

An Early Assessment of the Real-World Treatment Patterns of Type 2 Diabetes: A Comparison to the 2018 ADA/EASD Consensus Report Recommendations

Jay P. Bae PhD, Zbigniew A. Kadziola MSc, Dongju Liu MSc, Chanadda Chinthammit PhD,
Kristina S. Boye PhD, Kieren J. Mather MD

Eli Lilly and Company, Indianapolis, USA

Corresponding author:

Jay P. Bae

Eli Lilly and Company

Lilly Corporate Center

Indianapolis, IN 46285

Phone: +317-276-2000

Email: bae_jay@lilly.com

Supplementary Table 1 – Codes used for ASCVD

Diagnoses	Codes Used
Atherosclerosis	ICD9: 440.xx; ICD10 I70
Other IHD	ICD9: 411.xx; ICD10 I24
Angina pectoris	ICD9:413.xx; ICD10 I20
Other chronic IHD	ICD9:414.xx; ICD10 I25.1, I25.5, I25.6, I25.7, I25.8, I25.9
Myocardial infarction (acute)	ICD9:410.xx; ICD10 I21., I22., I23
Ventricular fibrillation	ICD9:427.1x, 427.3x; ICD10 I49.0
Atrial fibrillation	ICD9:427.4x, 427.5x; ICD10 I48
Other ASCVD	ICD9:429.2x
Old myocardial infarction	ICD9:412.xx; ICD10 I25.2
Heart failure	ICD9:428.xx; ICD10 I50
Atherosclerosis, severe	ICD9:440.23, 440.24
Aortic aneurysm/dissection	ICD9:441.xx; ICD10 I71

Abbreviations: ASCVD, atherosclerotic cardiovascular disease; IHD, ischemic heart disease.

Supplementary Table 2 – Explanatory variables selected for the multivariate logistic regression model

Variables Included in the Model		Variables Not Selected by the Model
Clinical group: Obesity	Meglitinides (history)	Number of diabetes drug classes (current)
Clinical group: Indicator of CKD	Sulfonylureas (history)	Number of diabetes drugs (current)
Clinical group: High risk or history of ASCVD	Thiazolidinediones (history)	Myocardial infarction
Clinical group: History of HF	Insulin (history)	Congestive heart failure
Clinical group: Need to minimize hypoglycemia	Number of diabetes drug classes (current)	Peripheral vascular disease
Age	Number of diabetes drugs (current)	Cerebrovascular disease
CCI score	Myocardial infarction	Diabetes without chronic complications
Years from onset of type 2 diabetes	Congestive heart failure	Diabetes with chronic complications
Gender	Peripheral vascular disease	Renal disease
Primary payer	Cerebrovascular disease	Obesity (history and current)
Region	Diabetes without chronic complications	Obesity class (history and current)
Dementia	Diabetes with chronic complications	Heart failure (history)
Chronic pulmonary disease	Renal disease	Heart failure (current)
Rheumatic disease	Obesity (history and current)	ASCVD (history)
Peptic ulcer disease	Obesity class (history and current)	ASCVD (current)
Mild liver disease	Heart failure (history)	CKD (history and current)
Hemiplegia or paraplegia	Heart failure (current)	Oral GLP-1 RA (history)
Any malignancy, including lymphoma and leukemia	ASCVD (history)	SGLT2 inhibitors (history)
Moderate or severe liver disease	ASCVD (current)	GLP-1 RA (history)
Metastatic solid tumor	CKD (history and current)	Oral GLP-1 RA (current)
AIDS or HIV	Oral GLP-1 RA (history)	SGLT2 inhibitors (current)
Liver disease	SGLT2 inhibitors (history)	GLP-1 RA (current)
Stroke (history)	GLP-1 RA (history)	Category of number of diabetes drug classes (current)
Hypertension (history and current)	Oral GLP-1 RA (current)	Category of number of diabetes drugs (current)
Atrial fibrillation or flutter (history and current)	SGLT2 inhibitors (current)	Severe Hypoglycemia (history)
Anemia (history and current)	GLP-1 RA (current)	
NASH related liver disease (history and current)	Category of number of diabetes drug classes (current)	
Amylin analogues (history)	Category of number of diabetes drugs (current)	
Amylin Analogues (current)	Severe Hypoglycemia (history)	
Alpha-Glucosidase Inhibitors (history)	Dyslipidemia (history and current)	
Biguanide (history)	Hyperlipidemia	
DPP-4 Inhibitors (history)	Lipids	
	Weight loss medications FDA approved	

Abbreviations: AIDS, acquired immunodeficiency syndrome; ASCVD, atherosclerotic cardiovascular disease; CCI, Charlson Comorbidity Index; CKD, chronic kidney disease; DPP-4, dipeptidyl peptidase-4; FDA, Food and Drug Administration; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HF, heart failure; HIV, human immunodeficiency virus; NASH, non-alcoholic steatohepatitis; SGLT-2i, sodium-glucose co-transporter-2 inhibitor.

