

# **Supplemental Material**

**Table S1. Patient and Clinical Characteristics by Covid-19 Testing, and Test Results Among Patients with Hypertension\* (N=824,650).**

	<b>Total (N=824,650) Row Percent= 100%</b>	<b>Covid-19 Testing, No (N=807,752)  98%</b>	<b>Covid-19 Testing, Yes (N=16,898)  2.0%</b>	<b>Test Negative (N=15,104)  89.4%</b>	<b>Test Positive (N=1,794)  10.6%</b>
Age in years	64.4 (13.56)	64.4 (13.54)	64.3 (14.37)	64.7 (14.44)	61.3 (13.42)
18-39	35067 (4.3%)	34294 (4.2%)	773 (4.6%)	683 (4.5%)	90 (5%)
40-64	363493 (44.1%)	355836 (44.1%)	7657 (45.3%)	6635 (43.9%)	1022 (57%)
65-85	382794 (46.4%)	375537 (46.5%)	7257 (42.9%)	6659 (44.1%)	598 (33.3%)
85+	43296 (5.3%)	42085 (5.2%)	1211 (7.2%)	1127 (7.5%)	84 (4.7%)
Men	397941 (48.3%)	390351 (48.3%)	7590 (44.9%)	6743 (44.6%)	847 (47.2%)
Race/ethnicity					
Asian	105040 (12.7%)	102725 (12.7%)	2315 (13.7%)	1976 (13.1%)	339 (18.9%)
Black	102667 (12.4%)	100230 (12.4%)	2437 (14.4%)	2208 (14.6%)	229 (12.8%)
Hispanic	270287 (32.8%)	264683 (32.8%)	5604 (33.2%)	4743 (31.4%)	861 (48%)
Other/Unknown	26053 (3.2%)	25679 (3.2%)	374 (2.2%)	343 (2.3%)	31 (1.7%)
White	320603 (38.9%)	314435 (38.9%)	6168 (36.5%)	5834 (38.6%)	334 (18.6%)
Neighborhood Income					
\$0-49k	152205 (18.5%)	148844 (18.4%)	3361 (19.9%)	2847 (18.8%)	514 (28.7%)
\$50-79k	308061 (37.4%)	301712 (37.4%)	6349 (37.6%)	5670 (37.5%)	679 (37.8%)
\$80-99k	165677 (20.1%)	162239 (20.1%)	3438 (20.3%)	3106 (20.6%)	332 (18.5%)
≥\$100k	197393 (23.9%)	193661 (24%)	3732 (22.1%)	3467 (23%)	265 (14.8%)
Missing	1314 (0.2%)	1296 (0.2%)	18 (0.1%)	14 (0.1%)	4 (0.2%)
Neighborhood Education (% of ≥High School Graduate)					
0-50%	25674 (3.1%)	25110 (3.1%)	564 (3.3%)	448 (3%)	116 (6.5%)
51-75%	202823 (24.6%)	198460 (24.6%)	4363 (25.8%)	3726 (24.7%)	637 (35.5%)
76-100%	594879 (72.1%)	582925 (72.2%)	11954 (70.7%)	10917 (72.3%)	1037 (57.8%)
Insurance Type					
Commercial	388737 (47.1%)	380548 (47.1%)	8189 (48.5%)	7086 (46.9%)	1103 (61.5%)
Private pay	281441 (34.1%)	276028 (34.2%)	5413 (32%)	4928 (32.6%)	485 (27%)
Medicare	131260 (15.9%)	128561 (15.9%)	2699 (16%)	2556 (16.9%)	143 (8%)
Medicaid	22935 (2.8%)	22340 (2.8%)	595 (3.5%)	532 (3.5%)	63 (3.5%)
Other/Missing	277 (0.03%)	275 (0.03%)	2 (0.01%)	2 (0.01%)	-
Body Mass Index (kg/m <sup>2</sup> )	30.8 (6.93)	30.8 (6.92)	31.1 (7.53)	31.0 (7.55)	32.0 (7.28)
<25	136795 (16.6%)	133638 (16.5%)	3157 (18.7%)	2923 (19.4%)	234 (13%)
25-29.9	241392 (29.3%)	236532 (29.3%)	4860 (28.8%)	4376 (29%)	484 (27%)
30-34.9	185222 (22.5%)	181220 (22.4%)	4002 (23.7%)	3555 (23.5%)	447 (24.9%)
35-39.9	95157 (11.5%)	93011 (11.5%)	2146 (12.7%)	1889 (12.5%)	257 (14.3%)
≥40	69271 (8.4%)	67468 (8.4%)	1803 (10.7%)	1603 (10.6%)	200 (11.1%)
Missing	96813 (11.7%)	95883 (11.9%)	930 (5.5%)	758 (5%)	172 (9.6%)
Smoking					
Current	45961 (5.6%)	45006 (5.6%)	955 (5.7%)	906 (6%)	49 (2.7%)
Former	255451 (31%)	249578 (30.9%)	5873 (34.8%)	5384 (35.6%)	489 (27.3%)
Never	521628 (63.3%)	511617 (63.3%)	10011 (59.2%)	8764 (58%)	1247 (69.5%)
Missing	1610 (0.2%)	1551 (0.2%)	59 (0.3%)	50 (0.3%)	9 (0.5%)
Blood Pressure (BP) (mm Hg)					
Systolic BP (SBP)	129.4 (13.7)	129.4 (13.67)	128.6 (14.91)	128.4 (14.96)	129.9 (14.33)

