Supplemental material

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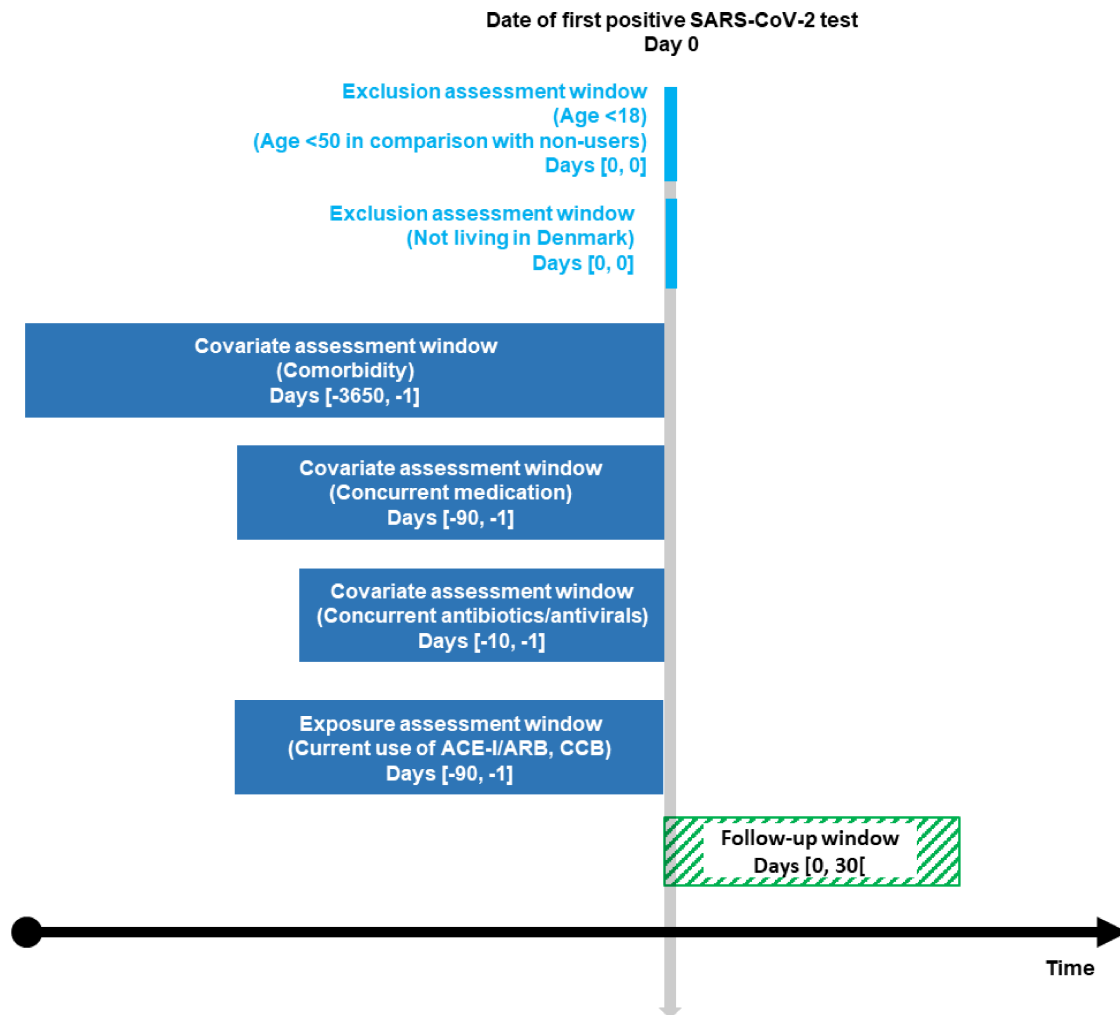
SUPPLEMENTAL CONTENT

eFigure 1. Cohort study design diagram.

eTable 1. Medication, diagnosis and treatment codes used in the study.

