

**Appendix 1****Supplemental Table 1. Codes**

	<b>GPI code/GPI code starts with</b>	<b>ICD-9-CM code</b>	<b>ICD-9-proc code</b>	<b>ICD-10 code<sup>a</sup></b>	<b>HCPCS/CDT</b>	<b>HealthCore clean lab code</b>	<b>HCISpec code</b>
AHA medications to identify the primary/secondary cohort							
Canagliflozin							
Canagliflozin 300 mg	27700020000330	–	–	–	–	–	–
GLP-1	271700						
Albiglutide 30 mg	2717001000D120	–	–	–	–	–	–
Albiglutide 50 mg	2717001000D130	–	–	–	–	–	–
Dulaglutide 0.75 mg/0.5 mL	2717001500D220	–	–	–	–	–	–
Dulaglutide 1.5 mg/0.5 mL	2717001500D230	–	–	–	–	–	–

Exenatide 5 µg/0.02 mL	27170020002050, 2717002000D220	–	–	–	–	–	–
Exenatide 10 µg/0.04 mL	27170020002060, 2717002000D240	–	–	–	–	–	–
Exenatide 2 mg	27170020001920, 2717002000D120	–	–	–	–	–	–
Exenatide for injection extended release suspension 2 mg	2717002000G220	–	–	–	–	–	–
Liraglutide 1.8 mg/3 mL	27170050002020, 2717005000D220	–	–	–	–	–	–
Lixisenatide (ndc 0024-5745-02, 0024-5747-02)	Not available	–	–	–	–	–	–
Lixisenatide + insulin glargine (ndc 0024-5761-05)	Not available	–	–	–	–	–	–
Other AHAs							
Amylin analogues							

Pramlintide aceate	2715005010	–	–	–	–	–	–
Incretin mimetic agents (GLP-1)							
Albiglutide	2717001000	–	–	–	–	–	–
Dulaglutide	2717001500	–	–	–	–	–	–
Exenatide	2717002000	–	–	–	–	–	–
Liraglutide	2717005000	–	–	–	–	–	–
Sulfonylureas							
Acetohexamide	2720001000	–	–	–	–	–	–
Chlorpropamide	2720002000	–	–	–	–	–	–
Tolazamide	2720005000	–	–	–	–	–	–
Tolbutamide	2720006000	–	–	–	–	–	–
Glimepiride	2720002700	–	–	–	–	–	–
Glipizide	2720003000	–	–	–	–	–	–
Glyburide	2720004000	–	–	–	–	–	–

Glyburide micronized	2720004010	–	–	–	–	–	–
Biguanides							
Metformin HCl	2725005000	–	–	–	–	–	–
Meglitinide analogues							
Nateglinide	2723405000, 2728004000	–	–	–	–	–	–
Repaglinide	2728006000	–	–	–	–	–	–
Alpha-glucosidase inhibitors							
Acarbose	2750001000	–	–	–	–	–	–
Miglitol	2750005000	–	–	–	–	–	–
SGLT2 inhibitors							
Canagliflozin	27700020	–	–	–	–	–	–
Dapagliflozin	277000402	–	–	–	–	–	–
Empagliflozin	277000500						

DPP-4 inhibitors							
Alogliptin benzoate	2755001010	–	–	–	–	–	–
Linagliptin	2755005000	–	–	–	–	–	–
Saxagliptin HCl	2755006510	–	–	–	–	–	–
Sitagliptin phosphate	2755007010	–	–	–	–	–	–
Dopamine receptor agonists - Antidiabetic	2757	–	–	–	–	–	–
Insulin sensitizing agents							
Pioglitazone HCl	2760705010	–	–	–	–	–	–
Rosiglitazone maleate	2760706010	–	–	–	–	–	–
Antidiabetic combinations							
Alogliptin-metformin HCl	2799250210	–	–	–	–	–	–
Alogliptin-pioglitazone	2799400210	–	–	–	–	–	–