	<b>Total (N=824,650) Row Percent= 100%</b>	<b>Covid-19 Testing, No (N=807,752)  98%</b>	<b>Covid-19 Testing, Yes (N=16,898)  2.0%</b>	<b>Test Negative (N=15,104)  89.4%</b>	<b>Test Positive (N=1,794)  10.6%</b>
Diastolic BP (DBP)	72.6 (11.8)	72.6 (11.79)	72.0 (12.53)	71.8 (12.59)	73.3 (11.86)
SBP/DBP <140/90	640878 (77.7%)	627469 (77.7%)	13409 (79.4%)	12046 (79.8%)	1363 (76%)
SBP/DBP <130/80	303924 (36.9%)	297026 (36.8%)	6898 (40.8%)	6263 (41.5%)	635 (35.4%)
Labs					
HbA1c (%)	6.5 (1.37)	6.5 (1.36)	6.6 (1.55)	6.6 (1.52)	6.9 (1.74)
Serum creatinine	0.9 (0.36)	0.9 (0.36)	1.0 (0.48)	1.0 (0.49)	0.9 (0.43)
Total Cholesterol (mg/dL)	169.8 (43.22)	169.9 (43.16)	167.6 (45.88)	167.2 (45.52)	171.3 (48.75)
HDL-C (mg/dL)	50.1 (14.36)	50.1 (14.35)	49.1 (14.98)	49.2 (15.13)	47.6 (13.55)
LDL-C (mg/dL)	95.0 (36.22)	95.0 (36.20)	93.5 (37.09)	93.1 (37.10)	96.7 (36.92)
Triglycerides (mg/dL)	139.0 (107.70)	138.9 (107.37)	144.7 (122.74)	143.8 (125.45)	151.7 (97.44)
Pre-existing conditions					
Elixhauser comorbidity score					
0	68139 (8.3%)	67371 (8.3%)	768 (4.5%)	624 (4.1%)	144 (8%)
1-3	459962 (55.8%)	452970 (56.1%)	6992 (41.4%)	6058 (40.1%)	934 (52.1%)
4+	296549 (36%)	287411 (35.6%)	9138 (54.1%)	8422 (55.8%)	716 (39.9%)
Diabetes	246744 (29.9%)	240318 (29.8%)	6426 (38%)	5726 (37.9%)	700 (39%)
Heart failure	22574 (2.7%)	21391 (2.6%)	1183 (7%)	1119 (7.4%)	64 (3.6%)
CAD	49481 (6%)	47608 (5.9%)	1873 (11.1%)	1758 (11.6%)	115 (6.4%)
CKD	52923 (6.4%)	51094 (6.3%)	1829 (10.8%)	1703 (11.3%)	126 (7%)
Asthma	71275 (8.6%)	68727 (8.5%)	2548 (15.1%)	2420 (16%)	128 (7.1%)
COPD	34268 (4.2%)	32707 (4%)	1561 (9.2%)	1506 (10%)	55 (3.1%)
Pneumonia	32988 (4%)	31373 (3.9%)	1615 (9.6%)	1505 (10%)	110 (6.1%)
Lung disease	6829 (0.8%)	6472 (0.8%)	357 (2.1%)	345 (2.3%)	12 (0.7%)
Arrhythmia	94680 (11.5%)	91422 (11.3%)	3258 (19.3%)	3065 (20.3%)	193 (10.8%)
Valvular Disease	28168 (3.4%)	26991 (3.3%)	1177 (7%)	1121 (7.4%)	56 (3.1%)
Pulmonary	13224 (1.6%)	12562 (1.6%)	662 (3.9%)	623 (4.1%)	39 (2.2%)
Circulation Disease					
PVD	191739 (23.3%)	186096 (23%)	5643 (33.4%)	5259 (34.8%)	384 (21.4%)
Cancer	8892 (1.1%)	8520 (1.1%)	372 (2.2%)	353 (2.3%)	19 (1.1%)
Paralysis	6010 (0.7%)	5690 (0.7%)	320 (1.9%)	301 (2%)	19 (1.1%)
Neurological	31001 (3.8%)	29708 (3.7%)	1293 (7.7%)	1209 (8%)	84 (4.7%)
Disorders					
Hypothyroidism	90429 (11%)	88188 (10.9%)	2241 (13.3%)	2087 (13.8%)	154 (8.6%)
Peptic Ulcer	3572 (0.4%)	3388 (0.4%)	184 (1.1%)	174 (1.2%)	10 (0.6%)
AIDS/HIV	1444 (0.2%)	1384 (0.2%)	60 (0.4%)	56 (0.4%)	4 (0.2%)
Lymphoma	4572 (0.6%)	4379 (0.5%)	193 (1.1%)	182 (1.2%)	11 (0.6%)
Solid Tumor	35228 (4.3%)	34092 (4.2%)	1136 (6.7%)	1078 (7.1%)	58 (3.2%)
Rheumatoid	24733 (3%)	23816 (2.9%)	917 (5.4%)	855 (5.7%)	62 (3.5%)
Arthritis					
Mild liver disease	43008 (5.2%)	41499 (5.1%)	1509 (8.9%)	1368 (9.1%)	141 (7.9%)
Coagulopathy	21749 (2.6%)	20795 (2.6%)	954 (5.6%)	905 (6%)	49 (2.7%)
Electrolyte	81218 (9.8%)	78096 (9.7%)	3122 (18.5%)	2916 (19.3%)	206 (11.5%)
Disorders					
Anemia	28019 (3.4%)	26797 (3.3%)	1222 (7.2%)	1133 (7.5%)	89 (5%)

