

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Definitions of inclusion and exclusion criteria

Criteria	Codes
Type 2 diabetes	AF diagnosis code in any inpatient position or ≥ 2 outpatient visits ICD-9 diagnosis codes: 250.*0, 250.*2 ICD-10 diagnosis codes: E11.***
Type 1 diabetes	ICD-9 diagnosis codes: 250.*1, 250.*3 ICD-10 diagnosis codes: E10.***
Secondary diabetes	ICD-9 diagnosis codes: 249.* ICD-10 diagnosis codes: E08.***, E09.***, E13.***, O99.81*
Malignancy	ICD-9 diagnosis codes: 140.**-208.** (except 173.**) ICD-10 diagnosis codes: C00.**-C96.** (except C44.**), D03.**, D45
Chronic kidney disease stage 5 or dialysis	ICD-9 diagnosis codes: 585.5, 585.6, V45.1*, V56.1-V56.3*, V56.8 ICD-9 procedure codes: 39.95, 54.98 ICD-10 diagnosis codes: N18.5, N18.6, Z49.31, Z49.32, Z99.2 ICD-10 procedure codes: 3E1M39Z, 5A1D00Z, 5A1D60Z CPT-4/HCPCS: 50360, 50365, 50380, 90920, 90921, 90924, 90925, 90935, 90937, 90940, 90945, 90947, 90957, 90958, 90959, 90960, 90961, 90962, 90965, 90966, 90969, 90970, 90989, 90993, 90999, 99512, 99559, G0257, G0314, G0315, G0316, G0317, G0318, G0319, G0322, G0323, G0326, G0327, S9335, S9339
Organ transplant	ICD-9 diagnosis codes: 996.8*, E878.0, V42.*, V58.44 ICD-9 procedure codes: 33.5*, 33.6, 37.51, 41.0*, 46.97, 50.5, 50.51, 50.59, 52.8*, 55.6* ICD-10 diagnosis codes: T86.**, Z94.**, Y83.0, Z48.21, Z48.22, Z48.23, Z48.24, Z48.280, Z48.288, Z48.290, Z48.298 ICD-10 procedure codes: 02YA0Z0, 02YA0Z1, 02YA0Z2, 0BYC0Z0, 0BYC0Z1, 0BYC0Z2, 0BYD0Z0, 0BYD0Z1, 0BYD0Z2, 0BYF0Z0, 0BYF0Z1, 0BYF0Z2, 0BYG0Z0, 0BYG0Z1, 0BYG0Z2, 0BYH0Z0, 0BYH0Z1, 0BYH0Z2, 0BYJ0Z0, 0BYJ0Z1, 0BYJ0Z2, 0BYK0Z0, 0BYK0Z1, 0BYK0Z2, 0BYL0Z0, 0BYL0Z1, 0BYL0Z2, 0BYM0Z0, 0BYM0Z1, 0BYM0Z2, 0DY80Z0, 0DY80Z1, 0DY80Z2, 0DYE0Z0, 0DYE0Z1, 0DYE0Z2, 0FSG0ZZ, 0FSG4ZZ, 0FY00Z0, 0FY00Z1, 0FY00Z2, 0FYG0Z0, 0FYG0Z1, 0FYG0Z2, 0TS00ZZ, 0TS10ZZ, 0TY00Z0, 0TY00Z1, 0TY00Z2, 0TY10Z0, 0TY10Z1, 0TY10Z2, 30230AZ, 30230G0, 30230G2, 30230G3, 30230G4, 30230X0, 30230X2, 30230X3, 30230X4, 30230Y0, 30230Y2, 30230Y3, 30230Y4, 30233AZ, 30233G0, 30233G2, 30233G3, 30233G4, 30233X0, 30233X2, 30233X3, 30233X4, 30233Y0, 30233Y2, 30233Y3, 30233Y4,

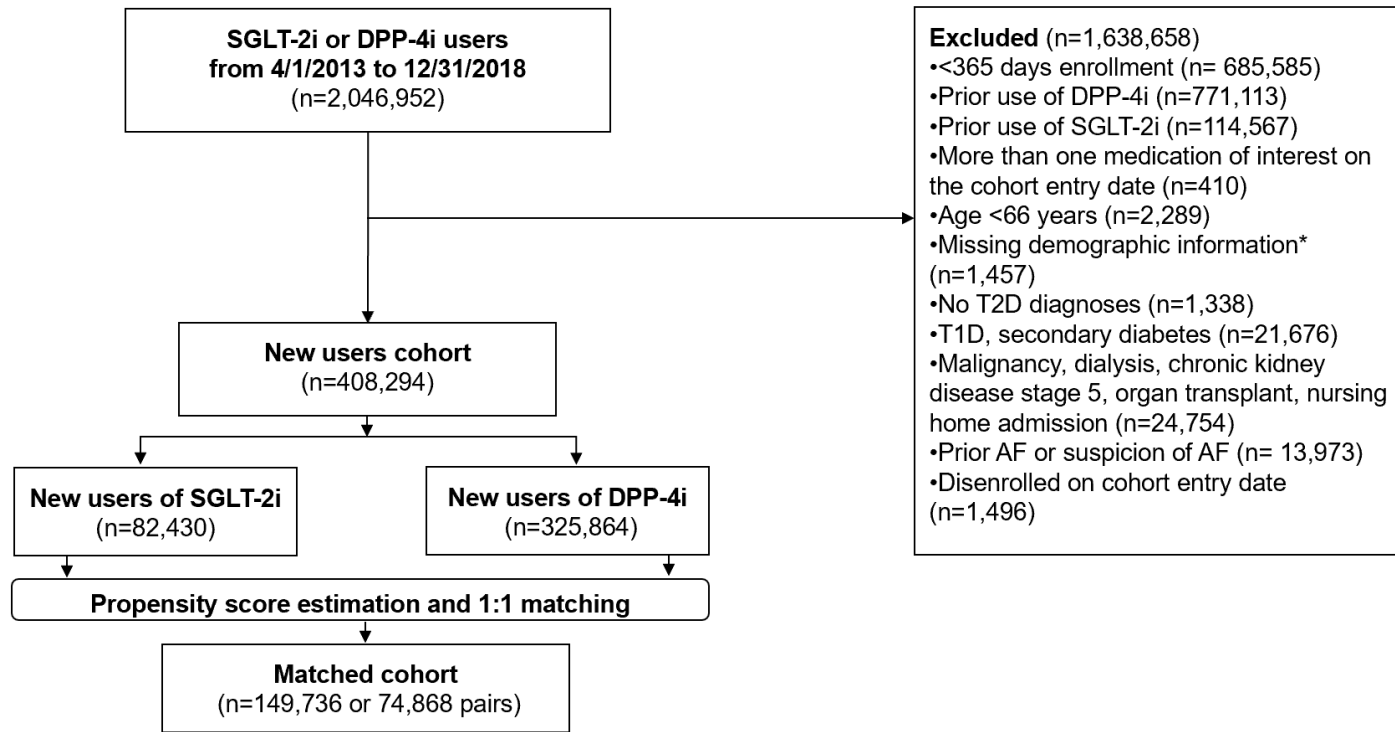
	<p>30240AZ, 30240G0, 30240G2, 30240G3, 30240G4, 30240X0, 30240X2, 30240X3, 30240X4, 30240Y0, 30240Y2, 30240Y3, 30240Y4, 30243AZ, 30243G0, 30243G2, 30243G3, 30243G4, 30243X0, 30243X2, 30243X3, 30243X4, 30243Y0, 30243Y2, 30243Y3, 30243Y4, 30250G0, 30250G1, 30250X0, 30250X1, 30250Y0, 30250Y1, 30253G0, 30253G1, 30253X0, 30253X1, 30253Y0, 30253Y1, 30260G0, 30260G1, 30260X0, 30260X1, 30260Y0, 30260Y1, 30263G0, 30263G1, 30263X0, 30263X1, 30263Y0, 30263Y1, 3E03005, 3E030U0, 3E030U1, 3E03305, 3E033U0, 3E033U1, 3E04005, 3E04305, 3E05005, 3E05305, 3E06005, 3E06305, 3E0J3U0, 3E0J3U1, 3E0J7U0, 3E0J7U1, 3E0J8U0, 3E0J8U1</p> <p>CPT-4/HCPCS: 32851-32854, 33935, 33945, 38240, 38241, 44135, 44136, 47135, 47136, 48554, 48556 CPT-4/HCPCS:, 50360, 50365, 50370, 50380</p>
<p>Prior atrial fibrillation or suspicion of atrial fibrillation</p>	<p>ICD-9 diagnosis codes: 427.3*</p> <p>ICD-9 procedure codes: 99.61, 99.62, 99.69</p> <p>ICD-10 diagnosis codes: I48.0, I48.1*, I48.2*, I48.3, I48.4, or I48.9*</p> <p>ICD-10 procedure codes: 02580ZZ, 5A2204Z</p> <p>CPT-4/HCPCS: 92960, 92961, 93651</p> <p>NDC medication: digoxin, amiodarone</p> <p>Any anticoagulant (enoxaparin, warfarin, fondaparinux, argatroban, bivalirudin, dabigatran, rivaroxaban, apixaban) AND any of the following medications: acebutolol, atenolol, betaxolol, bisoprolol, carteolol, esmolol, metoprolol, labetalol, penbutolol, nadolol, nebivolol, pindolol, propranolol, sotalol, carvedilol, diltiazem, verapamil)</p>