Canagliflozin-metformin HCl	279960022003	-	-	-	-	-	-
Canagliflozin-metformin HCl tab SR 24HR	279960022075	-	-	-	-	-	-
Dapagliflozin-metformin HCl	279960023075	-	-	-	-	-	-
Empagliflozin- linagliptin	279965023003	-	-	-	-	-	-
Empagliflozin- metformin HCl	279960024003	-	-	-	-	-	-
Glipizide-metformin HCl	2799700235	-	-	-	-	-	-
Glyburide-metformin	2799700240	-	-	-	-	-	-
Linagliptin-metformin HCl	2799250240	-	-	-	-	-	-
Linagliptin-metformin HCl	279925024075	-	-	-	-	-	-

Metformin HCl-dietary management product	2799900250	-	-	-	-	-	-
Pioglitazone HCl-glimepiride	2799780240	-	-	-	-	-	-
Pioglitazone HCl-metformin HCl	2799800240	-	-	-	-	-	-
Repaglinide-metformin HCl	279950027003	-	-	-	-	-	-
Rosiglitazone maleate-glimepiride	2799780260	-	-	-	-	-	-
Rosiglitazone maleate-metformin HCl	2799800260	-	-	-	-	-	-
Saxagliptin-metformin HCl	2799250260	-	-	-	-	-	-
Sitagliptin-metformin HCl	2799250270	-	-	-	-	-	-
Sitagliptin-simvastatin	2799300270	-	-	-	-	-	-

Saxagliptin-metformin HCl tab SR 24HR	279925026075	-	-	-	-	-	-
Sitagliptin-metformin HCl tab SR 24HR	279925027075	-	-	-	-	-	-
Diabetic other							
Dextrose (diabetic use)	2730003000	-	-	-	-	-	-
Diazoxide	2730002000	-	-	-	-	-	-
Glucagon	2730001000	-	-	-	-	-	-
Glucagon (rDNA)	2730001010	-	-	-	-	-	-
Glucagon HCl (rDNA)	2730001015	-	-	-	-	-	-
Glucose-vitamin C	2730990240	-	-	-	-	-	-
Mifepristone (hyperglycemia)	2730405000	-	-	-	-	-	-
Insulin	2710	-	-	-	-	-	-
Rapid acting		-	-	-	S5550- S5551	-	-



Lispro (Humalog)	27104005	–	–	–	–	–	–
Glulisine (Novolog)	27104004	–	–	–	–	–	–
Aspart (Apidra)	27104002	–	–	–	–	–	–
Short acting							
Regular (R) - Humulin / Novolin / Velosulin	27101010, 27102010, 27103010, 27104010, 27104015	–	–	–	–	–	–
Intermediate acting		–	–	–	S5552	–	–
NPH (N) – Intelin I / Intelin II / Insulatard	27101020, 27102020, 27103020, 27104020	–	–	–	–	–	–
Long acting		–	–	–	S5553	–	–
Lantus (insulin glargine)	27104003	–	–	–	–	–	–

Levemir (insulin detemir)	27104006	–	–	–	–	–	–
Mix							
Humalog mix	27104080	–	–	–	–	–	–
Novolog mix	27104070	–	–	–	–	–	–
Humulin or Novolin mix	27104090	–	–	–	–	–	–
Codes for diabetes							
T2DM	–	250.x0, 250.x2	–	E11.%	–	–	–
T1DM	–	250.x1, 250.x3	–	E10.%	–	–	–
Gestational DM and pregnancy	–	648.8, V22.xx- V24.xx, V28.xx	–	O24.4%	S9214	–	–

Steroid induced diabetes	–	249.xx and E932.0 on the same claim	–	E09.% and T38.0% on the same claim	–	–	–
Codes for comorbid conditions							
Cardiovascular							
Ischemic stroke	–	433.x1, 434.x1	–	I63.%	–	–	–
Acute myocardial infarction	–	410.xx, 412.xx	–	I21.%, I22.%	–	–	–
Atrial fibrillation	–	427.31	–	I48.0 - I48.2, I48.89, I48.91	–	–	–
Peripheral artery disease	–	–	–	I70.2%, I70.3%, I70.4%, I70.5%,	–	–	–