	<b>Total (N=824,650) Row Percent= 100%</b>	<b>Covid-19 Testing, No (N=807,752)  98%</b>	<b>Covid-19 Testing, Yes (N=16,898)  2.0%</b>	<b>Test Negative (N=15,104)  89.4%</b>	<b>Test Positive (N=1,794)  10.6%</b>
Alcohol Abuse	16412 (2%)	15747 (1.9%)	665 (3.9%)	625 (4.1%)	40 (2.2%)
Drug Abuse	10213 (1.2%)	9684 (1.2%)	529 (3.1%)	504 (3.3%)	25 (1.4%)
<b>Outpatient Antihypertensive Medication Use Prior to the Index Date</b>					
ACEI	279380 (33.9%)	274502 (34.0%)	4878 (28.9%)	4353 (28.8%)	525 (29.3%)
ARB	159248 (19.3%)	155775 (19.3%)	3473 (20.6%)	3116 (20.6%)	357 (19.9%)
BB or CCB or TD	184365 (22.4%)	180188 (22.3%)	4177 (24.7%)	3835 (25.4%)	342 (19.1%)
Other Antihypertensives	11457 (1.4%)	11080 (1.4%)	377 (2.2%)	355 (2.4%)	22 (1.2%)
No Antihypertensives	190200 (23.1%)	186207 (23.1%)	3993 (23.6%)	3445 (22.8%)	548 (30.5%)
<b>Outpatient Medications Prior to the Index Date Other than Antihypertensives</b>					
Lipid lowering	486243 (59%)	476022 (58.9%)	10221 (60.5%)	9198 (60.9%)	1023 (57%)
Antiplatelets	66093 (8%)	64292 (8%)	1801 (10.7%)	1639 (10.9%)	162 (9%)
Nitrates	28039 (3.4%)	26980 (3.3%)	1059 (6.3%)	999 (6.6%)	60 (3.3%)
Antiarrhythmic Agents	7422 (0.9%)	7151 (0.9%)	271 (1.6%)	255 (1.7%)	16 (0.9%)
Insulin	73776 (8.9%)	71346 (8.8%)	2430 (14.4%)	2183 (14.5%)	247 (13.8%)
Oral hypoglycemics	202842 (24.6%)	198119 (24.5%)	4723 (28%)	4146 (27.4%)	577 (32.2%)

Mean (SD) or N (%) are reported. Abbreviations: ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin receptor blockers; BP = blood pressure; CCB = calcium channel blockers; BB = beta-blockers; CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; DBP = diastolic blood pressure; HbA1c = hemoglobin A1c; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; PVD = peripheral vascular disease; SBP = systolic blood pressure; TD = thiazide diuretics. \*Patients with hypertension was identified from the Kaiser Permanente Southern California (KPSC) hypertension registry as of March 1<sup>st</sup>, 2020. The KPSC hypertension registry includes adult members having one of the following criteria: 1) hypertension diagnosis on the active problem list, 2)  $\geq 2$  outpatient visits with a diagnosis code of hypertension within 365 days of each other, 3)  $\geq 1$  outpatient visit and  $\geq 1$  hospital discharge with a diagnosis code of hypertension within 365 days of each other, 4)  $\geq 1$  antihypertensive medication dispensing in the past 6 months and  $\geq 1$  outpatient visit with a diagnosis code of hypertension within 365 days of the dispensing date, or 5)  $\geq 1$  outpatient visit with a diagnosis code of hypertension and having comorbidities of heart failure, diabetes, coronary artery disease, chronic kidney disease, or cerebrovascular accident.

**Table S2. Baseline Characteristics Before and After Matching (between ACEIs and CCB/BB/TD).**

	Before Matching		After Matching	
	ACEIs N=4,875	CCB/BB/TD N=4,170	ACEIs N=3,598	CCB/BB/TD N=3,598
Age in years				
18-39	159 (3.3%)	195 (4.7%)	126 (3.5%)	136 (3.8%)
40-64	2271 (46.6%)	1794 (43%)	1502 (41.7%)	1592 (44.2%)
65-85	2161 (44.3%)	1840 (44.1%)	1703 (47.3%)	1609 (44.7%)
85+	284 (5.8%)	341 (8.2%)	267 (7.4%)	261 (7.3%)
Women	2302 (47.2%)	2557 (61.3%)	1935 (53.8%)	2050 (57%)
Race/Ethnicity				
White	1896 (38.9%)	1621 (38.9%)	1485 (41.3%)	1421 (39.5%)
Asian	528 (10.8%)	565 (13.5%)	421 (11.7%)	457 (12.7%)
Black	603 (12.4%)	758 (18.2%)	559 (15.5%)	555 (15.4%)
Hispanic	1743 (35.8%)	1136 (27.2%)	1068 (29.7%)	1086 (30.2%)
Other/Unknown	105 (2.2%)	90 (2.2%)	65 (1.8%)	79 (2.2%)
BMI category				
<25	782 (16%)	887 (21.3%)	666 (18.5%)	699 (19.4%)
25-29.9	1403 (28.8%)	1270 (30.5%)	1102 (30.6%)	1101 (30.6%)
30-34.9	1242 (25.5%)	921 (22.1%)	861 (23.9%)	822 (22.8%)
35-39.9	645 (13.2%)	535 (12.8%)	472 (13.1%)	464 (12.9%)
≥40	554 (11.4%)	402 (9.6%)	356 (9.9%)	362 (10.1%)
Missing	249 (5.1%)	155 (3.7%)	141 (3.9%)	150 (4.2%)
Smoking status				
Never	2791 (57.3%)	2472 (59.3%)	2114 (58.8%)	2121 (58.9%)
Current	345 (7.1%)	211 (5.1%)	197 (5.5%)	203 (5.6%)
Former	1731 (35.5%)	1476 (35.4%)	1279 (35.5%)	1265 (35.2%)
Missing	8 (0.2%)	11 (0.3%)	8 (0.2%)	9 (0.3%)
Medicaid indicator	383 (7.9%)	342 (8.2%)	260 (7.2%)	291 (8.1%)
Household income				
\$0-49k	976 (20%)	753 (18.1%)	643 (17.9%)	666 (18.5%)
\$50-79k	1861 (38.2%)	1530 (36.7%)	1340 (37.2%)	1330 (37%)
\$80-99k	984 (20.2%)	856 (20.5%)	751 (20.9%)	737 (20.5%)
≥\$100k	1054 (21.6%)	1031 (24.7%)	864 (24%)	865 (24%)
Neighborhood education				
<75%	1487 (30.5%)	1097 (26.3%)	962 (26.7%)	985 (27.4%)
76-100%	3388 (69.5%)	3073 (73.7%)	2636 (73.3%)	2613 (72.6%)
Elixhauser score				
0	127 (2.6%)	112 (2.7%)	99 (2.8%)	98 (2.7%)
1-3	2079 (42.6%)	1744 (41.8%)	1546 (43%)	1515 (42.1%)
4+	2669 (54.7%)	2314 (55.5%)	1953 (54.3%)	1985 (55.2%)
Pre-existing comorbidities				
Pneumonia	393 (8.1%)	456 (10.9%)	331 (9.2%)	337 (9.4%)
Lung disease	82 (1.7%)	105 (2.5%)	71 (2%)	75 (2.1%)
Diabetes	2231 (45.8%)	1206 (28.9%)	1280 (35.6%)	1162 (32.3%)
Heart Failure	328 (6.7%)	395 (9.5%)	292 (8.1%)	298 (8.3%)
Asthma	618 (12.7%)	719 (17.2%)	541 (15%)	545 (15.1%)
COPD	378 (7.8%)	476 (11.4%)	348 (9.7%)	361 (10%)
Cancer	342 (7%)	333 (8%)	274 (7.6%)	278 (7.7%)
Outpatient Medications Prior to the Index Date				
Antiarrhythmic Agents	73 (1.5%)	112 (2.7%)	70 (1.9%)	71 (2%)
Antiplatelets	568 (11.7%)	479 (11.5%)	412 (11.5%)	408 (11.3%)
Insulin	892 (18.3%)	450 (10.8%)	491 (13.6%)	436 (12.1%)
Lipid lowering agents	3414 (70%)	2454 (58.8%)	2328 (64.7%)	2241 (62.3%)
Nitrates	318 (6.5%)	322 (7.7%)	280 (7.8%)	265 (7.4%)
Oral hypoglycemics	1805 (37%)	821 (19.7%)	887 (24.7%)	813 (22.6%)

