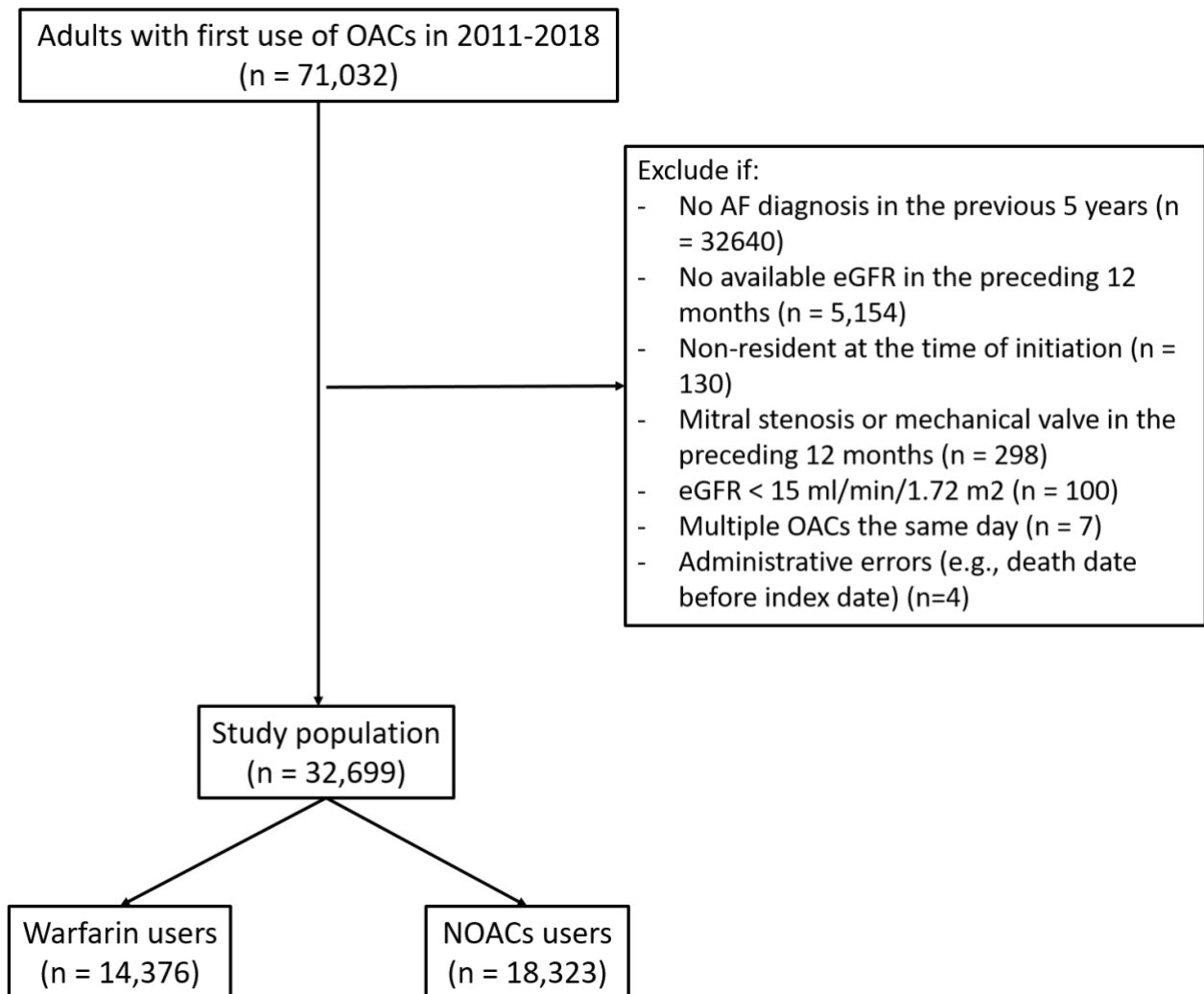
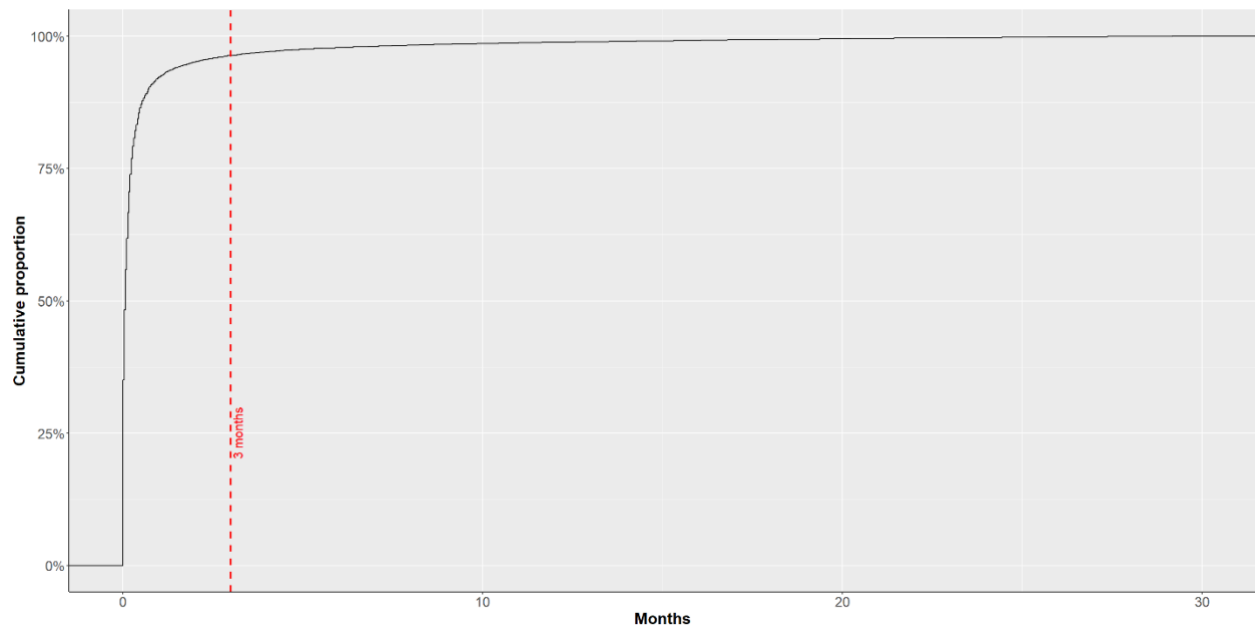