eTable 2. Outcome definitions

Outcome	Codes
AF hospitalization	AF diagnosis code in any inpatient position.
AF diagnosis	AF diagnosis code in any inpatient position or ≥ 2 outpatient visits ICD-9 codes: 427.3* ICD-10 codes: I48.0, I48.1*, I48.2*, I48.3, I48.4, or I48.9*
AF treated with medication	AF diagnosis code in any inpatient or outpatient position combined with any AF medication (anticoagulant or antiarrhythmic) within 30 days.
Hospitalization for AF	AF discharge diagnosis codes in the primary position.
Stroke or transient ischemic attack (stroke/TIA)	Stroke or TIA discharge diagnosis codes in the primary position. ICD-9 codes: 433.*1, 434.*1, 435.*, 436.* ICD-10 codes: I60.**, I61.*, I62.*, I63.*, G43.6*9, G45.*, G46.3, G46.4
Hospitalization for heart failure (HHF)	Heart failure discharge diagnosis codes in the primary position. ICD-9 codes: 398.91, 402.*1, 404.*1, 404.*3, 428.** ICD-10 codes: I09.81, I11.0, I13.0, I13.2, I50.**
AF hospitalization censored for HF	AF diagnosis code in any inpatient position censored for heart failure discharge diagnosis codes in the primary position.
Hospitalization for AF and heart failure (AF + HF)	AF and heart failure discharge diagnosis codes in any position.
Herpes zoster	Herpes zoster diagnosis code in any inpatient or outpatient position. ICD-9 DX: 053.** ICD-10 DX: B02.**

Abbreviations: AF, atrial fibrillation; HF, heart failure.

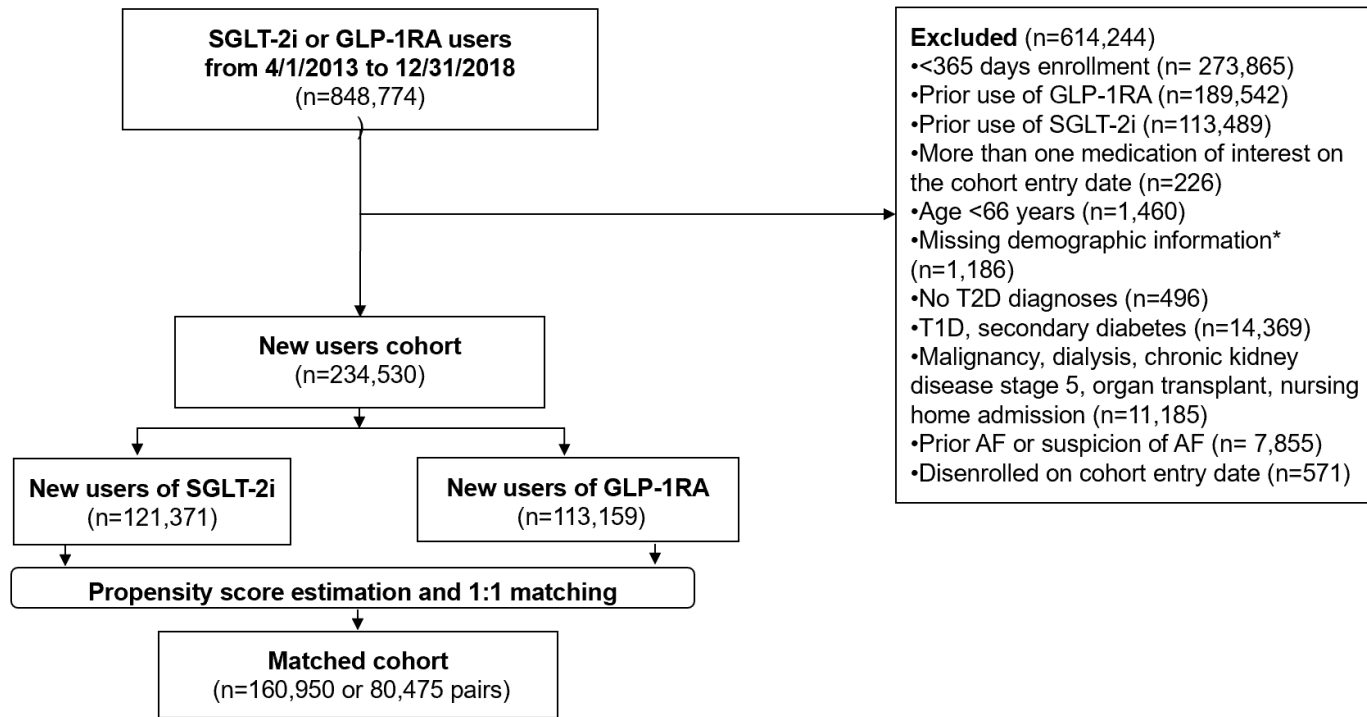
eFigure 1. Flowchart of patients included in SGLT-2i versus DPP-4i cohort.



Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; DPP-4i, dipeptidyl peptidase-4 inhibitors; T2D, type 2 diabetes; T1D, type 1 diabetes; AF, atrial fibrillation.

*Demographic information includes age, gender, and race. A total of 1,457 patients with missing race information were excluded.

eFigure 2. Flowchart of patients included in SGLT-2i versus GLP-1RA cohort.



Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; GLP-1RA, glucagon-like peptide-1 receptor agonist; T2D, type 2 diabetes; T1D, type 1 diabetes; AF, atrial fibrillation.

*Demographic information includes age, gender, and race. A total of 1,186 patients with missing race information were excluded.

eTable 3. Baseline characteristics of SGLT-2i versus DPP-4i initiators before and after 1:1 propensity score matching.