SBP/DBP <140/90 mm Hg	4004 (82.1%)	3419 (82%)	2952 (82%)	2941 (81.7%)
SBP/DBP <130/80 mm Hg	2130 (43.7%)	1775 (42.6%)	1586 (44.1%)	1540 (42.8%)
Labs				
Serum creatinine	1.0 (0.39)	1.0 (0.56)	1.0 (0.41)	1.0 (0.57)
HDL-C (mg/dL)	47.9 (13.97)	50.2 (16.14)	49.4 (14.36)	49.5 (15.57)
HbA1c (%)	6.8 (1.62)	6.3 (1.35)	6.5 (1.44)	6.4 (1.39)
LDL-C (mg/dL)	90.8 (36.39)	94.7 (37.33)	92.5 (35.71)	93.9 (37.31)
Total Cholesterol (mg/dL)	164.0 (45.91)	169.6 (46.74)	166.2 (43.50)	168.4 (46.64)
Triglycerides (mg/dL)	146.1 (107.58)	138.7 (107.34)	136.9 (81.82)	141.1 (111.73)

Mean (SD) or N (%) are reported. Abbreviations: ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin receptor blockers; BP = blood pressure; CCB = calcium channel blockers; BB = beta-blockers; CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; DBP = diastolic blood pressure; HbA1c = hemoglobin A1c; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; PVD = peripheral vascular disease; SBP = systolic blood pressure; TD = thiazide diuretics.

**Table S3. Baseline Characteristics Before and After Matching (between ARBs and CCB/BBTD).**

	Before Matching		After Matching	
	ARB N=3,468	CCB/BB/TD N=4,170	ARB N=2,945	CCB/BB/TD N=2,945
Age in years				
18-39	76 (2.2%)	195 (4.7%)	73 (2.5%)	77 (2.6%)
40-64	1445 (41.7%)	1794 (43%)	1199 (40.7%)	1277 (43.4%)
65-85	1721 (49.6%)	1840 (44.1%)	1456 (49.4%)	1378 (46.8%)
85+	226 (6.5%)	341 (8.2%)	217 (7.4%)	213 (7.2%)
Women	2065 (59.5%)	2557 (61.3%)	1766 (60%)	1763 (59.9%)
Race/Ethnicity				
White	1149 (33.1%)	1621 (38.9%)	1072 (36.4%)	1064 (36.1%)
Asian	698 (20.1%)	565 (13.5%)	477 (16.2%)	504 (17.1%)
Black	469 (13.5%)	758 (18.2%)	456 (15.5%)	442 (15%)
Hispanic	1068 (30.8%)	1136 (27.2%)	877 (29.8%)	862 (29.3%)
Other/Unknown	84 (2.4%)	90 (2.2%)	63 (2.1%)	73 (2.5%)
BMI category				
<25	554 (16%)	887 (21.3%)	518 (17.6%)	510 (17.3%)
25-29.9	990 (28.5%)	1270 (30.5%)	872 (29.6%)	887 (30.1%)
30-34.9	925 (26.7%)	921 (22.1%)	721 (24.5%)	727 (24.7%)
35-39.9	487 (14%)	535 (12.8%)	409 (13.9%)	410 (13.9%)
≥40	392 (11.3%)	402 (9.6%)	319 (10.8%)	306 (10.4%)
Missing	120 (3.5%)	155 (3.7%)	106 (3.6%)	105 (3.6%)
Smoking status				
Never	2134 (61.5%)	2472 (59.3%)	1778 (60.4%)	1775 (60.3%)
Current	132 (3.8%)	211 (5.1%)	120 (4.1%)	133 (4.5%)
Former	1198 (34.5%)	1476 (35.4%)	1043 (35.4%)	1034 (35.1%)
Missing	4 (0.1%)	11 (0.3%)	4 (0.1%)	3 (0.1%)
Medicaid indicator	294 (8.5%)	342 (8.2%)	223 (7.6%)	241 (8.2%)
Household income				
\$0-49k	635 (18.3%)	753 (18.1%)	526 (17.9%)	538 (18.3%)
\$50-79k	1281 (36.9%)	1530 (36.7%)	1079 (36.6%)	1073 (36.4%)
\$80-99k	772 (22.3%)	856 (20.5%)	634 (21.5%)	641 (21.8%)
≥\$100k	780 (22.5%)	1031 (24.7%)	706 (24%)	693 (23.5%)
Neighborhood education				
<75%	969 (27.9%)	1097 (26.3%)	777 (26.4%)	784 (26.6%)
76-100%	2499 (72.1%)	3073 (73.7%)	2168 (73.6%)	2161 (73.4%)
Elixhauser score				
0	57 (1.6%)	112 (2.7%)	56 (1.9%)	72 (2.4%)
1-3	1263 (36.4%)	1744 (41.8%)	1112 (37.8%)	1156 (39.3%)
4+	2148 (61.9%)	2314 (55.5%)	1777 (60.3%)	1717 (58.3%)
Pre-existing comorbidities				
Pneumonia	340 (9.8%)	456 (10.9%)	299 (10.2%)	296 (10.1%)
Lung disease	83 (2.4%)	105 (2.5%)	77 (2.6%)	77 (2.6%)
Diabetes	1708 (49.3%)	1206 (28.9%)	1202 (40.8%)	1134 (38.5%)
Heart Failure	281 (8.1%)	395 (9.5%)	264 (9%)	268 (9.1%)
Asthma	620 (17.9%)	719 (17.2%)	531 (18%)	504 (17.1%)
COPD	366 (10.6%)	476 (11.4%)	339 (11.5%)	326 (11.1%)
Cancer	236 (6.8%)	333 (8%)	215 (7.3%)	217 (7.4%)
Outpatient Medications Prior to the Index Date				
Antiarrhythmic Agents	45 (1.3%)	112 (2.7%)	45 (1.5%)	49 (1.7%)
Antiplatelets	470 (13.6%)	479 (11.5%)	384 (13%)	367 (12.5%)
Insulin	643 (18.5%)	450 (10.8%)	456 (15.5%)	427 (14.5%)
Lipid lowering agents	2525 (72.8%)	2454 (58.8%)	2032 (69%)	1967 (66.8%)
Nitrates	291 (8.4%)	322 (7.7%)	254 (8.6%)	244 (8.3%)
Oral hypoglycemics	1275 (36.8%)	821 (19.7%)	833 (28.3%)	790 (26.8%)