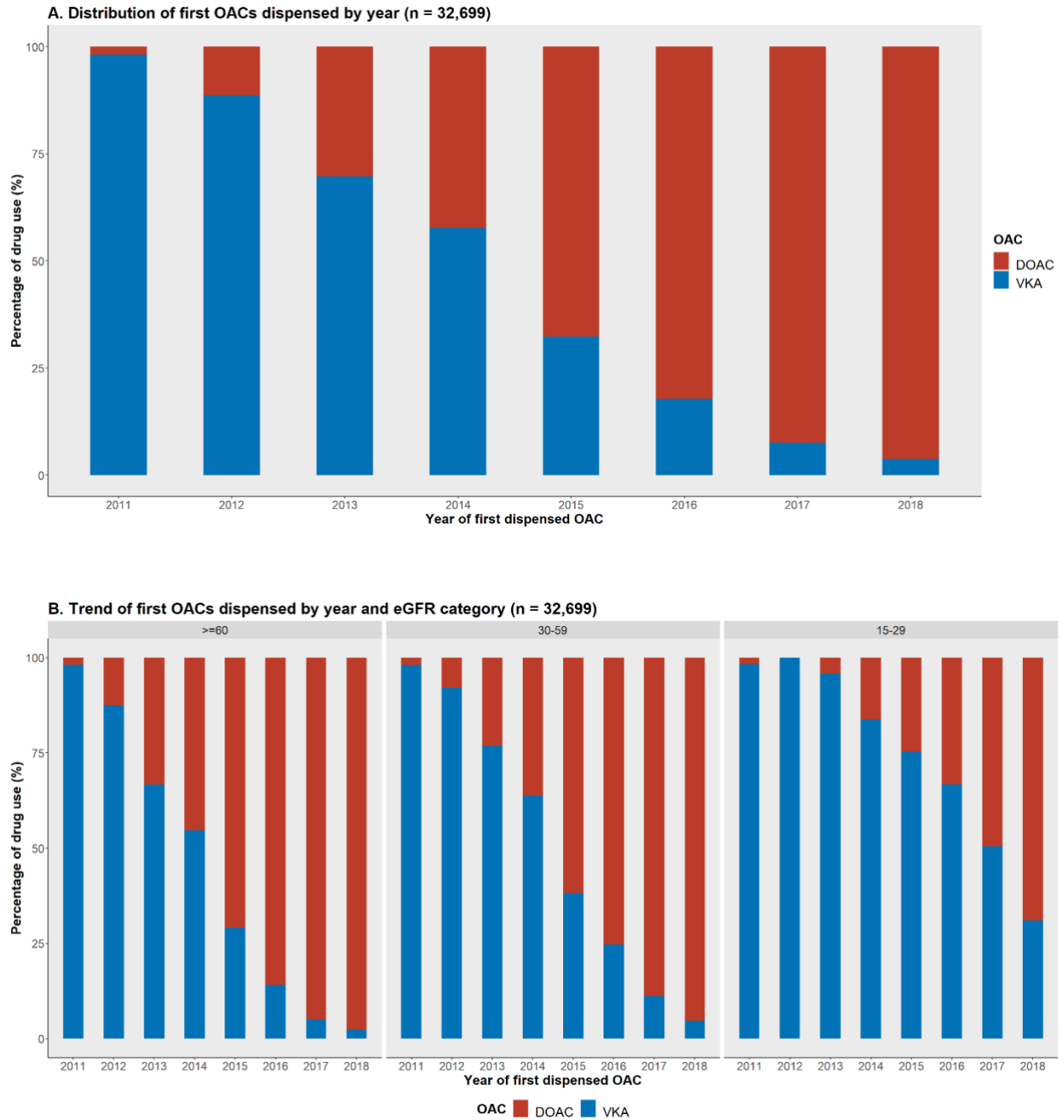
**Figure S1.** Selection of the study population



