA1c reduction

Results – Latent Class Analysis of Patients’ Preferences



Variable	Class1	Class2	Class3	Class4	Class5	Class6
Age	0.033	0.019	-0.015	-0.005	-0.004	-
Sex	-0.456	-0.816	-0.417	-0.274	-0.51	-
Area	0.64	0.467	0.214	1.261	0.168	-
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Discussion & Conclusion



Physicians

VS



Patients

Common Ground: Weight change and mode of administration were among the least important attributes for both physicians and patients.

Differences:

- (1) **Hypoglycemia risk ranked first** (22.9 % of relative importance).
- (2) **Cardiovascular benefit** received high priority, whereas patients were less sensitive to this attribute.
- (3) **Tiered pricing** will sway one-third of patients **but few** physicians.

Differences:

- (1) **Out-of-pocket cost** was the single **most important** attribute (31.6 %).
- (2) Patients exhibited a stronger preference for **oral administration** than physicians.
- (3) Patients disliked therapies associated with weight gain and preferred **options with no change or potential weight reduction**

- **A smaller physician sample**, relative to patients, may limit the precision and robustness of preference estimates.
- **Combining nausea, vomiting and diarrhoea** into one GI-AE attribute may obscure symptom-specific preferences.
- **Limited patient understanding** of HbA1c could affect the accuracy of stated preferences.
- **No opt-out option** may have forced choices and introduced bias.