	Source/coding	Look-back	Inclusion codes	Exclusion codes
Exposures (ATC codes)				
Number of antihypertensives	NPD/ATC	90d	0-5 (see below: ACEI/ARB, CCB, Thiazides/diuretics, BB, other antihypertensives)	
ACEI	NPD/ATC	90d	C09A, C09B	
ARB	NPD/ATC	90d	C09C, C09D	
Calcium channel blockers (CCB)	NPD/ATC	90d	C07FB, C08CA, C09BB, C09DB, C09DX01	
Thiazides/diuretics	NPD/ATC	90d	C03AA01, C03AA03, C03AB01, C03AB03, C03AX01, C03EA, C07B, C09BA, C09DA, C09DX01, C09DX03, C09XA52, C09XA54	C07BA06 C09BA04
Beta-blockers (BB)	NPD/ATC	90d	C07	
Other antihypertensives	NPD/ATC	90d	C02AC, C02CA, C03BA11, C09XA C02AB01	C09XA54
Outcomes				
ICU admission (procedure code)	DNPR/Procedure		NABE, NABB	
Mechanical ventilation (procedure code)	DNPR/Procedure		BGDA0	
Acute renal replacement therapy (dialysis) (in patients without chronic dialysis)	DNPR/Procedure		BJFD0	BJFD2 (any codes within prior 12 months)
Treatment with inotropes/vasopressors	DNPR/Procedure		BFHC92A, BFHC92B, BFHC92C, BFHC92D, BFHC92E, BFHC93A, BFHC93B, BFHC93C, BFHC95	
Covariates				
Age	CPR			
Sex	CPR			
Marital status	CPR		(Widowed, divorced, married, unmarried, or unknown)	
Rural/urban place of residence	CPR		(Urban = Living in the cities of Copenhagen, Aarhus, Odense, or Aalborg)	
Ethnicity	CPR		(First-/ second-generation immigrant or non-immigrant)	
Calendar time (before / after lockdown was instituted March 13, 2020)	DNPR			
Hospital-diagnosed hypertension	DNPR/ICD-10	10y	I10, I15	
Stable angina pectoris (without procedures)	DNPR/ICD-10	10y	I20, I251, I259	I21, I22, I23, I200
Stable angina pectoris or CABG/PCI procedures	DNPR/ICD-10	10y	I20, I251, I259	I21, I22, I23, I200
	DNPR/Procedure	10y	KFNA, KFNB, KFNC, KFND, KFNE, KFNF, KFNG, KFNH20	I21, I22, I23, I200

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				(any diagnosis during hospital contact with the procedure or within 10 years before)
Myocardial infarction	DNPR/ICD-10	10y	I21, I22, I23	
Heart failure	DNPR/ICD-10	10y	I50	
Stroke	DNPR/ICD-10	10y	I60, I61, I63, I64	
Atrial fibrillation/flutter	DNPR/ICD-10	10y	I48	
Heart valve disease	DNPR/ICD-10	10y	I05, I06, I07, I08, I09.8, I34-I37, I39, I51.1A, Q22, Q23	
Venous thromboembolism	DNPR/ICD-10	10y	I26, I801, I802, I803	
Diabetes	DNPR/ICD-10	10y	E10, E11, E12, E13, E14, O24, G63.2, H360, N083	O24.4
	NPD/ATC	10y	A10A, A10B	
Chronic pulmonary disease	DNPR/ICD-10	10y	J40, J41-J44, J45−J47, J60−J67, J68.4, J70.1, J70.3, J84.1, J92.0, J96.1, J98.2, J98.3	
Markers of smoking (diagnoses or medications for tobacco smoking or chronic obstructive pulmonary disease)	DNPR/ICD-10	10y	J41-J44, F17, Z716, Z720	
	NPD/ATC	10y	R03, N07BA	
Obesity diagnoses or medications	DNPR/ICD-10	10y	E66	
	NPD/ATC	10y	A08	
Alcoholism-related diagnoses or medication for alcohol deterrent	DNPR/ICD-10	10y	DF10, DE244, DG312, DG621, DG721, DI426, DK292, DK70, DK852, DK860, DQ860, DZ502, DZ714, DZ721	F100
	NPD/ATC	10y	V03AA, N07BB	
Kidney disease diagnosis	DNPR/ICD-10	10y	I12, I13, N00−N05, N07, N11, N14, N18−N19, Q61, N08, E102, E112, E142	
End-stage renal disease (kidney transplant or dialysis)	DNPR/Procedure	10y	BJFD2	
	DNPR/Surgery	10y	KKAS	
	DNPR/ICD-10	10y	T861, Z940	
Liver disease	DNPR/ICD-10	10y	B18, B150, B160, B162, B190, I85, K70, K71, K72, K73, K74, K760, K76.6	
Dementia	DNPR/ICD-10	10y	DF00, DF01, DF02, DF03, DG30, DG310B, DG311, DG318, DG319	