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Age, mean (SD), years	71.6 (4.9)	74.2 (6.5)	-0.45	71.85 (5.0)	71.7 (5.1)
Male	40,576 (49.2)	136,293 (41.8)	0.15	36,302 (48.5)	36,398 (48.6)
Race					
Black	6,240 (7.6)	36,951 (11.3)	-0.13	5,904 (7.9)	5,985 (8.0)
White	68,798 (83.5)	242,347 (74.4)	0.22	61,904 (82.7)	61,794 (82.5)
Other ^a	7,392 (9.0)	46,566 (14.3)	-0.17	7,060 (9.4)	7,089 (9.5)
Region					
Northeast	13,960 (16.9)	60,119 (18.4)	-0.04	12,737 (17.0)	12,581 (16.8)
South	36,575 (44.4)	139,050 (42.7)	0.03	33,231 (44.4)	33,223 (44.4)
Midwest	16,825 (20.4)	66,741 (20.5)	0.00	15,297 (20.4)	15,405 (20.6)
West	15,070 (18.3)	59,954 (18.4)	0.00	13,603 (18.2)	13,659 (18.2)
Year of cohort entry					
2013	1,410 (1.7)	45,779 (14.0)	-0.47	1,409 (1.9)	1,249 (1.7)
2014	9,711 (11.8)	67,628 (20.8)	-0.25	9,233 (12.3)	8,922 (11.9)
2015	17,878 (21.7)	65,401 (20.1)	0.04	16,485 (22.0)	16,430 (21.9)
2016	15,572 (18.9)	54,115 (16.6)	0.06	14,329 (19.1)	14,480 (19.3)
2017	18,672 (22.7)	49,235 (15.1)	0.20	16,734 (22.4)	16,903 (22.6)
2018	19,187 (23.3)	43,706 (13.4)	0.26	16,678 (22.3)	16,884 (22.6)
Diabetes related comorbidities					
Diabetic nephropathy ^b	9,246 (11.2)	45,357 (13.9)	-0.08	8,293 (11.1)	8,333 (11.1)
Diabetic neuropathy ^c	21,116 (25.6)	73,995 (22.7)	0.07	18,495 (24.7)	18,420 (24.6)
Diabetic retinopathy ^d	11,365 (13.8)	39,415 (12.1)	0.05	9,930 (13.3)	9,816 (13.1)
Diabetes with other ophthalmic manifestation ^e	9,646 (11.7)	44,826 (13.8)	-0.06	8,792 (11.7)	8,698 (11.6)
Diabetes with peripheral circulatory disorders ^f	2,559 (3.1)	16,099 (4.9)	-0.09	2,373 (3.2)	2,369 (3.2)
Diabetic foot ^g	2,086 (2.5)	9,096 (2.8)	-0.02	1,890 (2.5)	1,852 (2.5)
Osteomyelitis ^h	236 (0.3)	1,087 (0.3)	0.00	220 (0.3)	230 (0.3)
Lower extremity amputation ⁱ	352 (0.4)	1,620 (0.5)	-0.01	323 (0.4)	328 (0.4)
Erectile dysfunction ^j	3,908 (4.7)	10,683 (3.3)	0.07	3,391 (4.5)	3,452 (4.6)

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Hyperglycemia ^k	29,827 (36.2)	82,197 (25.2)	0.24	25,879 (34.6)	26,023 (34.8)
Hypoglycemia ^l	7,110 (8.6)	26,168 (8.0)	0.02	6,251 (8.3)	6,126 (8.2)
Hyperosmolar hyperglycemic nonketotic syndrome ^m	680 (0.8)	2,440 (0.7)	0.01	598 (0.8)	606 (0.8)
Diabetic ketoacidosis ⁿ	184 (0.2)	1,128 (0.3)	-0.02	168 (0.2)	166 (0.2)
Other diabetic complications ^o	7,226 (8.8)	23,464 (7.2)	0.06	6,335 (8.5)	6,252 (8.4)
Other comorbid conditions					
Hyperthyroidism	862 (1.0)	4,310 (1.3)	-0.03	778 (1.0)	803 (1.1)
Hypothyroidism	20,408 (24.8)	81,385 (25.0)	0.00	18,432 (24.6)	18,330 (24.5)
Other disorders of thyroid gland	6,342 (7.7)	22,073 (6.8)	0.03	5,513 (7.4)	5,482 (7.3)
Chronic kidney disease stages 1-2	3,114 (3.8)	14,633 (4.5)	-0.04	2,817 (3.8)	2,854 (3.8)
Chronic kidney disease stages 3-4	6,214 (7.5)	51,428 (15.8)	-0.26	5,896 (7.9)	5,763 (7.7)
Chronic kidney disease stage unspecified	3,392 (4.1)	30,629 (9.4)	-0.21	3,245 (4.3)	3,162 (4.2)
Acute kidney injury	1,882 (2.3)	18,423 (5.7)	-0.17	1,795 (2.4)	1,756 (2.3)
Hypertension	75,654 (91.8)	301,344 (92.5)	-0.03	68,604 (91.6)	68,639 (91.7)
Hyperlipidemia	71,451 (86.7)	279,659 (85.8)	0.03	64,592 (86.3)	64,573 (86.2)
Stable angina	4,864 (5.9)	17,338 (5.3)	0.03	4,350 (5.8)	4,244 (5.7)
Unstable angina	2,091 (2.5)	8,168 (2.5)	0.00	1,888 (2.5)	1,875 (2.5)
Acute myocardial infarction	1,415 (1.7)	6,474 (2.0)	-0.02	1,282 (1.7)	1,298 (1.7)
Old myocardial infarction	3,671 (4.5)	14,243 (4.4)	0.00	3,297 (4.4)	3,295 (4.4)
Coronary atherosclerosis	23,823 (28.9)	92,224 (28.3)	0.01	21,324 (28.5)	21,302 (28.5)
History of coronary procedure	8,182 (9.9)	29,691 (9.1)	0.03	7,260 (9.7)	7,277 (9.7)
Cardiac conduction disorders ^p	3,523 (4.3)	15,882 (4.9)	-0.03	3,157 (4.2)	3,173 (4.2)
Other cardiac dysrhythmia ^q	7,900 (9.6)	37,310 (11.4)	-0.06	7,227 (9.7)	7,229 (9.7)
Cardiomyopathy	1,943 (2.4)	8,824 (2.7)	-0.02	1,764 (2.4)	1,732 (2.3)
Congestive heart failure	6,427 (7.8)	33,744 (10.4)	-0.09	5,907 (7.9)	5,865 (7.8)
Valve disorders	8,179 (9.9)	38,140 (11.7)	-0.06	7,508 (10.0)	7,449 (9.9)
Other cardiovascular disease ^r	9,162 (11.1)	35,307 (10.8)	0.01	8,292 (11.1)	8,237 (11.0)
Transient ischemic attack	1,866 (2.3)	9,677 (3.0)	-0.04	1,710 (2.3)	1,689 (2.3)
Ischemic stroke	8,446 (10.2)	39,583 (12.1)	-0.06	7,730 (10.3)	7,758 (10.4)

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Hemorrhagic stroke	131 (0.2)	818 (0.3)	-0.02	122 (0.2)	126 (0.2)
Peripheral artery disease	9,310 (11.3)	44,833 (13.8)	-0.08	8,505 (11.4)	8,531 (11.4)
Cerebrovascular procedure	182 (0.2)	780 (0.2)	0.00	160 (0.2)	171 (0.2)
Atherosclerotic cerebrovascular disease	1,531 (1.9)	8,917 (2.7)	-0.05	1,417 (1.9)	1,402 (1.9)
Asthma	7,328 (8.9)	29,113 (8.9)	0.00	6,643 (8.9)	6,763 (9.0)
Chronic obstructive pulmonary disease	9,217 (11.2)	43,309 (13.3)	-0.06	8,543 (11.4)	8,620 (11.5)
Obstructive sleep apnea	13,220 (16.0)	34,438 (10.6)	0.16	11,257 (15.0)	11,375 (15.2)
Pneumonia	3,004 (3.6)	16,165 (5.0)	-0.07	2,766 (3.7)	2,710 (3.6)
Liver disease	3,277 (4.0)	13,614 (4.2)	-0.01	2,971 (4.0)	2,984 (4.0)
Nonalcoholic fatty liver disease	4,345 (5.3)	12,963 (4.0)	0.06	3,814 (5.1)	3,782 (5.1)
Osteoarthritis	22,943 (27.8)	89,115 (27.3)	0.01	20,734 (27.7)	20,679 (27.6)
Urinary tract infection	11,823 (14.3)	63,982 (19.6)	-0.14	10,966 (14.6)	10,942 (14.6)
Kidney stone	3,566 (4.3)	13,473 (4.1)	0.01	3,231 (4.3)	3,258 (4.4)
Urinary stone	225 (0.3)	903 (0.3)	0.00	205 (0.3)	197 (0.3)
Hypertensive nephropathy	4,470 (5.4)	35,146 (10.8)	-0.20	4,218 (5.6)	4,264 (5.7)
Proteinuria	4,193 (5.1)	18,312 (5.6)	-0.02	3,682 (4.9)	3,688 (4.9)
Miscellaneous renal disease ^s	7,026 (8.5)	43,468 (13.3)	-0.15	6,551 (8.8)	6,456 (8.6)
Electrolyte disorders	5,028 (6.1)	31,577 (9.7)	-0.13	4,691 (6.3)	4,643 (6.2)
Edema	9,264 (11.2)	41,807 (12.8)	-0.05	8,386 (11.2)	8,361 (11.2)
Falls	3,375 (4.1)	16,268 (5.0)	-0.04	3,080 (4.1)	3,198 (4.3)
Fractures	1,522 (1.8)	6,779 (2.1)	-0.02	1,382 (1.8)	1,358 (1.8)
Anxiety	9,861 (12.0)	39,256 (12.0)	0.00	9,014 (12.0)	9,109 (12.2)
Depression	12,308 (14.9)	49,277 (15.1)	-0.01	11,148 (14.9)	11,141 (14.9)
Psychosis	690 (0.8)	5,768 (1.8)	-0.09	660 (0.9)	652 (0.9)
Dementia	3,056 (3.7)	23,878 (7.3)	-0.16	2,897 (3.9)	2,823 (3.8)
Delirium	467 (0.6)	3,956 (1.2)	-0.06	450 (0.6)	422 (0.6)
Sleep disorders	8,510 (10.3)	30,932 (9.5)	0.03	7,602 (10.2)	7,520 (10.0)
Alcohol abuse or dependence	933 (1.1)	3,849 (1.2)	-0.01	860 (1.1)	854 (1.1)
Drug abuse or dependence	1,290 (1.6)	4,991 (1.5)	0.01	1,160 (1.5)	1,167 (1.6)
Smoking	15,937 (19.3)	58,784 (18.0)	0.03	14,434 (19.3)	14,490 (19.4)