				170.6%, 170.7%			
Carotid artery disease	–	433.x1, 434.01, 434.11, 434.91, 435.xx, 362.34	–	172.0%, 165.2%	–	–	–
Abdominal aortic disease	–	441.02, 441.3x, 441.4x	–	170.0, 171.%	–	–	–
Congestive heart failure	–	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91,	–	150.%, 111.0%, 113.0%, 113.2%	–	–	–

		404.93, 428.x					
Ventricular arrhythmia	–	427.4	–	I47.0, I47.2, I49.0%	–	–	–
Angina	–	413.x, 414.x	–	I20.%	–	–	–
Microvascular complications							
Neuropathy	–	356.9, 250.6, 358.1, 951.0, 951.1, 951.3, 354.0- 355.9, 713.5, 357.2, 596.54, 337.0,	–	E08.40, E08.41, E08.42, E08.43, E10.40, E10.42, E10.43, E11.40, E11.41, E11.42, E11.43, E13.40,	–	–	–

		337.1, 564.5, 536.3, 458.0		E13.41, E13.42, E13.43			
Retinopathy	–	250.5x, 362.01, 362.1, 362.83, 362.53, 362.81, 362.82, 362.02, 361.xx, 369.xx, 0.00-0.99, 379.23	–	E08.32% - E08.3599, E10.32 - E10.3599, E11.32 - E11.3599, E13.32% - E13.3599	–	–	–
Nephropathy	–	250.4, 580, 581-583, 585, 586, 593.9	–	E08.2%, E10.2%, E11.2%, E13.2%	–	–	–

Other conditions							
Hypertension	–	401.xx, 402.00, 402.10, 403.xx, 404.00, 404.02, 404.10, 404.12, 404.90, 404.92	–	I16.%, I10.%, I11.%, I12.%, I13.%	–	–	–
Dyslipidemia	–	272.xx	–	E78.0 - E78.5	–	–	–
Anxiety/depression	–	296.2x- 296.3x, 298.0, 300.0x, 300.2x, 300.4x, 309.0x- 309.1x,	–	F32 - F32.5, F33.%, F41.1%	–	–	–

		309.28, 311.xx					
Back pain	–	724.5x	–	M54.4%, M54.5	–	–	–
Obesity	–	270.0x, V85.3x, V85.4x	–	E66.%, Z68.3%, Z68.4%	–	–	–
Cancer	–	140.xx - 172.xx, 174.xx - 195.xx, 200.xx- 208.xx, 238.6x	–	C02.% - C4A.9%,  C45.% - C96.9%	–	–	–
Solid organ transplant	–	–	52.8x, 50.5x, 37.51, 33.5x, 33.6x,	–	50360, 50365, 48554, 47135, 47136, 33945, 33935, 32851, 32852, 32853, 32854, 44135,	–	–



			46.97, 55.69		44136, S2065, S2060, S2053, S2054		
Chronic kidney disease							
Stage 1	–	585.1x	–	N18.1%	–	–	–
Stage 2	–	585.2x	–	N18.2%	–	–	–
Stage 3	–	585.3x	–	N18.3%	–	–	–
Stage 4	–	585.4x	–	N18.4%	–	–	–
Stage 5	–	585.5x	–	N18.5%	–	–	–
ESRD	–	585.6x	–	N18.6%	–	–	–
CKD unspecified	–	585.9x, 403.xx	–	N18.9%	–	–	–
HbA1c test	–	–	–	–	–	1	–
Physician specialty codes	–	–	–	–	–	–	–

Endocrinology/metabolism	–	–	–	–	–	–	6
Cardiology	–	–	–	–	–	–	3
Internal Medicine	–	–	–	–	–	–	12
Family/General Practice	–	–	–	–	–	–	7
Other (Non-physician)	–	–	–	–	–	–	19
Other (Allergy/Immunology, Anesthesiology/Pain Management, Dermatology, Emergency Medicine, Gastroenterology, Geriatrics, Hematology, Infectious Disease, Nephrology, Neurology, Nuclear Medicine, Obstetrics/Gynecology, Oncology, Ophthalmology, Other [Physician],	–	–	–	–	–	–	1, 2, 4, 5, 8-11, 13- 18, 20-31