	NPD/ATC	10y	N06D	
Cancer (including metastatic cancer)	DNPR/ICD-10	10y	C00−C96, D459, D46, D471, D473, D474, D475, CxxxM	C44
Concurrent antihypertensive medication (see exposures)	NPD/ATC			
Statins	NPD/ATC	90d	C10AA, C10B	
Aspirin	NPD/ATC	90d	B01AC06, N02BA01, N02BA51	
Opioid use	NPD/ATC	90d	N02A, N07BC02	
Immunosuppressant use	NPD/ATC	90d	L04	
Glucocorticoids	NPD/ATC	90d	H02AB	
Loop diuretics	NPD/ATC	90d	C03C	
Antibiotics	NPD/ATC	10d	J01	
Antivirals	NPD/ATC	10d	J05	
Vitamin K antagonists	NPD/ATC	90d	B01AA	
Antidepressants	NPD/ATC	90d	N06A	
Antipsychotics	NPD/ATC	90d	N05A	
Hypnotics/sedatives	NPD/ATC	90d	N05C	

Abbreviations: ATC, Anatomical Therapeutic Chemical Classification System; CPR, Danish Civil Registration System; DNPR, Danish National Patient Registry; ICD-10, *International Classification of Diseases, Tenth Revision*; NPD, National Prescription Database.

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eTable 2. Outcomes (death and ICU admission) among current ACEI/ARB users compared with CCB users after propensity-score weighting. Stratified by subgroups.

Death	Exposed		Unexposed		Comparison	
	Events	Risk (%)	Events	Risk (%)	Risk difference (%)	Relative risk
Overall	131/1,065	12.3 (10.3-14.4)	40/285	13.9 (9.2-18.6)	-1.5 (-6.7-3.6)	0.89 (0.61-1.30)
Subgroups:						
Age >65 years	122/573	21.2 (17.7-24.7)	45/190	23.5 (15.2-31.8)	-2.3 (-11.3-6.7)	0.90 (0.61-1.33)
Hypertension (no other cardiovascular disease)	55/616	9.0 (6.7-11.3)	17/179	9.7 (5.0-14.4)	-0.7 (-5.9-4.5)	0.93 (0.54-1.60)
After lock-down	124/1,022	12.1 (10.0-14.2)	39/276	14.0 (9.0-19.0)	-1.9 (-7.2-3.5)	0.87 (0.58-1.29)
ICU admission						
Overall	66/1,058	6.3 (4.8-7.8)	15/283	5.4 (2.3-8.4)	0.9 (-2.4-4.3)	1.17 (0.64-2.16)
Subgroups:						
Age >65 years	53/567	9.3 (6.9-11.7)	14/188	7.4 (0.9-14.0)	1.9 (-5.1-8.8)	1.25 (0.50-3.14)
Hypertension (no other cardiovascular disease)	39/613	6.3 (4.3-8.4)	7/179	3.9 (0.7-7.0)	2.5 (-1.3-6.2)	1.64 (0.68-3.97)
After lock-down	64/1,016	6.3 (4.8-7.8)	16/273	5.7 (2.0-9.4)	0.6 (-3.4-4.5)	1.10 (0.55-2.18)

Abbreviations: ACEI, Angiotensin converting enzyme inhibitors; ARB, Angiotensin receptor blockers; CCB, Calcium channel blockers; ICU, Intensive care unit

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eTable 3. Outcomes (death and ICU admission) by different exposure definitions after inverse probability of treatment weighting.