SBP/DBP <140/90 mm Hg	2767 (79.8%)	3419 (82%)	2359 (80.1%)	2385 (81%)
SBP/DBP <130/80 mm Hg	1369 (39.5%)	1775 (42.6%)	1175 (39.9%)	1240 (42.1%)
Labs				
Serum creatinine	1.0 (0.51)	1.0 (0.56)	1.0 (0.43)	1.0 (0.60)
HDL-C (mg/dL)	49.0 (14.52)	50.2 (16.14)	49.9 (14.96)	49.4 (15.60)
HbA1c (%)	6.7 (1.40)	6.3 (1.35)	6.6 (1.34)	6.5 (1.45)
LDL-C (mg/dL)	89.1 (34.93)	94.7 (37.33)	90.7 (35.27)	92.8 (37.96)
Total Cholesterol (mg/dL)	163.7 (42.78)	169.6 (46.74)	165.2 (42.86)	167.3 (47.07)
Triglycerides (mg/dL)	151.1 (156.94)	138.7 (107.34)	145.2 (159.27)	140.5 (94.59)

Mean (SD) or N (%) are reported. ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin receptor blockers; BP = blood pressure; CCB = calcium channel blockers; BB = beta-blockers; CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; DBP = diastolic blood pressure; HbA1c = hemoglobin A1c; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; PVD = peripheral vascular disease; SBP = systolic blood pressure; TD = thiazide diuretics.



**Table S4. Baseline Characteristics Before and After Matching (between No Antihypertensive Medications and CCB/BB/TD).**

	Before Matching		After Matching	
	No Antihypertensive Medications N=3,990	CCB/BB/TD N=4,170	No Antihypertensive Medications N=3,110	CCB/BB/TD N=3,110
Age in years				
18-39	335 (8.4%)	195 (4.7%)	192 (6.2%)	143 (4.6%)
40-64	2031 (50.9%)	1794 (43%)	1507 (48.5%)	1531 (49.2%)
65-85	1321 (33.1%)	1840 (44.1%)	1173 (37.7%)	1176 (37.8%)
85+	303 (7.6%)	341 (8.2%)	238 (7.7%)	260 (8.4%)
Women	2215 (55.5%)	2557 (61.3%)	1879 (60.4%)	1850 (59.5%)
Race/Ethnicity				
White	1314 (32.9%)	1621 (38.9%)	1125 (36.2%)	1134 (36.5%)
Asian	495 (12.4%)	565 (13.5%)	415 (13.3%)	387 (12.4%)
Black	547 (13.7%)	758 (18.2%)	487 (15.7%)	503 (16.2%)
Hispanic	1546 (38.7%)	1136 (27.2%)	1010 (32.5%)	1026 (33%)
Other/Unknown	88 (2.2%)	90 (2.2%)	73 (2.3%)	60 (1.9%)
BMI category				
<25	851 (21.3%)	887 (21.3%)	688 (22.1%)	700 (22.5%)
25-29.9	1070 (26.8%)	1270 (30.5%)	909 (29.2%)	886 (28.5%)
30-34.9	827 (20.7%)	921 (22.1%)	666 (21.4%)	666 (21.4%)
35-39.9	435 (10.9%)	535 (12.8%)	385 (12.4%)	371 (11.9%)
≥40	412 (10.3%)	402 (9.6%)	308 (9.9%)	315 (10.1%)
Missing	395 (9.9%)	155 (3.7%)	154 (5%)	172 (5.5%)
Smoking status				
Never	2434 (61%)	2472 (59.3%)	1895 (60.9%)	1889 (60.7%)
Current	245 (6.1%)	211 (5.1%)	177 (5.7%)	175 (5.6%)
Former	1275 (32%)	1476 (35.4%)	1027 (33%)	1030 (33.1%)
Missing	36 (0.9%)	11 (0.3%)	11 (0.4%)	16 (0.5%)
Medicaid indicator	457 (11.5%)	342 (8.2%)	296 (9.5%)	283 (9.1%)
Household income				
\$0-49k	922 (23.1%)	753 (18.1%)	600 (19.3%)	623 (20%)
\$50-79k	1536 (38.5%)	1530 (36.7%)	1195 (38.4%)	1194 (38.4%)
\$80-99k	749 (18.8%)	856 (20.5%)	615 (19.8%)	616 (19.8%)
≥\$100k	783 (19.6%)	1031 (24.7%)	700 (22.5%)	677 (21.8%)
Neighborhood education				
<75%	1266 (31.7%)	1097 (26.3%)	885 (28.5%)	894 (28.7%)
76-100%	2724 (68.3%)	3073 (73.7%)	2225 (71.5%)	2216 (71.3%)
Elixhauser score				
0	455 (11.4%)	112 (2.7%)	105 (3.4%)	251 (8.1%)
1-3	1820 (45.6%)	1744 (41.8%)	1450 (46.6%)	1400 (45%)
4+	1715 (43%)	2314 (55.5%)	1555 (50%)	1459 (46.9%)
Pre-existing comorbidities				
Pneumonia	356 (8.9%)	456 (10.9%)	294 (9.5%)	282 (9.1%)
Lung disease	69 (1.7%)	105 (2.5%)	58 (1.9%)	59 (1.9%)
Diabetes	1129 (28.3%)	1206 (28.9%)	859 (27.6%)	893 (28.7%)
Heart Failure	105 (2.6%)	395 (9.5%)	114 (3.7%)	99 (3.2%)
Asthma	511 (12.8%)	719 (17.2%)	459 (14.8%)	453 (14.6%)
COPD	254 (6.4%)	476 (11.4%)	242 (7.8%)	238 (7.7%)
Cancer	233 (5.8%)	333 (8%)	217 (7%)	213 (6.8%)
Outpatient Medications Prior to the Index Date				
Antiarrhythmic Agents	26 (0.7%)	112 (2.7%)	30 (1%)	25 (0.8%)
Antiplatelets	239 (6%)	479 (11.5%)	240 (7.7%)	227 (7.3%)
Insulin	386 (9.7%)	450 (10.8%)	300 (9.6%)	322 (10.4%)
Lipid lowering agents	1577 (39.5%)	2454 (58.8%)	1508 (48.5%)	1460 (46.9%)