Otolaryngology, Pathology, Pediatrics [all types], Physical Medicine/Rehabilitation, Podiatry, Psychiatry, Pulmonary Medicine, Radiology, Rheumatology, Surgery [all types], Urology)							
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AHA, antihyperglycemic agents; CDT, Current Dental Terminology; CKD, chronic kidney disease; DM, diabetes mellitus; DPP-4, dipeptidyl peptidase-4; ESRD, end-stage renal disease; GLP-1, glucagon-like peptide-1 receptor agonist; GPI, general product identifier; HCPCS, Healthcare Common Procedure Coding System; HCISpec, Health Core Information Specialty; ICD-9-CM, *International Classification of Disease, Ninth Revision Clinical Modification*; ICD-9-proc, *International Classification of Disease, Ninth Revision Procedures*; ICD-10, *International Classification of Disease, Tenth Revision*; SGLT2, sodium glucose co-transporter 2; T1DM, type 1 diabetes mellitus; T2DM, type 2 diabetes mellitus.

<sup>a</sup>Percentage signs represent placeholders.

Supplemental Table 2. Demographic and Clinical Characteristics

	Before Inverse Probability of Treatment Weighting			After Inverse Probability of Treatment Weighting		
	Any dose of			Any dose of		
	Canagliflozin 300 mg (n = 755)	GLP-1 receptor agonist (n = 2,416)	Absolute std diff <sup>a</sup>	Canagliflozin 300 mg (n = 750)	GLP-1 receptor agonist (n = 2,417)	Absolute std diff <sup>a</sup>
Comorbidities, n (%)						
Cardiovascular						
Ischemic stroke	0 (0.0)	≤10	4%	0 (0.0)	≤10	4%
Acute myocardial infarction	12 (1.6)	44 (1.8)	2%	16 (2.2)	44 (1.8)	3%
Atrial fibrillation	22 (2.9)	56 (2.3)	4%	16 (2.2)	58 (2.4)	2%
Peripheral artery disease	25 (3.3)	85 (3.5)	1%	24 (3.2)	84 (3.5)	1%
Carotid artery disease	≤10	33 (1.4)	4%	≤10	30 (1.2)	1%
Abdominal aortic aneurysm	≤10	12 (0.5)	7%	≤10	≤10	4%
Heart failure	11 (1.5)	57 (2.4)	7%	16 (2.1)	52 (2.2)	0%
Ventricular arrhythmia	0 (0.0)	≤10	4%	0 (0.0)	≤10	4%
Angina	70 (9.3)	246 (10.2)	3%	79 (10.6)	243 (10.0)	2%
Microvascular complications						
Neuropathy	104 (13.8)	387 (16.0)	6%	117 (15.6)	376 (15.5)	0%
Retinopathy	120 (15.9)	399 (16.5)	2%	120 (16.1)	396 (16.4)	1%
Nephrology	37 (4.9)	119 (4.9)	0%	38 (5.1)	119 (4.9)	1%