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Overweight ^t	6,785 (8.2)	23,164 (7.1)	0.04	6,133 (8.2)	6,311 (8.4)
Obesity ^u	28,373 (34.4)	75,834 (23.3)	0.25	24,452 (32.7)	24,383 (32.6)
Sepsis/systemic inflammatory response syndrome	803 (1.0)	5,080 (1.6)	-0.05	760 (1.0)	778 (1.0)
Claims-based frailty index					
Non-frail	27,726 (33.6)	91,412 (28.1)	0.12	25,196 (33.7)	25,506 (34.1)
Pre-frail	47,996 (58.2)	190,650 (58.5)	-0.01	43,438 (58.0)	43,094 (57.6)
Frail	6,708 (8.1)	43,802 (13.4)	-0.17	6,234 (8.3)	6,268 (8.4)
Combined comorbidity index (CCI), mean (SD)	1.0 (1.8)	1.4 (2.2)	-0.03	1.0 (1.8)	1.0 (1.8)
Use of diabetes drugs					
Metformin	65,240 (79.1)	244,730 (75.1)	0.10	59,258 (79.1)	59,503 (79.5)
Sulfonylureas	37,666 (45.7)	156,966 (48.2)	-0.05	34,628 (46.3)	34,814 (46.5)
Insulins	24,878 (30.2)	51,343 (15.8)	0.35	20,174 (26.9)	20,112 (26.9)
GLP-1RA	15,355 (18.6)	10,248 (3.1)	0.51	8,686 (11.6)	8,114 (10.8)
Glitazones	9,467 (11.5)	29,658 (9.1)	0.08	8,227 (11.0)	8,213 (11.0)
Meglitinides	1,622 (2.0)	6,525 (2.0)	0.00	1,445 (1.9)	1,450 (1.9)
Alpha glucosidase inhibitors	618 (0.7)	2,265 (0.7)	0.00	545 (0.7)	552 (0.7)
Thiazolidinediones	9,467 (11.5)	29,658 (9.1)	0.08	8,227 (11.0)	8,213 (11.0)
Pramlintide	86 (0.1)	35 (0.0)	0.04	32 (0.0)	30 (0.0)
Number of antidiabetic medications, mean (SD)	2.4 (0.9)	2.2 (0.8)	0.01	2.3 (0.9)	2.3 (0.8)
Other drugs					
Antiarrhythmics	102 (0.1)	342 (0.1)	0.00	91 (0.1)	96 (0.1)
Anticoagulants	871 (1.1)	3,487 (1.1)	0.00	796 (1.1)	802 (1.1)
Angiotensin converting enzyme inhibitors	37,886 (46.0)	151,846 (46.6)	-0.01	34,519 (46.1)	34,580 (46.2)
Angiotensin II receptor blockers	30,172 (36.6)	114,663 (35.2)	0.03	26,959 (36.0)	26,801 (35.8)
Beta blockers	34,936 (42.4)	143,120 (43.9)	-0.03	31,674 (42.3)	31,645 (42.3)
Calcium channel blockers	26,372 (32.0)	118,969 (36.5)	-0.09	24,164 (32.3)	23,959 (32.0)
Thiazide	13,137 (15.9)	53,566 (16.4)	-0.01	11,922 (15.9)	11,877 (15.9)
Loop diuretics	11,908 (14.4)	55,928 (17.2)	-0.08	10,765 (14.4)	10,697 (14.3)
Mineralocorticoid receptor antagonists	2,994 (3.6)	11,617 (3.6)	0.00	2,662 (3.6)	2,674 (3.6)
Other potassium-sparing diuretics	2,323 (2.8)	10,090 (3.1)	-0.02	2,146 (2.9)	2,145 (2.9)

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Other antihypertensive medications	5,933 (7.2)	30,719 (9.4)	-0.08	5,467 (7.3)	5,496 (7.3)
Sacubitril/valsartan	96 (0.1)	207 (0.1)	0.00	81 (0.1)	90 (0.1)
Nitrates and other antianginal agents	6,861 (8.3)	28,859 (8.9)	-0.02	6,153 (8.2)	6,172 (8.2)
Antiplatelet agents	10,752 (13.0)	46,113 (14.2)	-0.04	9,711 (13.0)	9,777 (13.1)
Statins	64,088 (77.7)	245,786 (75.4)	0.05	57,809 (77.2)	57,683 (77.0)
Other lipid-lowering agents	15,143 (18.4)	55,126 (16.9)	0.04	13,397 (17.9)	13,289 (17.7)
COPD/asthma medications	15,654 (19.0)	62,231 (19.1)	0.00	14,163 (18.9)	14,264 (19.1)
NSAIDs	21,897 (26.6)	86,377 (26.5)	0.00	19,909 (26.6)	19,929 (26.6)
Antiosteoporosis agents	3,768 (4.6)	22,358 (6.9)	-0.10	3,551 (4.7)	3,476 (4.6)
Benzodiazepines	11,339 (13.8)	45,922 (14.1)	-0.01	10,311 (13.8)	10,322 (13.8)
Antidepressants	23,959 (29.1)	90,094 (27.6)	0.03	21,512 (28.7)	21,498 (28.7)
Anxiolytics/hypnotics	6,391 (7.8)	26,121 (8.0)	-0.01	5,816 (7.8)	5,838 (7.8)
Corticosteroids	13,692 (16.6)	53,322 (16.4)	0.01	12,478 (16.7)	12,396 (16.6)
Dementia medications	1,946 (2.4)	17,070 (5.2)	-0.15	1,883 (2.5)	1,847 (2.5)
Antiparkinsonian medications	2,945 (3.6)	11,898 (3.7)	-0.01	2,659 (3.6)	2,639 (3.5)
Antipsychotics	1,875 (2.3)	11,075 (3.4)	-0.07	1,741 (2.3)	1,715 (2.3)
Opioids	27,826 (33.8)	110,934 (34.0)	0.00	25,158 (33.6)	25,157 (33.6)
Gabapentinoids	14,528 (17.6)	56,589 (17.4)	0.01	13,069 (17.5)	13,165 (17.6)
Number of total medications, mean (SD)	12.8 (5.7)	12.5 (5.9)	0.05	12.6 (5.7)	12.6 (5.8)
Health care utilization					
Electrocardiogram	36,873 (44.7)	153,447 (47.1)	-0.05	33,390 (44.6)	33,344 (44.5)
Cardiac imaging	19,659 (23.8)	82,183 (25.2)	-0.03	17,791 (23.8)	17,702 (23.6)
Cardiovascular stress test	10,461 (12.7)	37,860 (11.6)	0.03	9,360 (12.5)	9,247 (12.4)
Glucose test	27,077 (32.8)	106,659 (32.7)	0.00	23,980 (32.0)	24,042 (32.1)
HbA1c test order	79,870 (96.9)	310,554 (95.3)	0.08	72,440 (96.8)	72,426 (96.7)
Metabolic panel test	79,193 (96.1)	311,509 (95.6)	0.03	71,881 (96.0)	71,923 (96.1)
Pap smear	4,547 (5.5)	16,187 (5.0)	0.02	4,091 (5.5)	4,188 (5.6)
Prostate cancer screening	22,515 (27.3)	72,399 (22.2)	0.12	20,143 (26.9)	20,338 (27.2)
Colorectal cancer screening	8,673 (10.5)	29,326 (9.0)	0.05	7,723 (10.3)	7,708 (10.3)
Influenza vaccine	51,017 (61.9)	191,989 (58.9)	0.06	45,884 (61.3)	45,944 (61.4)