	Exposed		Unexposed		Comparison	
Death	Events	Risk (%)	Events	Risk (%)	Risk difference (%)	Relative risk
cACEI/ARB vs. cCCB	131/1,065	12.3 (10.3-14.4)	40/285	13.9 (9.2-18.6)	-1.5 (-6.7-3.6)	0.89 (0.61-1.30)
cACEI/ARB vs. no ACEI/ARB (50+)	112/1,179	9.5 (7.5-11.5)	512/4,738	10.8 (9.1-12.5)	-1.3 (-3.9-1.3)	0.88 (0.68-1.14)
Other exposures:						
Former vs. no ACEI/ARB (50+)	41/464	8.8 (6.2-11.4)	420/4,343	9.7 (8.7-10.6)	-0.9 (-3.6-1.9)	0.91 (0.67-1.24)
cACEI/ARB vs. cCCB with current use defined as 120 days	145/1,194	12.2 (10.2-14.1)	41/319	12.9 (9.0-16.9)	-0.7 (-5.1-3.6)	0.94 (0.67-1.33)
cACEI/ARB vs. no ACEI/ARB (50+) with current use defined as 120 days	124/1,354	9.1 (7.4-10.8)	522/4,713	11.1 (9.4-12.8)	-2.0 (-4.3-0.4)	0.82 (0.65-1.05)
cACEI vs. cCCB	66/425	15.6 (11.3-20.0)	43/285	14.9 (9.8-20.0)	0.7 (-6.0-7.4)	1.05 (0.68-1.62)
cARB vs. cCCB	72/636	11.3 (8.6-14.0)	41/288	14.1 (9.5-18.8)	-2.8 (-8.2-2.5)	0.80 (0.53-1.20)
cACEI/ARB vs. thiazide	120/1,001	12.0 (9.9-14.1)	19/202	9.5 (3.7-15.2)	2.5 (-3.6-8.6)	1.27 (0.67-2.38)
cACEI/ARB vs. beta blocker	165/1,182	14.0 (9.4-18.5)	60/456	13.2 (10.0-16.5)	0.7 (-4.9-6.3)	1.06 (0.70-1.59)
ICU admission						
cACEI/ARB vs. cCCB	66/1,058	6.3 (4.8-7.8)	15/283	5.4 (2.3-8.4)	0.9 (-2.4-4.3)	1.17 (0.64-2.16)
cACEI/ARB vs. no ACEI/ARB (50+)	75/1,173	6.4 (4.7-8.1)	243/4,733	5.1 (2.2-8.1)	1.3 (-2.1-4.7)	1.25 (0.66-2.36)
Other exposures:						
Former vs. no ACEI/ARB (50+)	32/463	6.9 (4.4-9.5)	172/4,338	4.0 (3.4-4.6)	3.0 (0.3-5.6)	1.74 (1.17-2.59)
cACEI/ARB vs. cCCB with current use defined as 120 days	84/1,188	7.0 (5.6-8.5)	15/316	4.7 (2.3-7.1)	2.4 (-0.5-5.2)	1.50 (0.86-2.63)
cACEI/ARB vs. no ACEI/ARB (50+) with current use defined as 120 days	103/1,349	7.6 (5.8-9.4)	239/4,708	5.1 (2.3-7.8)	2.5 (-0.7-5.8)	1.50 (0.83-2.69)
cACEI vs. cCCB	28/418	6.8 (4.2-9.4)	20/283	7.0 (2.5-11.4)	-0.2 (-5.3-4.9)	0.98 (0.47-2.05)
cARB vs. cCCB	40/634	6.3 (4.3-8.3)	14/286	4.8 (2.3-7.2)	1.5 (-1.6-4.7)	1.32 (0.72-2.42)
cACEI/ARB vs. thiazide	NA	NA	NA	NA	5.7 (2.6-8.9)	4.24 (0.93-19.40)
cACEI/ARB vs. beta blocker	87/1,175	7.4 (3.8-11.1)	33/452	7.3 (4.0-10.5)	0.2 (-4.7-5.1)	1.02 (0.53-1.99)

Abbreviations: ACEI, Angiotensin converting enzyme inhibitors; ARB, Angiotensin receptor blockers; c, Current; CCB, Calcium channel blockers; NA, not available (masked to prevent identification of individuals when n<5)

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eTable 4. Characteristics by exposure group (current ACEI/ARB, no ACEI/ARB, current CCB) regardless of test result