**Figure S2.** Cumulative proportion of time between atrial fibrillation diagnosis and treatment initiation (n=32,699)

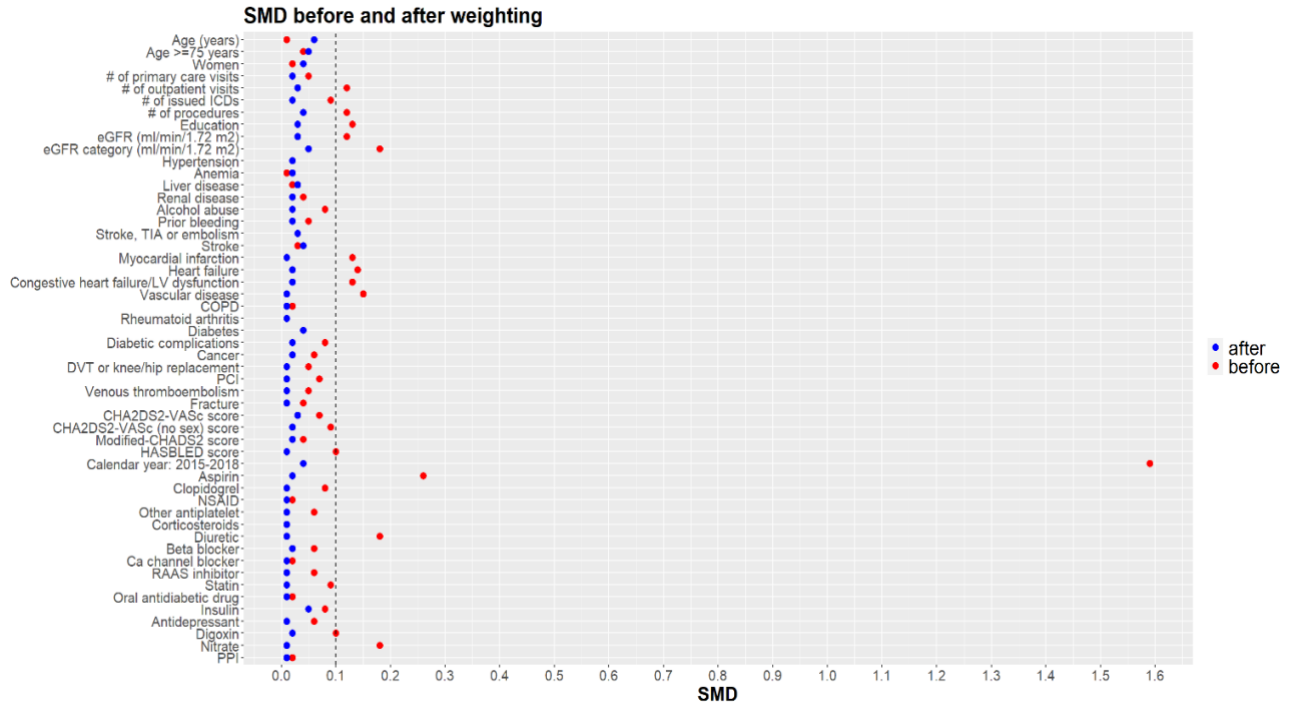


**Figure S3.** Pattern of OAC prescription over time overall (Panel A) and by eGFR categories (Panel B).



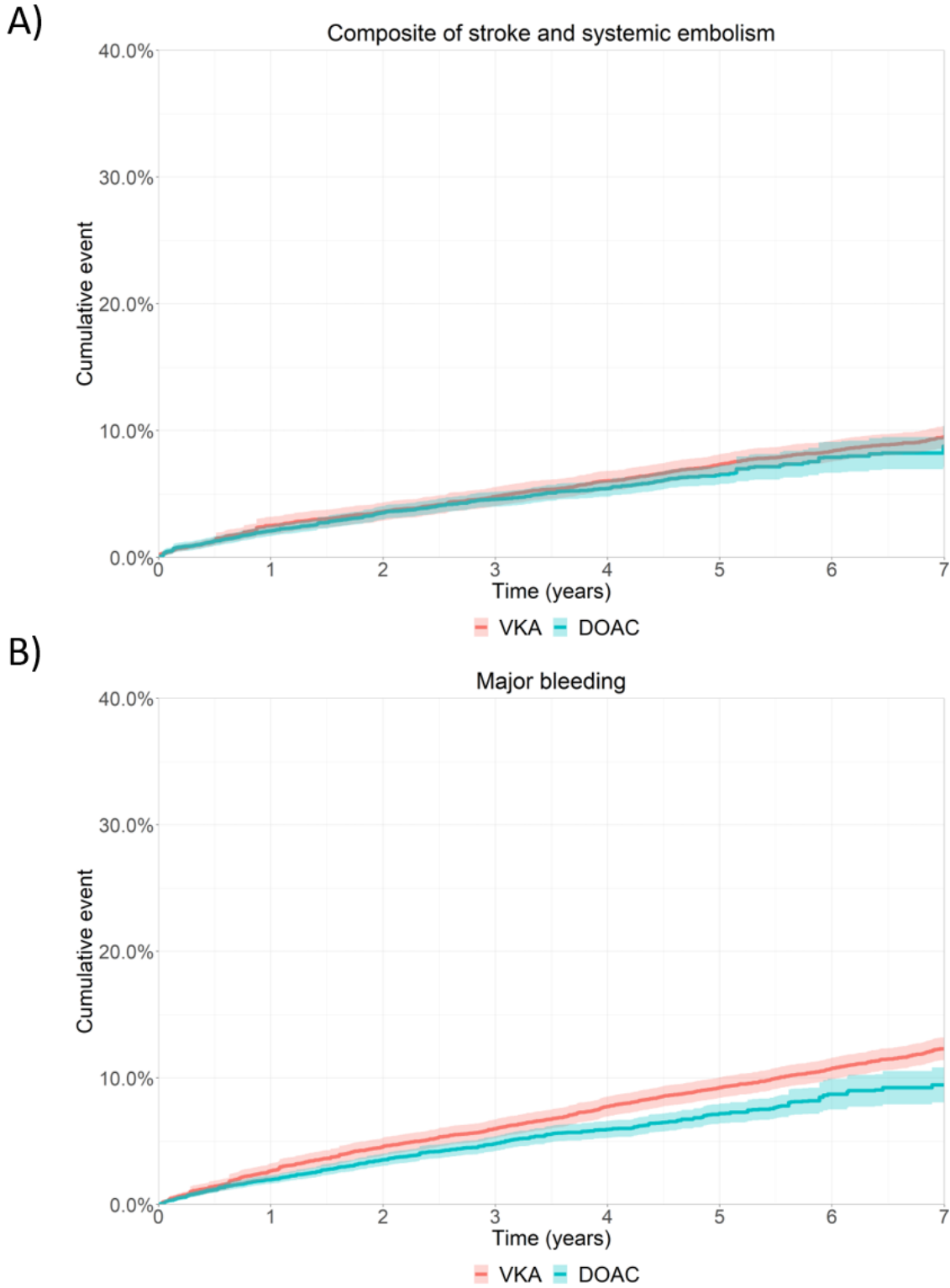
Note: Oral anticoagulants (OAC) refer to both direct oral anticoagulants (DOACs) and warfarin.