Characteristics	Before matching			After matching	
	SGLT-2i (n=82,430) Patients, No. (%)	DPP-4i (n=325,864) Patients, No. (%)	St. D	SGLT-2i (n=74,868) Patients, No. (%)	DPP-4i (n=74,868) Patients, No. (%)
Pneumococcal vaccine	17,106 (20.8)	55,356 (17.0)	0.10	15,332 (20.5)	15,427 (20.6)
Emergency department visit	20,285 (24.6)	100,665 (30.9)	-0.14	18,739 (25.0)	18,740 (25.0)
Hospitalization	7,637 (9.3)	45,048 (13.8)	-0.14	7,113 (9.5)	7,148 (9.5)
Internal medicine visit	73,207 (88.8)	289,973 (89.0)	-0.01	66,533 (88.9)	66,620 (89.0)
Cardiologist visit	33,001 (40.0)	133,133 (40.9)	-0.02	29,731 (39.7)	29,597 (39.5)
Endocrinologist visit	17,574 (21.3)	42,072 (12.9)	0.22	13,832 (18.5)	13,600 (18.2)
Nephrologist visit	3,096 (3.8)	28,206 (8.7)	-0.20	2,927 (3.9)	2,958 (4.0)
Number of office visits, mean (SD)	10.5 (7.1)	10.4 (7.5)	0.01	10.3 (7.1)	10.3 (7.3)

Values are numbers (percentages) unless stated otherwise

All standardized differences in post-matching cohorts were less than 0.1

Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; DPP-4i, dipeptidyl peptidase-4 inhibitors; St. D, standardized difference; SD, standard deviation; GLP-1RA, glucagon-like peptide-1 receptor agonist; COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroidal anti-inflammatory drugs; HbA1c, hemoglobin A1c

^aOther: Asian, North American Native, Hispanic, and other (plus an unknown category).

^bDiabetic nephropathy: diabetes with renal manifestations, diabetic nephropathy, et al.

^cDiabetic neuropathy: diabetes with neurological manifestations, polyneuropathy in diabetes, diabetic polyneuropathy, et al.

^dDiabetic retinopathy: diabetic retinopathy with or without macular edema, pan retinal photocoagulation, history of vitreous hemorrhage or vitrectomy, intravitreal anti-vascular endothelial growth factor injection, et al.

^eDiabetes with other ophthalmic manifestation: diabetic cataract, diabetic glaucoma, retinal vein occlusion, age-related macular degeneration, et al.

^fDiabetes with peripheral circulatory disorders: diabetic peripheral angiopathy without gangrene, diabetic peripheral angiopathy with gangrene, type 2 diabetes mellitus with other circulatory complications, et al.

^gDiabetic foot: type 2 diabetes mellitus with foot ulcer, non-pressure chronic ulcer of calf, non-pressure chronic ulcer of ankle, non-pressure chronic ulcer of heel, et al.

^hOsteomyelitis: acute hematogenous osteomyelitis, subacute osteomyelitis, chronic osteomyelitis, et al.

ⁱLower extremity amputation: ankle amputation, foot amputation, below knee amputation, above knee amputation, acquired absence of foot, acquired absence of ankle, acquired absence of leg below knee, acquired absence of leg above knee, et al.

^jErectile dysfunction: erectile dysfunction due to arterial insufficiency, unspecified male erectile dysfunction, et al.

^kHyperglycemia: type 2 diabetes mellitus with hyperglycemia, unspecified hyperglycemia, et al.

^lHypoglycemia: hypoglycemia with coma, hypoglycemia without coma, drug-induced hypoglycemia, et al.

^mHyperosmolar hyperglycemic nonketotic syndrome: diabetes with hyperosmolarity, diabetes with hyperosmolarity with coma, et al.

ⁿDiabetic ketoacidosis: diabetes with ketoacidosis with coma, diabetes with ketoacidosis without coma, et al.

^oOther diabetic complications: diabetes with unspecified complication

^pCardiac conduction disorders: atrioventricular block, left bundle branch block, right bundle branch block, et al.

^qOther cardiac arrhythmia: ventricular tachycardia, premature beats, et al.

^rOther cardiac vascular disease: rheumatic heart disease, pericarditis, myocarditis, et al.

^sMiscellaneous renal insufficiency: gouty nephropathy, nephrotic syndrome, vesicoureteral reflex, et al.

^tOverweight: body mass index 25.0-29.9

^uObesity: morbid obesity due to excess calories, gastric restrictive procedure, insertion of gastric bubble, body mass index 30.0-69.9, body mass index 70 and over, et al.

eTable 4. Baseline characteristics of SGLT-2i versus GLP-1RA initiators before and after 1:1 propensity score matching.

Characteristics	Before matching			After matching	
	SGLT-2i (n=121,371) Patients, No. (%)	GLP-1 RA (n=113,159) Patients, No. (%)	St. D	SGLT-2i (n=80,475) Patients, No. (%)	GLP-1 RA (n=80,475) Patients, No. (%)
Age, mean (SD), years	72.2 (5.3)	71.7 (5.0)	0.10	71.8 (5.1)	71.8 (5.1)
Male	58,808 (48.5)	47,650 (42.1)	0.13	35,977 (44.7)	36,025 (44.8)
Race					
Black	9,484 (7.8)	9,792 (8.7)	-0.03	6,581 (8.2)	6,616 (8.2)
White	96,435 (79.5)	94,426 (83.4)	-0.10	66,883 (83.1)	66,583 (82.7)
Other ^a	15,452 (12.7)	8,941 (7.9)	0.16	7,011 (8.7)	7,276 (9.0)
Region					
Northeast	23,044 (19.0)	18,396 (16.3)	0.07	13,693 (17.0)	13,803 (17.2)
South	51,557 (42.5)	48,735 (43.1)	-0.01	35,018 (43.5)	34,958 (43.4)
Midwest	23,298 (19.2)	25,570 (22.6)	-0.08	17,179 (21.3)	17,091 (21.2)
West	23,472 (19.3)	20,458 (18.1)	0.03	14,585 (18.1)	14,623 (18.2)
Year of cohort entry					
2013	2,373 (2.0)	9,961 (8.8)	-0.30	2,372 (2.9)	2,543 (3.2)
2014	15,544 (12.8)	14,788 (13.1)	-0.01	11,221 (13.9)	11,193 (13.9)
2015	27,362 (22.5)	17,086 (15.1)	0.19	14,529 (18.1)	14,727 (18.3)
2016	23,680 (19.5)	18,609 (16.4)	0.08	14,818 (18.4)	14,832 (18.4)
2017	26,709 (22.0)	22,980 (20.3)	0.04	17,479 (21.7)	17,443 (21.7)
2018	25,703 (21.2)	29,735 (26.3)	-0.12	20,056 (24.9)	19,737 (24.5)
Diabetes related comorbidities					
Diabetic nephropathy ^b	13,523 (11.1)	21,798 (19.3)	-0.23	10,960 (13.6)	11,044 (13.7)
Diabetic neuropathy ^c	29,917 (24.6)	34,768 (30.7)	-0.14	21,951 (27.3)	21,972 (27.3)
Diabetic retinopathy ^d	16,363 (13.5)	18,387 (16.2)	-0.08	11,586 (14.4)	11,656 (14.5)
Diabetes with other ophthalmic manifestation ^e	14,862 (12.2)	14,493 (12.8)	-0.02	9,720 (12.1)	9,806 (12.2)
Diabetes with peripheral circulatory disorders ^f	4,369 (3.6)	4,112 (3.6)	0.00	2,646 (3.3)	2,743 (3.4)
Diabetic foot ^g	2,852 (2.3)	3,857 (3.4)	-0.07	2,199 (2.7)	2,174 (2.7)
Osteomyelitis ^h	338 (0.3)	432 (0.4)	-0.02	253 (0.3)	247 (0.3)
Lower extremity amputation ⁱ	466 (0.4)	746 (0.7)	-0.04	382 (0.5)	389 (0.5)
Erectile dysfunction ^j	5,452 (4.5)	4,657 (4.1)	0.02	3,458 (4.3)	3,492 (4.3)