	Current ACEI/ARB users	No ACEI/ARB use	Current CCB users
	(n=110,330)	(n=952,875)	(n=56,591)
Age, median (IQR)	67 (58-76)	38 (24-54)	68 (59-77)
Sex (male)	55,846 (50.6)	404,285 (42.4)	28,864 (51.0)
Marital status			
Widowed	16,449 (14.9)	32,025 (3.4)	9,313 (16.5)
Divorced	18,459 (16.7)	97,169 (10.2)	9,494 (16.8)
Married	62,299 (56.5)	351,872 (36.9)	31,511 (55.7)
Unmarried	12,783 (11.6)	470,651 (49.4)	6,096 (10.8)
Unknown	340 (0.3)	1,158 (0.1)	177 (0.3)
Ethnicity			
Non-immigrant	102,792 (93.2)	807,456 (84.7)	52,765 (93.2)
First- or second-generation immigrant	7,538 (6.8)	145,419 (15.3)	3,826 (6.8)
Residence			
Non-urban	76,907 (69.7)	551,966 (57.9)	40,045 (70.8)
Urban	33,423 (30.3)	400,909 (42.1)	16,546 (29.2)
Health care professional			
Physician	455 (0.4)	9,961 (1.0)	217 (0.4)
Nurse	1,771 (1.6)	30,429 (3.2)	729 (1.3)
Care assistant	2,037 (1.8)	22,091 (2.3)	947 (1.7)
Use of antihypertensives			
Angiotensin converting enzyme inhibitors	46,782 (42.4)	-	12,532 (22.1)
Angiotensin receptor blockers	64,354 (58.3)	-	18,289 (32.3)
Calcium channel blockers	30,604 (27.7)	19,850 (2.1)	56,591 (100.0)
Thiazides	33,622 (30.5)	11,409 (1.2)	14,031 (24.8)
Beta blockers	28,483 (25.8)	26,275 (2.8)	14,370 (25.4)
Other antihypertensives	1,919 (1.7)	1,000 (0.1)	1,566 (2.8)
Diagnoses			
Hypertension	48,937 (44.4)	34,836 (3.7)	27,620 (48.8)
Atrial fibrillation	14,370 (13.0)	21,345 (2.2)	6,135 (10.8)
Obesity	12,019 (10.9)	56,152 (5.9)	5,500 (9.7)
Angina	16,843 (15.3)	21,063 (2.2)	8,505 (15.0)
Heart valve disease	6,605 (6.0)	10,172 (1.1)	3,362 (5.9)

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Alcohol abuse	4,804 (4.4)	21,345 (2.2)	2,546 (4.5)
Diabetes	27,006 (24.5)	34,298 (3.6)	12,452 (22.0)
Venous thromboembolism	3,837 (3.5)	11,906 (1.2)	1,917 (3.4)
Dementia	2,576 (2.3)	6,887 (0.7)	1,485 (2.6)
Myocardial infarction	6,082 (5.5)	6,637 (0.7)	2,600 (4.6)
Liver disease	1,689 (1.5)	8,155 (0.9)	879 (1.6)
Kidney disease	5,888 (5.3)	7,720 (0.8)	4,073 (7.2)
Chronic obstructive pulmonary disease	13,410 (12.2)	56,044 (5.9)	6,894 (12.2)
End-stage renal disease	352 (0.3)	714 (0.1)	437 (0.8)
Heart failure	9,786 (8.9)	5,122 (0.5)	2,012 (3.6)
Cancer	14,748 (13.4)	41,817 (4.4)	8,032 (14.2)
Stroke	8,264 (7.5)	12,739 (1.3)	5,004 (8.8)
Markers of smoking	39,884 (36.1)	245,705 (25.8)	20,330 (35.9)
Medication			
Statins	43,769 (39.7)	42,956 (4.5)	22,058 (39.0)
Antiviral	1,117 (1.0)	10,877 (1.1)	553 (1.0)
Low-dose acetylsalicylic acid	16,737 (15.2)	16,868 (1.8)	9,111 (16.1)
Vitamin K-antagonists	3,259 (3.0)	4,048 (0.4)	1,375 (2.4)
Opioids	12,914 (11.7)	34,683 (3.6)	7,119 (12.6)
Antidepressants	15,166 (13.7)	55,507 (5.8)	8,243 (14.6)
Immunosuppresants	822 (0.7)	3,183 (0.3)	405 (0.7)
Antipsychotics	3,270 (3.0)	18,408 (1.9)	1,791 (3.2)
Glucocorticoids	4,669 (4.2)	13,543 (1.4)	2,534 (4.5)
Hypnotics	6,395 (5.8)	21,623 (2.3)	3,554 (6.3)
Loop diuretics	12,532 (11.4)	13,744 (1.4)	6,003 (10.6)
Antibiotics	18,183 (16.5)	89,109 (9.4)	9,589 (16.9)

Abbreviations: ACEI, angiotensin converting enzyme inhibitors; ARB, angiotensin receptor blocker; CCB, calcium channel blocker.

eTable 5. Positive:negative ratio of SARS-CoV-2 test in exposure groups overall and stratified by age groups.

	Current ACEI/ARB users	No ACEI/ARB use	Current CCB users
Overall	0.0135	0.0122	0.0123
Age group (years)			
18-29	0.0078	0.0112	0.0164
30-44	0.0124	0.0129	0.0108
45-65	0.0137	0.0147	0.0116
>65	0.0134	0.0140	0.0129

Abbreviations: ACEI, angiotensin converting enzyme inhibitors; ARB, angiotensin receptor blocker; CCB, calcium channel blocker.

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