Other comorbid conditions						
Hypertension	590 (78.1)	1,868 (77.3)	2%	586 (78.2)	1,873 (77.5)	2%
Dyslipidemia	634 (84.0)	1,998 (82.7)	3%	630 (84.0)	2,007 (83.1)	3%
Anxiety/depression	101 (13.4)	477 (19.7)	17%	137 (18.2)	440 (18.2)	0%
Back pain	42 (5.6)	149 (6.2)	3%	49 (6.5)	146 (6.1)	2%
Obesity	78 (10.3)	319 (13.2)	9%	93 (12.5)	302 (12.5)	0%
Liver disease	51 (6.8)	147 (6.1)	3%	44 (5.9)	150 (6.2)	1%
Prescribing physician on index date <sup>b</sup> , n (%)						
Endocrinology	161 (21.3)	601 (24.9)	8%	186 (24.8)	585 (24.2)	1%
Cardiology	≤10	23 (1.0)	3%	≤10	21 (0.9)	1%
Family medicine/general practitioner	415 (55.0)	1,225 (50.7)	9%	376 (50.2)	1,245 (51.5)	3%
Physician assistant/nurse practitioner	94 (12.5)	386 (16.0)	10%	117 (15.5)	366 (15.1)	1%
Other	77 (10.2)	152 (6.3)	14%	57 (7.6)	178 (7.4)	1%
AHA use, n (%)						
Amylin analogues (pramlintide acetate)	≤10	≤10	2%	≤10	≤10	2%
Sulfonylureas,	360 (47.7)	902 (37.3)	21%	300 (40.0)	965 (39.9)	0%
First generation <sup>c</sup>	0 (0.0)	0 (0.0)	0%	0 (0.0)	0 (0.0)	0%
Second generation <sup>d</sup>	360 (47.7)	902 (37.3)	21%	300 (40.0)	965 (39.9)	0%
Biguanides (metformin HCl)	599 (79.3)	1,999 (82.7)	9%	617 (82.3)	1,982 (82.0)	1%
Meglitinide analogues	≤10	32 (1.3)	1%	≤10	31 (1.3)	1%
Nateglinide	≤10	15 (0.6)	1%	≤10	15 (0.6)	1%
Repaglinide	≤10	17 (0.7)	1%	≤10	17 (0.7)	1%

Alpha-glucosidase inhibitors	≤10	≤10	3%	≤10	12 (0.5)	1%
Acarbose	≤10	≤10	4%	≤10	11 (0.5)	1%
Miglitol	0 (0.0)	≤10	3%	0 (0.0)	≤10	3%
DPP-4 inhibitors	383 (50.7)	815 (33.7)	35%	299 (39.8)	914 (37.8)	4%
Alogliptin	≤10	14 (0.6)	1%	≤10	13 (0.6)	2%
Linagliptin	49 (6.5)	96 (4.0)	11%	33 (4.4)	110 (4.6)	1%
Saxagliptin	61 (8.1)	126 (5.2)	12%	48 (6.4)	143 (5.9)	2%
Sitagliptin	281 (37.2)	602 (24.9)	27%	222 (29.6)	678 (28.0)	3%
Thiazolidinediones	73 (9.7)	259 (10.7)	3%	83 (11.1)	254 (10.5)	2%
Pioglitazone HCl	73 (9.7)	259 (10.7)	3%	83 (11.1)	254 (10.5)	2%
Rosiglitazone maleate	0 (0.0)	0 (0.0)	0%	0 (0.0)	0 (0.0)	0%
Diabetic others <sup>e</sup>	0 (0.0)	≤10	4%	0 (0.0)	2 (0.1)	4%
Insulin	143 (18.9)	508 (21.0)	5%	162 (21.6)	504 (20.9)	2%
Rapid or short acting	64 (8.5)	175 (7.2)	5%	55 (7.3)	181 (7.5)	1%
Intermediate or long acting	126 (16.7)	455 (18.8)	6%	149 (19.8)	446 (18.5)	3%
Mix	18 (2.4)	59 (2.4)	0%	18 (2.4)	60 (2.5)	0%

AHA, antihyperglycemic agent; DPP-4, dipeptidyl peptidase-4; GLP-1, glucagon-like peptide-1; SD, standard deviation; std diff, standardized difference.