Nitrates	88 (2.2%)	322 (7.7%)	98 (3.2%)	88 (2.8%)
Oral hypoglycemics	739 (18.5%)	821 (19.7%)	592 (19%)	587 (18.9%)
SBP/DBP <140/90 mm Hg	2881 (72.2%)	3419 (82%)	2459 (79.1%)	2404 (77.3%)
SBP/DBP <130/80 mm Hg	1416 (35.5%)	1775 (42.6%)	1238 (39.8%)	1197 (38.5%)
Labs				
Serum creatinine	0.9 (0.44)	1.0 (0.56)	1.0 (0.55)	0.9 (0.43)
HDL-C (mg/dL)	49.3 (15.18)	50.2 (16.14)	50.3 (16.23)	50.1 (15.42)
HbA1c (%)	6.6 (1.75)	6.3 (1.35)	6.3 (1.36)	6.6 (1.70)
LDL-C (mg/dL)	101.5 (38.96)	94.7 (37.33)	97.9 (37.08)	101.0 (40.03)
Total Cholesterol (mg/dL)	175.7 (46.96)	169.6 (46.74)	173.1 (46.48)	175.3 (47.92)
Triglycerides (mg/dL)	145.0 (122.04)	138.7 (107.34)	141.0 (114.92)	140.3 (113.01)

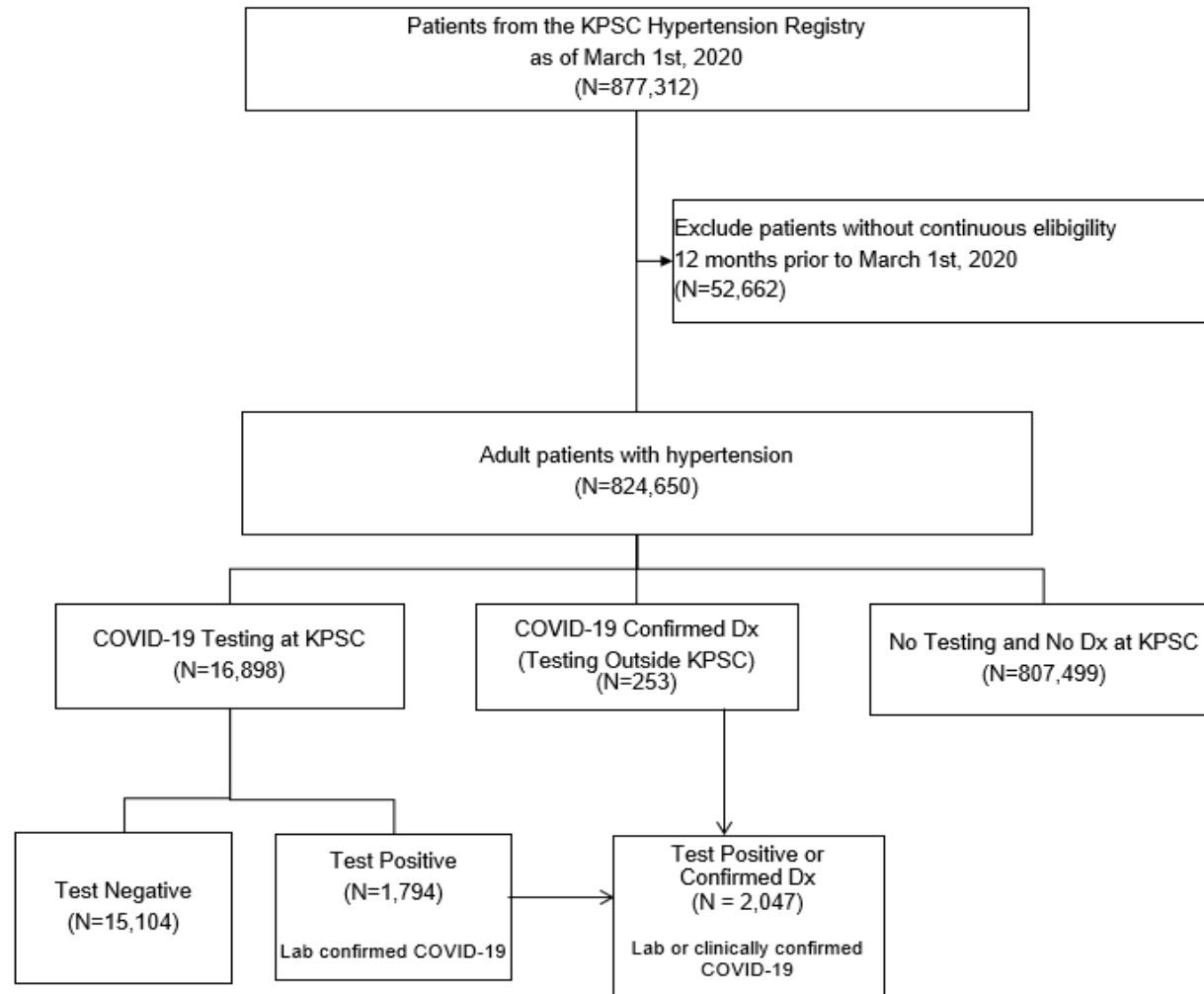
Mean (SD) or N (%) are reported. ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin receptor blockers; BP = blood pressure; CCB = calcium channel blockers; BB = beta-blockers; CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; DBP = diastolic blood pressure; HbA1c = hemoglobin A1c; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; PVD = peripheral vascular disease; SBP = systolic blood pressure; TD = thiazide diuretics.