Supplementary Table 3 – Use of GLP-1 RA and/or SGLT-2i in 2019 modelled by multivariate logistic regression: Commercial cohort results for the 5 clinical groups and for the most important (Wald Chi-square) 20 significant variables sorted by their decreasing importance

Variable	Unit	Odds Ratio	Wald Lower Confidence Limit for Odds Ratio	Wald Upper Confidence Limit for Odds Ratio	Wald Chi-square
OBESITY		1.251	1.231	1.272	709.4622
HF		0.817	0.783	0.853	107.1069
ASCVD		0.968	0.945	0.992	107.1069
CKD		0.744	0.721	0.769	323.0626
HYPO		0.679	0.615	0.748	60.3179
WT LOS MED		5.229	5.099	5.362	16548.3519
DPP4 PAST		1.895	1.852	1.939	2950.1353
AGE	10.0000	0.828	0.818	0.837	1104.4119
REGION NORTH EAST		1.094	1.066	1.123	819.4631
REGION SOUTH		1.248	1.223	1.274	819.4631
REGION WEST		0.910	0.884	0.938	819.4631
SU PAST		1.393	1.361	1.426	768.7819
METFORMIN CURRENT		0.727	0.709	0.745	628.3028
METFORMIN PAST		1.331	1.298	1.366	478.5694
CCI SCORE	1.0000	1.086	1.078	1.095	435.2974
STATIN		1.267	1.239	1.296	433.1141
ICOSAPENT ETHYL		1.938	1.811	2.073	366.9845
HI DEDUC HP vs PPO		0.991	0.972	1.010	325.2977
HMO vs PPO		0.802	0.783	0.822	325.2977
ANEMIA		0.842	0.826	0.859	282.7470
TUMOR		0.480	0.437	0.527	236.6111
INSULIN PAST		1.236	1.197	1.275	173.2770
MALIGNANCY		0.797	0.769	0.825	160.9854
HYDRALZINE		0.675	0.635	0.718	157.8943
FIBRATES		1.151	1.125	1.178	142.1196
INSULIN CURRENT		1.189	1.152	1.226	118.3040
DIURETICS		0.896	0.878	0.914	115.0806
HYPERTENSION		1.141	1.113	1.170	105.9369

Included sample in the regression for the Commercial cohort (N=322,788). Abbreviations: ASCVD, atherosclerotic cardiovascular disease; CCI, Charlson Comorbidity Index; CKD, chronic kidney disease; DPP-4, dipeptidyl peptidase-4; HF, heart failure; HI DEDUC HP, High Deductible Health Plan; HMO, Health Maintenance Organization; HYPO, hypoglycemia; PPO, Preferred Provider Organization; SU, Sulfonylureas; WT LOS MED, weight loss medication.

Supplementary Table 4 – Use of GLP-1 RA and/or SGLT-2i in 2019 modelled by multivariate logistic regression: Medicare cohort results for the 5 clinical groups and for the most important (Wald Chi-square) 20 significant variables sorted by their decreasing importance

Variable	Unit	Odds Ratio	Wald Lower Confidence Limit for Odds Ratio	Wald Upper Confidence Limit for Odds Ratio	Wald Chi-square
OBESITY		1.260	1.206	1.317	105.6937
HF		0.815	0.759	0.874	32.3281
ASCVD		1.015	0.962	1.072	32.3281
CKD		0.796	0.745	0.851	45.4018
HYPO		0.653	0.545	0.783	21.2123
WT LOS MED		11.447	10.701	12.245	5030.6946
AGE	10.0000	0.479	0.461	0.497	1423.2464
DPP4 PAST		1.973	1.860	2.092	511.7589
REGION NORTH EAST		1.469	1.367	1.579	120.0192
REGION SOUTH		1.232	1.148	1.321	120.0192
REGION WEST		1.361	1.233	1.503	120.0192
SU PAST		1.373	1.291	1.461	100.9033
MALE		1.249	1.196	1.305	99.6948
TZD PAST		1.317	1.225	1.415	56.3268
ANEMIA		0.841	0.803	0.881	53.9432
HI DEDUC HP vs PPO		0.979	0.819	1.171	47.4733
HMO vs PPO		0.796	0.746	0.850	47.4733
ICOSAPENT ETHYL		1.764	1.493	2.085	44.3069
INSULIN CURRENT		1.354	1.237	1.483	43.0071
HYDRALZINE		0.701	0.628	0.783	39.5863
DEMENTIA		0.682	0.602	0.774	35.6236
METFORMIN PAST		1.228	1.143	1.318	31.8864
T2D ONSET YEARS	1.0000	0.974	0.965	0.983	30.5746
STATIN		1.228	1.139	1.323	28.7489
METFORMIN CURRENT		0.855	0.805	0.909	25.2409
MALIGNANCY		0.851	0.798	0.908	23.7839
HEMI/PARAPLEGIA		0.668	0.567	0.786	23.4851
CCI SCORE	1.0000	1.042	1.023	1.060	20.4760

Included sample in the regression for the Medicare cohort (N=70,456). Abbreviations: ASCVD, atherosclerotic cardiovascular disease; CCI, Charlson Comorbidity Index; CKD, chronic kidney disease; DPP-4, dipeptidyl peptidase-4; HF, heart failure; HI DEDUC HP, High Deductible Health Plan; HMO, Health Maintenance Organization; HYPO, hypoglycemia; PPO, Preferred Provider Organization; SU, Sulfonylureas; TZP, thiazolidinediones WT LOS MED, weight loss medication.