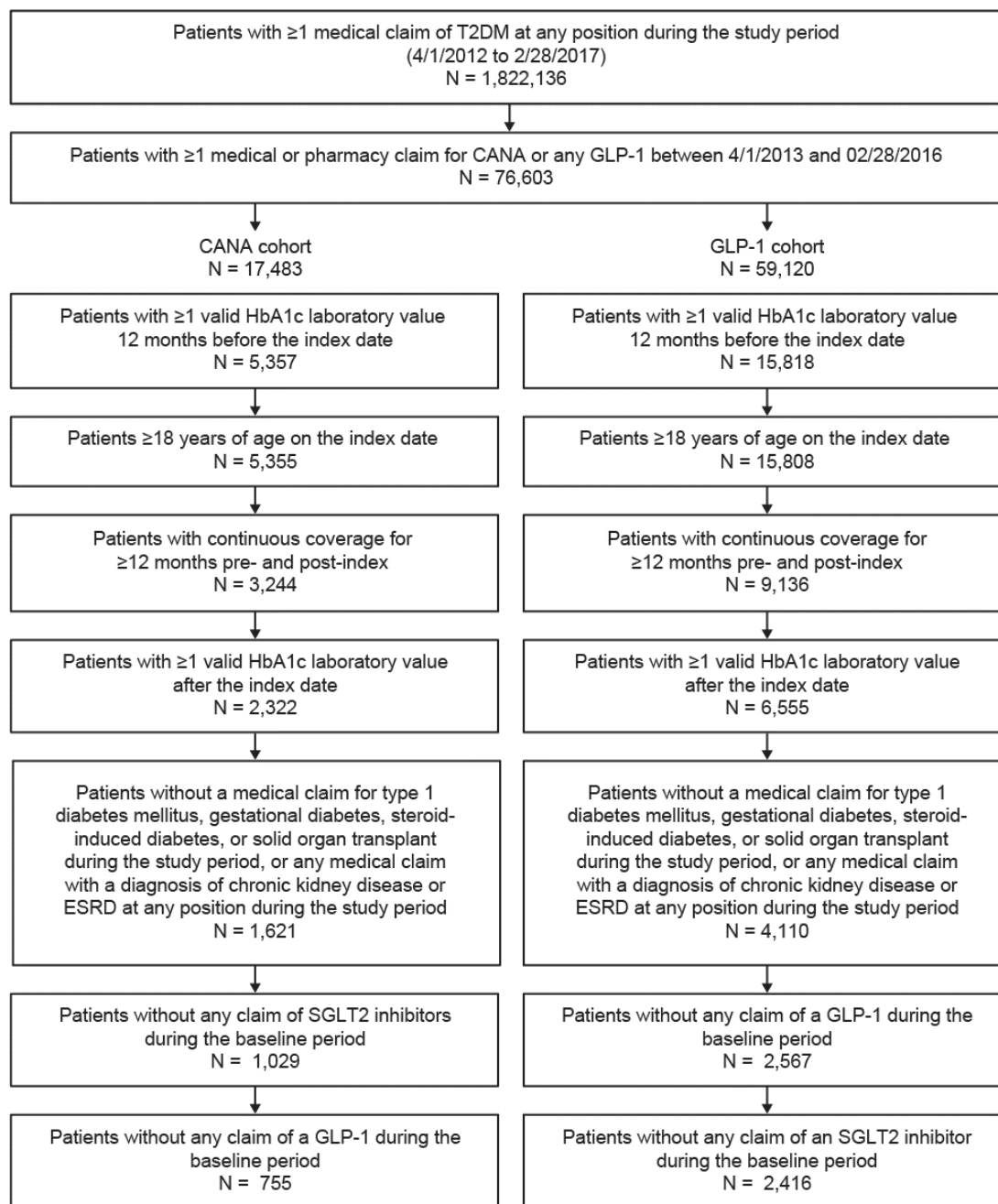
<sup>a</sup>Absolute std diff >10% is considered significant.

<sup>b</sup>Prescribing physician of index medication.

<sup>c</sup>Includes acetohexamide, chlorpropamide, tolazamide, and tolbutamide.

<sup>d</sup>Includes glimepiride, glipizide, glyburide, and glyburide micronized.

<sup>e</sup>Includes dextrose, bromocriptine, diazoxide, glucagon, glucagon (rDNA), glucagon HCl (rDNA), glucose-vitamin C, mifepristone (hyperglycemia), metformin HCl – dietary management product, aldose reductase inhibitors.

**Supplemental Figure 1. Patient disposition.**

CANA, canagliflozin 300 mg; ESRD, end-stage renal disease; GLP-1, any dose of a glucagon-like peptide-1 receptor agonist; SGLT2, sodium glucose co-transporter 2; T2DM, type 2 diabetes mellitus.