**Figure S4.** Standardized mean difference before and after inverse probability of treatment weighting.

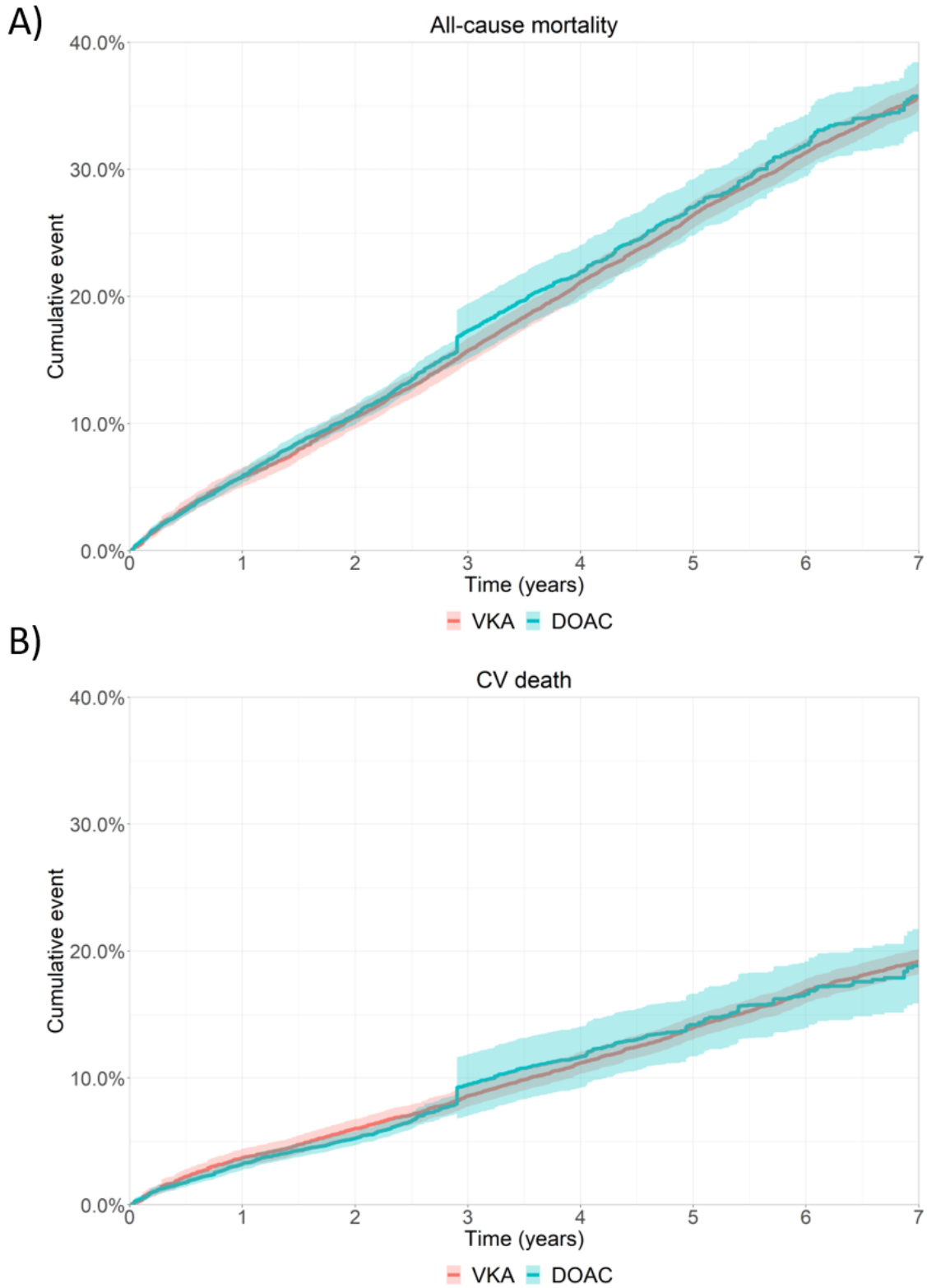


Abbreviations: SMD, standardized mean difference; eGFR, estimated glomerular filtration rate; TIA, transient ischemic attack, LV, left ventricular; COPD, chronic obstructive pulmonary disease; DVT, deep vein thrombosis; PCI, percutaneous coronary intervention; NSAID, non-steroidal anti-inflammatory drug; RAAS, renin-angiotensin-aldosterone system; PPI, proton pump inhibitors