Characteristics	Before matching			After matching	
	SGLT-2i (n=121,371) Patients, No. (%)	GLP-1 RA (n=113,159) Patients, No. (%)	St. D	SGLT-2i (n=80,475) Patients, No. (%)	GLP-1 RA (n=80,475) Patients, No. (%)
Hyperglycemia ^k	41,710 (34.4)	44,522 (39.3)	-0.10	30,568 (38.0)	30,289 (37.6)
Hypoglycemia ^l	9,931 (8.2)	11,511 (10.2)	-0.07	7,230 (9.0)	7,212 (9.0)
Hyperosmolar hyperglycemic nonketotic syndrome ^m	996 (0.8)	1,115 (1.0)	-0.02	713 (0.9)	708 (0.9)
Diabetic ketoacidosis ⁿ	273 (0.2)	326 (0.3)	-0.02	193 (0.2)	184 (0.2)
Other diabetic complications ^o	10,152 (8.4)	11,814 (10.4)	-0.07	7,509 (9.3)	7,528 (9.4)
Other comorbid conditions					
Hyperthyroidism	1,368 (1.1)	1,275 (1.1)	0.00	905 (1.1)	916 (1.1)
Hypothyroidism	29,471 (24.3)	30,570 (27.0)	-0.06	20,777 (25.8)	20,852 (25.9)
Other disorders of thyroid gland	9,051 (7.5)	9,971 (8.8)	-0.05	6,657 (8.3)	6,620 (8.2)
Chronic kidney disease stages 1-2	4,672 (3.8)	5,703 (5.0)	-0.06	3,393 (4.2)	3,449 (4.3)
Chronic kidney disease stages 3-4	9,357 (7.7)	20,665 (18.3)	-0.32	8,636 (10.7)	8,780 (10.9)
Chronic kidney disease stage unspecified	5,183 (4.3)	10,496 (9.3)	-0.20	4,558 (5.7)	4,627 (5.7)
Acute kidney injury	2,867 (2.4)	5,353 (4.7)	-0.12	2,428 (3.0)	2,452 (3.0)
Hypertension	111,490 (91.9)	105,577 (93.3)	-0.05	74,383 (92.4)	74,397 (92.4)
Hyperlipidemia	105,538 (87.0)	98,518 (87.1)	0.00	69,568 (86.4)	69,714 (86.6)
Stable angina	7,161 (5.9)	6,784 (6.0)	0.00	4,701 (5.8)	4,711 (5.9)
Unstable angina	2,881 (2.4)	2,855 (2.5)	-0.01	1,982 (2.5)	1,956 (2.4)
Acute myocardial infarction	1,960 (1.6)	1,898 (1.7)	-0.01	1,293 (1.6)	1,292 (1.6)
Old myocardial infarction	5,009 (4.1)	5,261 (4.6)	-0.02	3,501 (4.4)	3,521 (4.4)
Coronary atherosclerosis	34,227 (28.2)	33,412 (29.5)	-0.03	22,927 (28.5)	22,827 (28.4)
History of coronary procedure	11,199 (9.2)	11,336 (10.0)	-0.03	7,661 (9.5)	7,604 (9.4)
Cardiac conduction disorders ^p	4,956 (4.1)	5,398 (4.8)	-0.03	3,494 (4.3)	3,537 (4.4)
Other cardiac dysrhythmia ^q	11,492 (9.5)	11,737 (10.4)	-0.03	7,904 (9.8)	7,887 (9.8)
Cardiomyopathy	2,765 (2.3)	3,024 (2.7)	-0.03	1,943 (2.4)	1,922 (2.4)
Congestive heart failure	9,253 (7.6)	11,834 (10.5)	-0.10	6,883 (8.6)	6,864 (8.5)
Valve disorders	12,346 (10.2)	12,185 (10.8)	-0.02	8,240 (10.2)	8,240 (10.2)
Other cardiovascular disease ^r	12,978 (10.7)	14,167 (12.5)	-0.06	9,262 (11.5)	9,295 (11.6)
Transient ischemic attack	2,859 (2.4)	2,797 (2.5)	-0.01	1,928 (2.4)	1,917 (2.4)
Ischemic stroke	12,924 (10.6)	12,445 (11.0)	-0.01	8,509 (10.6)	8,496 (10.6)
Hemorrhagic stroke	195 (0.2)	204 (0.2)	0.00	137 (0.2)	147 (0.2)

Characteristics	Before matching			After matching	
	SGLT-2i (n=121,371) Patients, No. (%)	GLP-1 RA (n=113,159) Patients, No. (%)	St. D	SGLT-2i (n=80,475) Patients, No. (%)	GLP-1 RA (n=80,475) Patients, No. (%)
Peripheral artery disease	14,689 (12.1)	14,789 (13.1)	-0.03	9,841 (12.2)	9,853 (12.2)
Cerebrovascular procedure	235 (0.2)	242 (0.2)	0.00	162 (0.2)	154 (0.2)
Atherosclerotic cerebrovascular disease	2,360 (1.9)	2,502 (2.2)	-0.02	1,619 (2.0)	1,635 (2.0)
Asthma	10,328 (8.5)	11,666 (10.3)	-0.06	7,623 (9.5)	7,687 (9.6)
Chronic obstructive pulmonary disease	13,447 (11.1)	15,047 (13.3)	-0.07	9,646 (12.0)	9,629 (12.0)
Obstructive sleep apnea	16,015 (13.2)	22,563 (19.9)	-0.18	13,405 (16.7)	13,478 (16.7)
Pneumonia	4,380 (3.6)	5,109 (4.5)	-0.05	3,232 (4.0)	3,235 (4.0)
Liver disease	5,149 (4.2)	4,493 (4.0)	0.01	3,252 (4.0)	3,247 (4.0)
Nonalcoholic fatty liver disease	6,241 (5.1)	6,327 (5.6)	-0.02	4,427 (5.5)	4,436 (5.5)
Osteoarthritis	33,492 (27.6)	35,439 (31.3)	-0.08	23,872 (29.7)	23,914 (29.7)
Urinary tract infection	18,336 (15.1)	20,703 (18.3)	-0.09	13,304 (16.5)	13,247 (16.5)
Kidney stone	5,240 (4.3)	5,529 (4.9)	-0.03	3,721 (4.6)	3,679 (4.6)
Urinary stone	327 (0.3)	338 (0.3)	0.00	234 (0.3)	233 (0.3)
Hypertensive nephropathy	6,720 (5.5)	13,314 (11.8)	-0.23	5,741 (7.1)	5,884 (7.3)
Proteinuria	5,918 (4.9)	8,516 (7.5)	-0.11	4,548 (5.7)	4,572 (5.7)
Miscellaneous renal disease ^s	10,667 (8.8)	14,678 (13.0)	-0.14	8,219 (10.2)	8,249 (10.3)
Electrolyte disorders	7,569 (6.2)	9,399 (8.3)	-0.08	5,469 (6.8)	5,473 (6.8)
Edema	13,186 (10.9)	16,944 (15.0)	-0.12	10,020 (12.5)	10,050 (12.5)
Falls	5,011 (4.1)	5,881 (5.2)	-0.05	3,738 (4.6)	3,760 (4.7)
Fractures	2,189 (1.8)	2,465 (2.2)	-0.03	1,625 (2.0)	1,604 (2.0)
Anxiety	13,929 (11.5)	14,994 (13.3)	-0.05	10,167 (12.6)	10,192 (12.7)
Depression	17,001 (14.0)	21,035 (18.6)	-0.12	13,323 (16.6)	13,354 (16.6)
Psychosis	1,132 (0.9)	1,137 (1.0)	-0.01	760 (0.9)	761 (0.9)
Dementia	5,222 (4.3)	5,215 (4.6)	-0.01	3,540 (4.4)	3,466 (4.3)
Delirium	747 (0.6)	1,004 (0.9)	-0.03	567 (0.7)	552 (0.7)
Sleep disorders	11,730 (9.7)	13,586 (12.0)	-0.07	8,807 (10.9)	8,895 (11.1)
Alcohol abuse or dependence	1,343 (1.1)	1,085 (1.0)	0.01	832 (1.0)	815 (1.0)
Drug abuse or dependence	1,768 (1.5)	2,141 (1.9)	-0.03	1,340 (1.7)	1,354 (1.7)
Smoking	21,949 (18.1)	23,618 (20.9)	-0.07	15,914 (19.8)	15,822 (19.7)
Overweight ^t	10,395 (8.6)	8,511 (7.5)	0.04	6,522 (8.1)	6,483 (8.1)