**Table S5. Odds Ratio (95% CI) of Covid-19 Infection Associated with Antihypertensive Drug Exposure Among All Patients with Hypertension (Outcome = Covid-19 Infection; Reference group: CCB/BB/TD).**

	<b>Crude OR</b>	<b>Age- and Sex- Adjusted OR</b>	<b>Multivariable Adjusted OR*</b>
<b>ACEI</b>	1.01 (0.88-1.16)	0.98 (0.86-1.13)	0.92 (0.80-1.06)
<b>ARB</b>	1.20 (1.04-1.40)	1.15 (0.99-1.33)	1.04 (0.89-1.21)
<b>No Antihypertensive Medication</b>	1.55 (1.36-1.78)	1.38 (1.21-1.59)	1.44 (1.25-1.65)

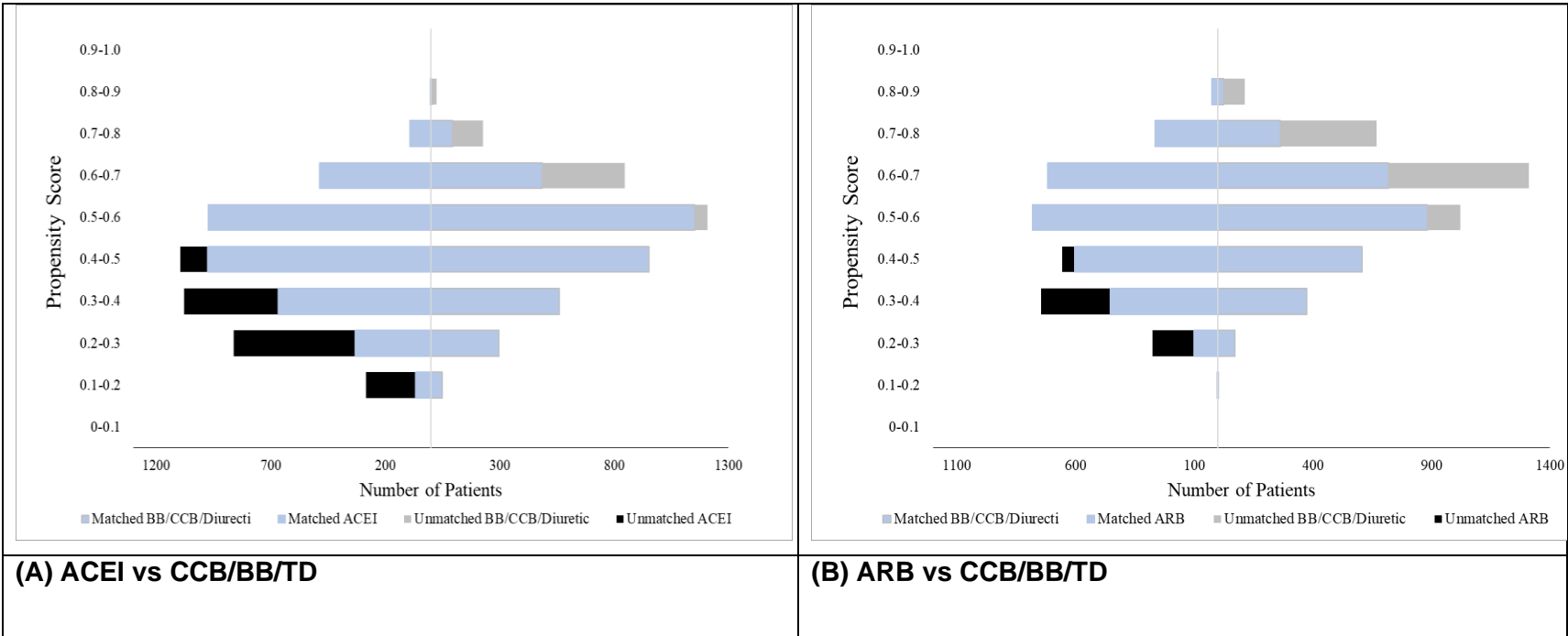
ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin receptor blockers; BB = beta blocker; CCB = calcium channel blocker; \*Patient demographics, neighborhood income and education, insurance, body mass index, smoking status, outpatient blood pressure, baseline comorbidities, and outpatient medication use were adjusted.

Figure S1. Study Cohort.