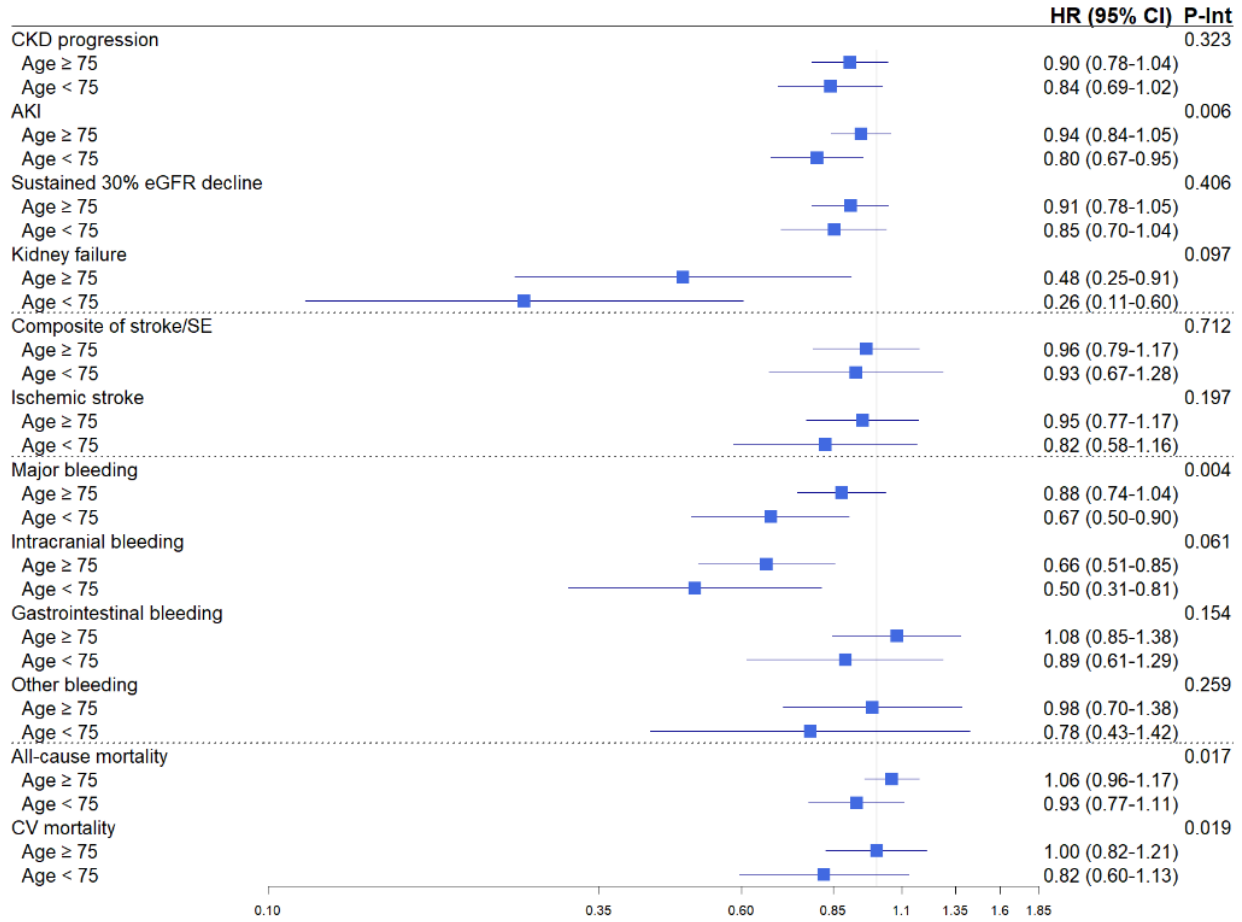
**Figure S5.** Weighted cumulative incidence curves for (A) composite of stroke and systemic embolism and (B) major bleeding by DOAC or VKA initiation. Shaded areas represent 95% confidence intervals.



**Figure S6.** Weighted cumulative incidence curves for (A) all-cause of death and (B) cardiovascular death by DOAC or VKA initiation. Shaded areas represent 95% confidence intervals.