Characteristics	Before matching			After matching	
	SGLT-2i (n=121,371) Patients, No. (%)	GLP-1 RA (n=113,159) Patients, No. (%)	St. D	SGLT-2i (n=80,475) Patients, No. (%)	GLP-1 RA (n=80,475) Patients, No. (%)
Obesity ^u	36,008 (29.7)	47,069 (41.6)	-0.25	29,408 (36.5)	29,319 (36.4)
Sepsis/systemic inflammatory response syndrome	1,184 (1.0)	1,493 (1.3)	-0.03	856 (1.1)	892 (1.1)
Claims-based frailty index					
Non-frail	41,161 (33.9)	28,770 (25.4)	0.19	23,802 (29.6)	23,779 (29.5)
Pre-frail	69,975 (57.7)	70,055 (61.9)	-0.09	48,716 (60.5)	48,669 (60.5)
Frail	10,235 (8.4)	14,334 (12.7)	-0.14	7,957 (9.9)	8,027 (10.0)
Combined comorbidity index (CCI), mean (SD)	1.0 (1.8)	1.5 (2.0)	-0.26	1.2 (1.9)	1.2 (1.9)
Use of diabetes drugs					
Metformin	98,097 (80.8)	80,373 (71.0)	0.23	61,810 (76.8)	61,816 (76.8)
Sulfonylureas	61,481 (50.7)	53,117 (46.9)	0.08	39,270 (48.8)	39,280 (48.8)
Insulins	27,179 (22.4)	46,893 (41.4)	-0.42	25,194 (31.3)	25,180 (31.3)
DPP-4i	52,562 (43.3)	37,515 (33.2)	0.21	29,216 (36.3)	29,545 (36.7)
Glitazones	14,568 (12.0)	12,592 (11.1)	0.03	9,296 (11.6)	9,368 (11.6)
Meglitinides	3,295 (2.7)	2,962 (2.6)	0.01	2,092 (2.6)	2,093 (2.6)
Alpha glucosidase inhibitors	1,295 (1.1)	1,091 (1.0)	0.01	815 (1.0)	773 (1.0)
Thiazolidinediones	14,568 (12.0)	12,592 (11.1)	0.03	9,296 (11.6)	9,368 (11.6)
Pramlintide	69 (0.1)	179 (0.2)	-0.03	68 (0.1)	67 (0.1)
Number of antidiabetic medications, mean (SD)	2.6 (1.0)	2.5 (1.0)	0.10	2.5 (1.0)	2.5 (1.0)
Other drugs					
Antiarrhythmics	157 (0.1)	138 (0.1)	0.00	97 (0.1)	106 (0.1)
Anticoagulants	1,160 (1.0)	1,384 (1.2)	-0.02	879 (1.1)	875 (1.1)
Angiotensin converting enzyme inhibitors	55,438 (45.7)	52,356 (46.3)	-0.01	37,156 (46.2)	37,080 (46.1)
Angiotensin II receptor blockers	45,540 (37.5)	43,373 (38.3)	-0.02	30,279 (37.6)	30,455 (37.8)
Beta blockers	51,284 (42.3)	51,533 (45.5)	-0.06	35,054 (43.6)	34,988 (43.5)
Calcium channel blockers	39,955 (32.9)	38,906 (34.4)	-0.03	26,754 (33.2)	26,710 (33.2)
Thiazide	18,248 (15.0)	19,891 (17.6)	-0.07	13,328 (16.6)	13,329 (16.6)
Loop diuretics	16,154 (13.3)	23,385 (20.7)	-0.20	12,985 (16.1)	12,998 (16.2)
Mineralocorticoid receptor antagonists	3,848 (3.2)	5,424 (4.8)	-0.08	3,091 (3.8)	3,094 (3.8)
Other potassium-sparing diuretics	3,307 (2.7)	3,598 (3.2)	-0.03	2,457 (3.1)	2,414 (3.0)
Other antihypertensive medications	8,854 (7.3)	10,281 (9.1)	-0.07	6,393 (7.9)	6,354 (7.9)

Characteristics	Before matching			After matching	
	SGLT-2i (n=121,371) Patients, No. (%)	GLP-1 RA (n=113,159) Patients, No. (%)	St. D	SGLT-2i (n=80,475) Patients, No. (%)	GLP-1 RA (n=80,475) Patients, No. (%)
Sacubitril/valsartan	161 (0.1)	129 (0.1)	0.00	95 (0.1)	92 (0.1)
Nitrates and other antianginal agents	10,014 (8.3)	10,317 (9.1)	-0.03	6,781 (8.4)	6,749 (8.4)
Antiplatelet agents	16,331 (13.5)	15,475 (13.7)	-0.01	10,632 (13.2)	10,646 (13.2)
Statins	95,323 (78.5)	89,497 (79.1)	-0.01	63,174 (78.5)	63,169 (78.5)
Other lipid-lowering agents	23,517 (19.4)	21,534 (19.0)	0.01	15,164 (18.8)	15,179 (18.9)
COPD/asthma medications	22,821 (18.8)	24,791 (21.9)	-0.08	16,417 (20.4)	16,481 (20.5)
NSAIDs	33,862 (27.9)	31,080 (27.5)	0.01	22,511 (28.0)	22,456 (27.9)
Antiosteoporosis agents	7,232 (6.0)	5,717 (5.1)	0.04	4,139 (5.1)	4,183 (5.2)
Benzodiazepines	16,211 (13.4)	16,528 (14.6)	-0.03	11,447 (14.2)	11,510 (14.3)
Antidepressants	32,712 (27.0)	39,347 (34.8)	-0.17	25,390 (31.6)	25,417 (31.6)
Anxiolytics/hypnotics	9,427 (7.8)	10,016 (8.9)	-0.04	6,678 (8.3)	6,695 (8.3)
Corticosteroids	19,087 (15.7)	20,029 (17.7)	-0.05	13,624 (16.9)	13,604 (16.9)
Dementia medications	3,836 (3.2)	3,437 (3.0)	0.01	2,422 (3.0)	2,377 (3.0)
Antiparkinsonian medications	4,232 (3.5)	5,149 (4.6)	-0.06	3,201 (4.0)	3,230 (4.0)
Antipsychotics	2,976 (2.5)	3,238 (2.9)	-0.02	2,195 (2.7)	2,152 (2.7)
Opioids	39,350 (32.4)	43,128 (38.1)	-0.12	28,539 (35.5)	28,535 (35.5)
Gabapentinoids	20,895 (17.2)	24,659 (21.8)	-0.12	15,700 (19.5)	15,630 (19.4)
Number of total medications, mean (SD)	12.9 (5.9)	14.3 (6.1)	-0.23	13.6 (6.1)	13.6 (5.8)
Health care utilization					
Electrocardiogram	54,545 (44.9)	52,433 (46.3)	-0.03	36,342 (45.2)	36,337 (45.2)
Cardiac imaging	28,983 (23.9)	29,131 (25.7)	-0.04	19,578 (24.3)	19,620 (24.4)
Cardiovascular stress test	15,129 (12.5)	15,008 (13.3)	-0.02	10,263 (12.8)	10,246 (12.7)
Glucose test	39,662 (32.7)	40,988 (36.2)	-0.07	27,364 (34.0)	27,409 (34.1)
HbA1c test order	117,541 (96.8)	109,914 (97.1)	-0.02	78,054 (97.0)	78,042 (97.0)
Metabolic panel test	116,848 (96.3)	108,683 (96.0)	0.02	77,204 (95.9)	77,246 (96.0)
Pap smear	6,613 (5.4)	6,651 (5.9)	-0.02	4,698 (5.8)	4,747 (5.9)
Prostate cancer screening	33,182 (27.3)	25,229 (22.3)	0.12	19,486 (24.2)	19,542 (24.3)
Colorectal cancer screening	12,134 (10.0)	12,068 (10.7)	-0.02	8,435 (10.5)	8,426 (10.5)
Influenza vaccine	74,336 (61.2)	71,535 (63.2)	-0.04	50,077 (62.2)	50,203 (62.4)
Pneumococcal vaccine	24,371 (20.1)	23,241 (20.5)	-0.01	16,654 (20.7)	16,714 (20.8)