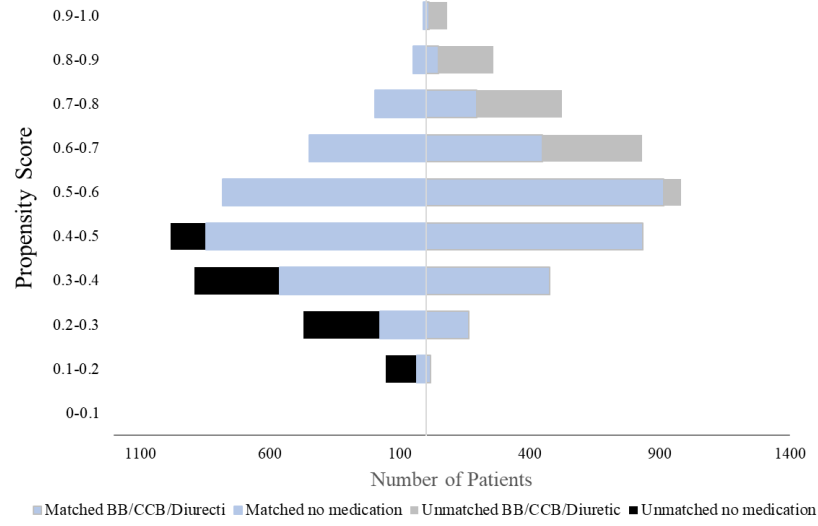
KPSC = Kaiser Permanente Southern California; Dx = diagnosis; COVID-19 Testing period = March 1-May 6, 2020; Test positive = Ever positive results

**Figure S2. Propensity Score Distribution.**



**(A) ACEI vs CCB/BB/TD**

**(B) ARB vs CCB/BB/TD**



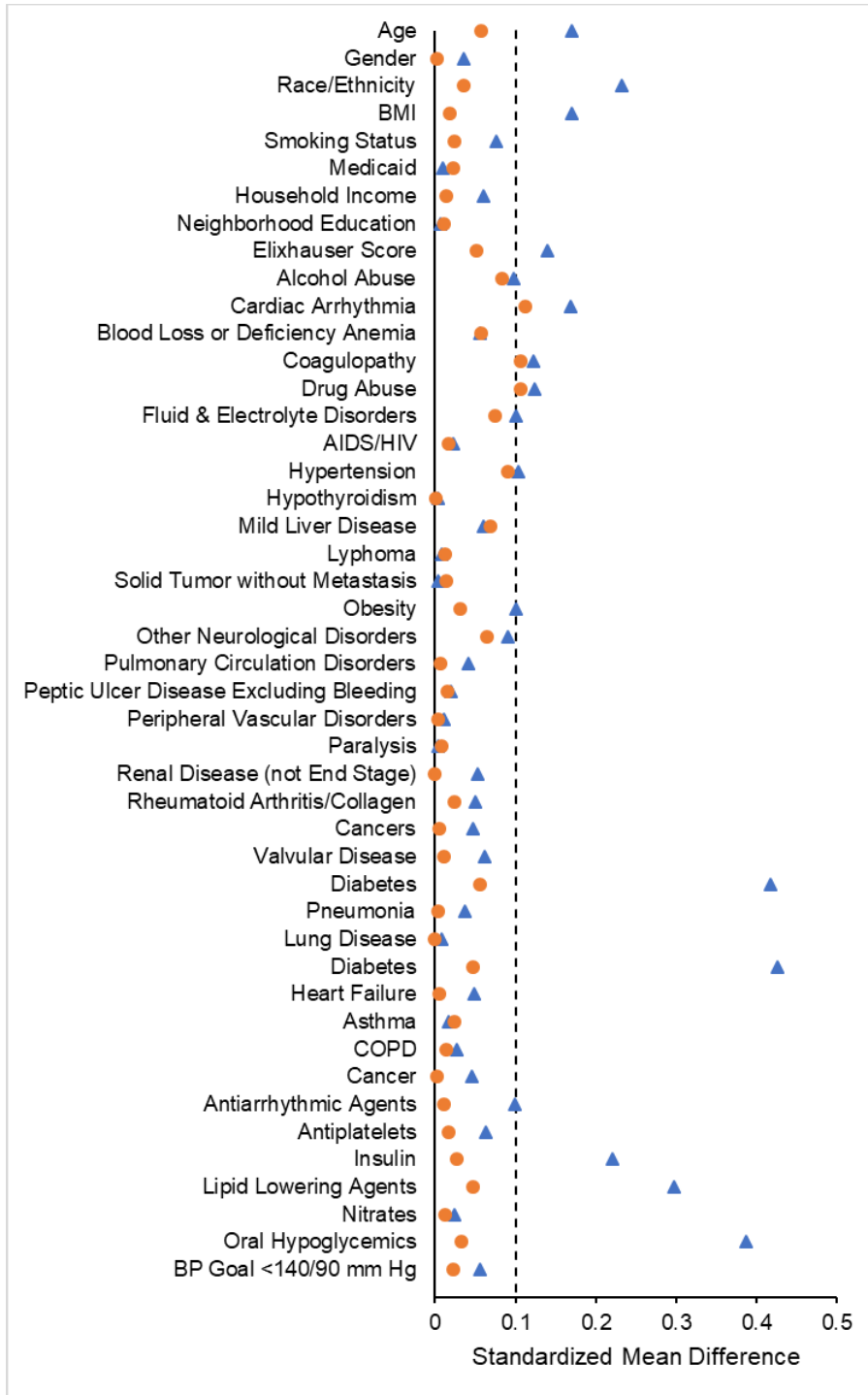
**(C) No antihypertensive medication vs CCB/BB/TD**

**Figure S3. Standardized Mean Difference Comparison Before and After Propensity Score Matching among Patients Taking ACEI or BB/CCB/TD.**



Blue triangle represents standardized mean difference (SMD) before matching, and orange circle represents SMD after matching. Hypertension refers to  $\geq 1$  outpatient visits with hypertension diagnosis codes.

**Figure S4. Standardized Mean Difference Comparison Before and After Propensity Score Matching among Patients Taking ARB or BB/CCB/TD.**



Blue triangle represents standardized mean difference (SMD) before matching, and orange circle represents SMD after matching. Hypertension refers to  $\geq 1$  outpatient visits with hypertension diagnosis codes.



**Figure S5. Standardized Mean Difference Comparison Before and After Propensity Score Matching among Patients Not Taking Antihypertensive Medications or Taking BB/CCB/TD.**



Blue triangle represents standardized mean difference (SMD) before matching, and orange circle represents SMD after matching. Hypertension refers to  $\geq 1$  outpatient visits with hypertension diagnosis codes.