**Figure S7.** Association between DOAC vs. VKA use and outcomes by age strata

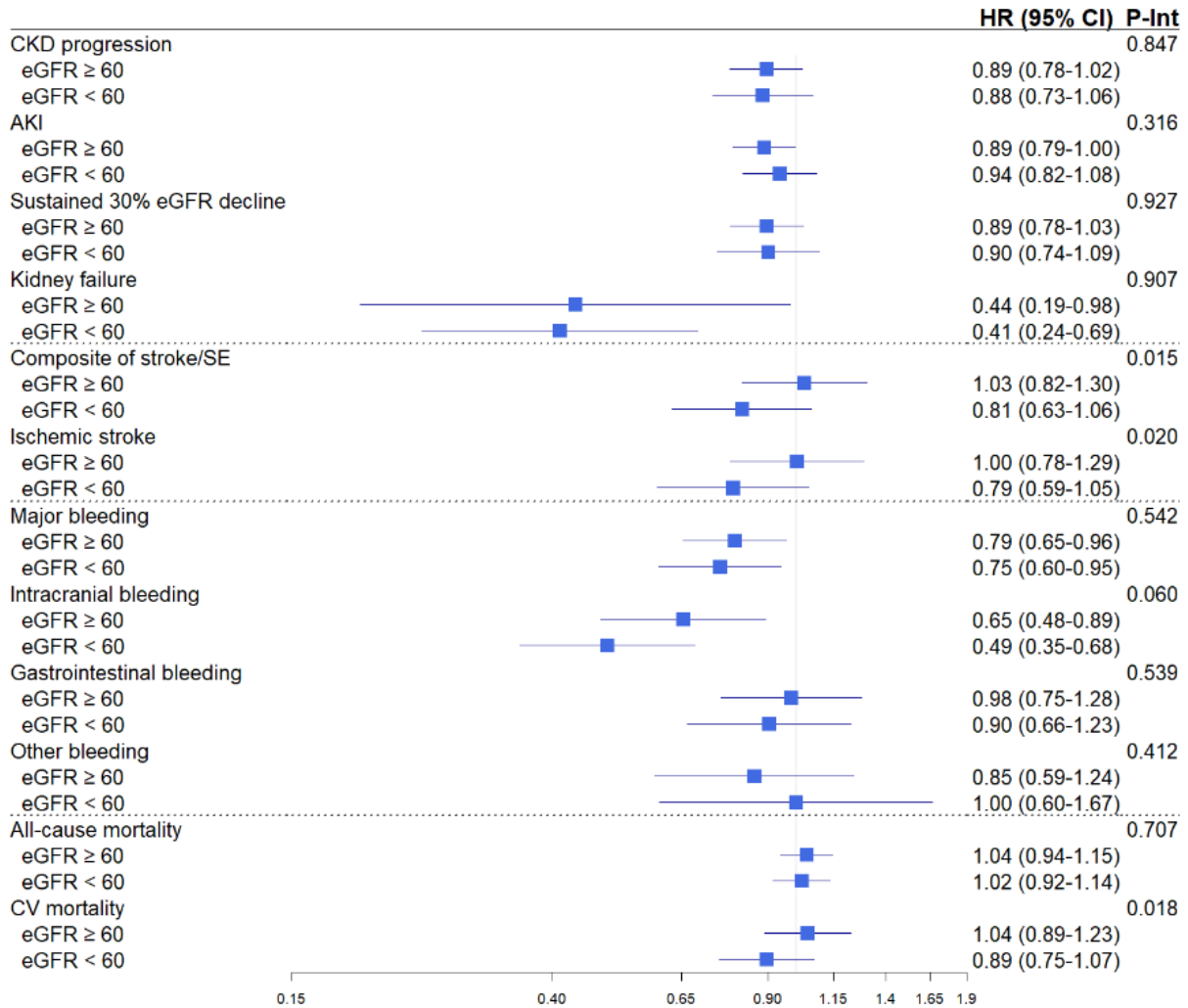


Abbreviations: DOAC, direct oral anticoagulant; VKA, vitamin K antagonist; HR, hazard ratio; CI, confidence interval; P-int, p-value interaction; AKI, acute kidney injury; SE, systemic embolism; CV, cardiovascular

Analyses were adjusted for: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors using inverse probability of treatment weighting

Note: These results should be carefully interpreted and considered as hypothesis generating only, as they are not corrected for multiple testing and may be subject to false positives.