Emergency department visit	29,627 (24.4)	32,325 (28.6)	-0.10	21,157 (26.3)	21,214 (26.4)
Hospitalization	10,895 (9.0)	12,695 (11.2)	-0.07	7,880 (9.8)	7,888 (9.8)
Internal medicine visit	108,345 (89.3)	100,613 (88.9)	0.01	71,508 (88.9)	71,537 (88.9)
Cardiologist visit	47,681 (39.3)	47,956 (42.4)	-0.06	32,550 (40.4)	32,512 (40.4)
Endocrinologist visit	21,581 (17.8)	29,462 (26.0)	-0.20	17,389 (21.6)	17,450 (21.7)
Nephrologist visit	4,631 (3.8)	11,178 (9.9)	-0.24	4,199 (5.2)	4,376 (5.4)
Number of office visits, mean (SD)	10.4 (7.3)	11.8 (7.9)	-0.18	11.0 (7.5)	11.0 (7.4)

Values are numbers (percentages) unless stated otherwise

All standardized differences in post-matching cohorts were less than 0.1

Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; GLP-1RA, glucagon-like peptide-1 receptor agonist; St. D, standardized difference; SD, standard deviation; DPP-4i, dipeptidyl peptidase-4 inhibitors; COPD, chronic obstructive pulmonary disease; NSAIDs, nonsteroidal anti-inflammatory drugs; HbA1c, hemoglobin A1c

^aOther: Asian, North American Native, Hispanic, and other (plus an unknown category).

^bDiabetic nephropathy: diabetes with renal manifestations, diabetic nephropathy, et al.

^cDiabetic neuropathy: diabetes with neurological manifestations, polyneuropathy in diabetes, diabetic polyneuropathy, et al.

^dDiabetic retinopathy: diabetic retinopathy with or without macular edema, pan retinal photocoagulation, history of vitreous hemorrhage or vitrectomy, intravitreal anti-vascular endothelial growth factor injection, et al.

^eDiabetes with other ophthalmic manifestation: diabetic cataract, diabetic glaucoma, retinal vein occlusion, age-related macular degeneration, et al.

^fDiabetes with peripheral circulatory disorders: diabetic peripheral angiopathy without gangrene, diabetic peripheral angiopathy with gangrene, type 2 diabetes mellitus with other circulatory complications, et al.

^gDiabetic foot: type 2 diabetes mellitus with foot ulcer, non-pressure chronic ulcer of calf, non-pressure chronic ulcer of ankle, non-pressure chronic ulcer of heel, et al.

^hOsteomyelitis: acute hematogenous osteomyelitis, subacute osteomyelitis, chronic osteomyelitis, et al.

ⁱLower extremity amputation: ankle amputation, foot amputation, below knee amputation, above knee amputation, acquired absence of foot, acquired absence of ankle, acquired absence of leg below knee, acquired absence of leg above knee, et al.

^jErectile dysfunction: erectile dysfunction due to arterial insufficiency, unspecified male erectile dysfunction, et al.

^kHyperglycemia: type 2 diabetes mellitus with hyperglycemia, unspecified hyperglycemia, et al.

^lHypoglycemia: hypoglycemia with coma, hypoglycemia without coma, drug-induced hypoglycemia, et al.

^mHyperosmolar hyperglycemic nonketotic syndrome: diabetes with hyperosmolarity, diabetes with hyperosmolarity with coma, et al.

ⁿDiabetic ketoacidosis: diabetes with ketoacidosis with coma, diabetes with ketoacidosis without coma, et al.

^oOther diabetic complications: diabetes with unspecified complication

^pCardiac conduction disorders: atrioventricular block, left bundle branch block, right bundle branch block, et al.

^qOther cardiac arrhythmia: ventricular tachycardia, premature beats, et al.

^rOther cardiac vascular disease: rheumatic heart disease, pericarditis, myocarditis, et al.

^sMiscellaneous renal insufficiency: gouty nephropathy, nephrotic syndrome, vesicoureteral reflex, et al.

^tOverweight: body mass index 25.0-29.9

^uObesity: morbid obesity due to excess calories, gastric restrictive procedure, insertion of gastric bubble, body mass index 30.0-69.9, body mass index 70 and over, et al.

eTable 5. Reasons for censoring in 1:1 propensity score–matched cohorts

Reasons for censoring	SGLT-2i versus DPP-4i (n=74,868 pairs)		SGLT-2i versus GLP-1RA (n=80,475 pairs)	
	SGLT-2i Patients, No. (%)	DPP-4i Patients, No. (%)	SGLT-2i Patients, No. (%)	GLP-1RA Patients, No. (%)
Atrial fibrillation hospitalization	1,082 (1.4)	1,410 (1.9)	1,175 (1.4)	1,235 (1.5)
Death	580 (0.8)	935 (1.2)	638 (0.8)	628 (0.8)
Initiation of comparator medication	5,460 (7.3)	4,171 (5.6)	5,232 (6.5)	4,357 (5.4)
Discontinuation of index exposure	44,188 (59.0)	42,443 (56.7)	47,429 (58.9)	47,970 (59.6)
End of study date	19,233 (25.7)	20,930 (28.0)	21,358 (26.5)	21,859 (27.2)
End of insurance enrollment	4,325 (5.8)	4,979 (6.7)	4,643 (5.8)	4,426 (5.5)

Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; DPP-4i, dipeptidyl peptidase-4 inhibitors; GLP-1RA, glucagon-like peptide-1 receptor agonist.

eTable 6. Number of events, incidence rate, hazard ratios for sensitivity analyses in 1:1 propensity score–matched cohorts

Sensitivity analyses for AF outcome	SGLT-2i	DPP-4i	SGLT-2i vs DPP-4i	SGLT-2i	GLP-1RA	SGLT-2i vs GLP-1RA
	N events (IR)	N events (IR)	HR (95% CI)	N events (IR)	N events (IR)	HR (95% CI)
Grace period and risk period 30 days	818 (16.0)	1,088 (19.7)	0.81 (0.74, 0.89)	871 (17.5)	901 (16.3)	0.93 (0.84, 1.01)
Grace period and risk period 90 days	1,244 (17.1)	1,626 (21.0)	0.82 (0.76, 0.88)	1,350 (17.4)	1,452 (19.2)	0.90 (0.84, 0.97)
Intention-to-treat (ITT), No. (%)	1,088 (14.5)	1,268 (16.9)	0.86 (0.79, 0.93)	1,160 (14.4)	1,256 (15.6)	0.92 (0.85, 1.00)
Herpes zoster	827 (12.8)	887 (12.9)	0.99 (0.90, 1.09)	893 (12.9)	823 (12.5)	1.04 (0.94, 1.14)

Values are numbers (percentages) unless stated otherwise

Abbreviations: SGLT-2i, sodium-glucose cotransporter-2 inhibitors; DPP-4i, dipeptidyl peptidase-4 inhibitors; GLP-1RA, glucagon-like peptide-1 receptor agonist; AF, atrial fibrillation; N events, number of events; IR, incidence rate in 1000 patient years; HR, hazard ratio; CI, confidence interval.