**Figure S8.** Association between DOAC vs. VKA use and outcomes by eGFR strata

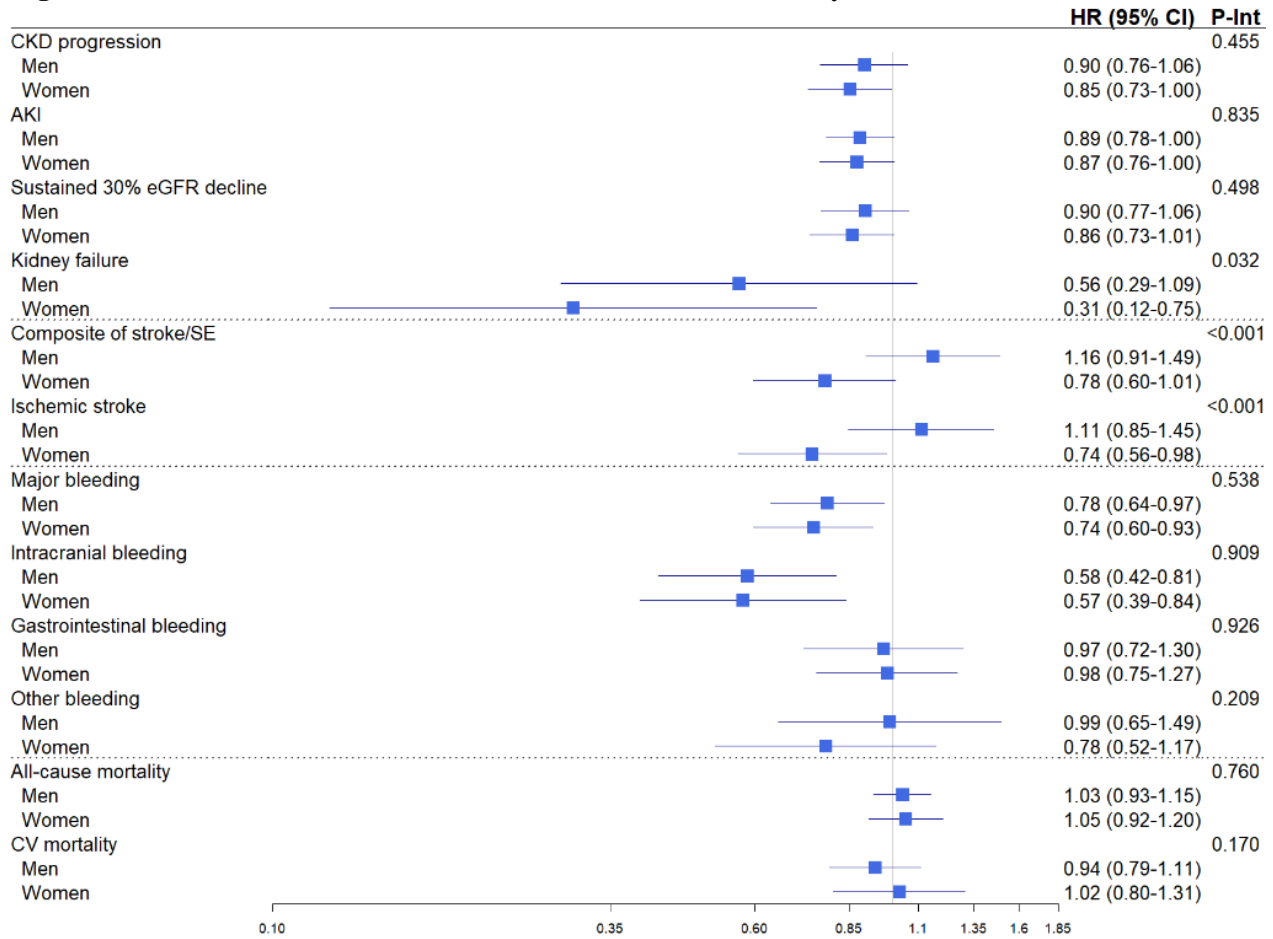


Abbreviations: DOAC, direct oral anticoagulant; VKA, vitamin K antagonist; eGFR, estimated glomerular filtration rate; HR, hazard ratio; CI, confidence interval; P-int, p-value interaction; AKI, acute kidney injury; SE, systemic embolism; CV, cardiovascular

Analyses were adjusted for: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors using inverse probability of treatment weighting

Note: These results should be carefully interpreted and considered as hypothesis generating only, as they are not corrected for multiple testing and may be subject to false positives.

**Figure S9.** Association between DOAC vs. VKA use and outcomes by sex



Abbreviations: DOAC, direct oral anticoagulant; VKA, vitamin K antagonist; HR, hazard ratio; CI, confidence interval; P-int, p-value interaction; AKI, acute kidney injury; SE, systemic embolism; CV, cardiovascular

Analyses were adjusted for: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors using inverse probability of treatment weighting

Note: These results should be carefully interpreted and considered as hypothesis generating only, as they are not corrected for multiple testing and may be subject to false positives.

**Table S1.** Definition of comorbidities

<b>Baseline comorbidities</b>	<b>ICD-code beginning with</b>
Atrial fibrillation	I48
Hypertension	I10-I15
Anaemia	D50-64
Liver disease	K70-77
Chronic kidney disease	N183, N184, N185, N189
Alcoholism	E244, F10, G312, G621, G721, I426, K292, K70, K860, O354, P043, Q860, T51, Y90-91, Z502, Z714
Any severe bleed	I60-62, I690-I692, S064-66, I850, I983, K25-28 (subcodes 0-2 and 4-6 only), K625, K922, D500, D629, J942, I312, H431, H356
Ischemic stroke, arterial embolism, and stroke, unspecified	I63, I64, I67, I69, Z866A, Z866B, Z867, G450, G451, G452, G453, G458, G45.9, I74
Stroke	I63, I64, I67, I69
Myocardial infarction	I21, I22, I252
Heart failure	I50
Congestive heart failure/LV dysfunction	I50, I110, I130, I132
Vascular disease	I20-I25, I70, I739
COPD	J43-44
Rheumatoid arthritis	M05, M06, M32-34, M315, M351, M353, M360
Diabetes	E10-14
Diabetes complications	E110-E118, E130-E138, E140-E148, E160-E162, G990, G590, G632, H280, H358, H360, M142, M146
Cancer	C-series
Mechanical valves or mitral stenosis (1 year prior)	I050, I052, I342, Z952 Procedure codes: FCA60, FDC10, FGE00, FGE96, FJF00, FJF96, FKD00, FKD96, FMD00, FMD96
DVT or knee/hip replacement (1 year prior)	I26, I80, I81, I82, NGB, NGC, NFB, NFG (procedure codes)
PCI	Procedure codes: FNG
Venous thromboembolism	I26, I80-82
Fracture	S02 (except S025), S12, S22, S32, S42, S52, S62, S72, S82, S92, T02, T08, T10, T12, M484, M485, M843

**Table S2.** Definition of medications

<b>Medication</b>	<b>ATC code beginning with</b>
Vitamin K antagonist	B01AA03
DOAC	B01AF02, B01AE07, B01AF03, B01AF01
Aspirin (low-dose)	B01AC06
Clopidogrel	B01AC04
NSAID	M01A
Other antiplatelet	B01AC22, B01AC24, B01AC07
Corticosteroids	H02AA01, H02AA02, H02AA03, H02AB
Diuretic	C03A, C03B, C03C, C03D, C03E
Beta blocker	C07A, C07B, C07C, C07D, C07E, C07F
Calcium channel blocker	C08C, C08D, C08E, C08G
RAAS inhibitor	C09A, C09B, C09C, C09D, C09X
Statin	C10AA
Oral antidiabetic drug	A10B
Insulin	A10A
Antidepressant	N06A
Digoxin	C01AA05
Nitrate	C01DA
PPI	A02BC

DOAC direct oral anticoagulant; NSAID non-steroidal anti-inflammatory drug; RAAS renin-angiotensin-aldosterone system, PPI proton pump inhibitor

**Table S3.** Risk scores

**CHA<sub>2</sub>DS<sub>2</sub>-VASc**

Predictor	Score	Definition
Congestive heart failure/LV dysfunction	1	I50,I110,I130,I132
Hypertension	1	I10-I15
Age		Age at initiation
65-74 y	1	
≥ 75 y	2	
Diabetes mellitus	1	E10-14
Previous stroke / TIA / TE	2	I63, I64, I67, I69, Z866A, Z866B, Z867, G450, G451, G452, G453, G458, G45.9,I74
Vascular disease	1	I20-I25, I70, I739
Sex (female gender)	1	Registered sex

**Modified-CHADS<sub>2</sub>**

Predictor	Score	Definition SCREAM
Age		Age at initiation
40-64	1	
65-69	2	
70-74	3	
75-79	4	
80-85	5	
85-115	6	
Sex		Registered sex
Male	0	
Female	1	
Diabetes	1	E10-14
History of stroke/TIA	6	I63, I64, I67, I69, Z866A, Z866B, Z867, G450, G451, G452, G453, G458, G45.9

**HAS-BLED**

Predictor	Score	Definition
Hypertension	1	I10-13,I15
Abnormal kidney function	1	Dialysis, transplantation or creatinine >200 µmol/L
Liver disease	1	K70-77
Stroke	1	I63, I64, I67, I69
Bleeding	1	I230, I312, S260, I600-616, I618-621, I629, S065, S066, H922, R041, K625, K921, D62, D683, D698, D699, K661, K762, M250, R58, S064, T792, J942, K920, R042, R048, R049, S271, I850, I983, K226, K250, K252, K254, K256, K260, K262, K264, K266, K270, K272, K274, K276, K280, K282, K284, K286, K290, K922, N924, N938, N939, N950, J942, K920, R042, R048, R049,

		S271, I850, I983, K226, K250, K252, K254, K256, K260, K262
Age >65 years	1	Age at initiation
Use of aspirin, clopidogrel, NSAIDs	1	B01AC06, B01AC04, M01A
Alcoholism	1	E244, F10, G312, G621, G721, I426, K292, K70, K860, O354, P043, Q860, T51, Y90-91, Z502, Z714

Abbreviations: LV left ventricle; TIA transient ischemic attack; TE thromboembolism; NSAIDs non-steroidal anti-inflammatory drugs

**Table S4.** Definition of outcomes

<b>Outcomes</b>	<b>Definition</b>	<b>End of follow-up</b>
<b>CKD progression</b>		
Kidney failure	<ul style="list-style-type: none"> <li>Registration of kidney transplantation or initiation of maintenance dialysis in the Swedish Renal Registry <u>OR</u></li> <li>Hospitalization with ICD-10 code N185 in first or second diagnostic position <u>OR</u></li> </ul> <p>Sustained eGFR &lt; 15 ml/min/1.73m<sup>2</sup>. For each individual a linear regression line was fitted through all his longitudinal outpatient eGFR measurements. To be considered a sustained eGFR &lt;15 ml/min/1.73m<sup>2</sup> the linear regression slope needed to be negative, and the 15 ml/min/1.73m<sup>2</sup> threshold needed to be crossed before the last measurement. The time to event was defined as the moment the linear regression line crossed the 15 ml/min/1.73m<sup>2</sup> threshold.</p>	31 <sup>st</sup> December 2018
30% eGFR decline	<p>Sustained 30% eGFR decline. For each individual a linear regression line was fitted through all his longitudinal outpatient eGFR measurements. To be considered a sustained 30% eGFR decline the linear regression slope needed to be negative, and the 30% eGFR decline threshold needed to be crossed before the last measurement. The time to event was defined as the moment the linear regression line crossed the 30% eGFR decline threshold.</p>	31 <sup>st</sup> December 2018
<b>Acute kidney Injury</b>		
AKI	<ul style="list-style-type: none"> <li>Outpatient or in-hospital with ICD-10 code N17</li> <li>Elevation of kidney function during hospitalization, defined in 3 stage: <ul style="list-style-type: none"> <li>Stage 1: Creatinine elevation 1.5-1.9 times higher than baseline creatinine in the first 7 days after admission or creatinine increase of 26 µmol/L within 48 hours</li> <li>Stage 2: Creatinine elevation 2.0-2.9 times higher than baseline creatinine in the first 7 days after admission</li> <li>Stage 3: Creatinine increase of 353.6 µmol/L within 48 hours or creatinine elevation ≥3 times higher than baseline creatinine or need for kidney replacement therapy (defined by procedure codes DR015 and DR023)</li> </ul> </li> </ul> <p>Baseline creatinine was defined as average of outpatient and primary care measurements in the period 12 months up to 7 days prior hospital admission</p>	31 <sup>st</sup> December 2018
<b>Stroke and systemic embolism</b>		
Ischemic stroke	ICD-10 codes: I63	31 <sup>st</sup> December 2019
Undefined stroke	ICD-10 codes: I64	31 <sup>st</sup> December 2019
Systemic embolism	ICD-10 codes: I74	31 <sup>st</sup> December 2019
<b>Major Bleeding</b>		

Intracranial	ICD-10 codes: I60-I62, S064-S066	31 <sup>st</sup> December 2019
Gastrointestinal	ICD-10 codes: K25-28 (subcodes 0-2 and 4-6 only), K625, K922	31 <sup>st</sup> December 2019
Other	ICD-10 codes: I850, I983, D500, D629, J942, I312, H431, H356	31 <sup>st</sup> December 2019
<b>Mortality</b>		
All-cause	Any ICD-10 code	31 <sup>st</sup> December 2019
Cardiovascular	ICD-10 codes: I, G45-46, H341	31 <sup>st</sup> December 2019
<b>Falsification outcomes</b>		
Pneumonia	ICD-10 code: J18	31 <sup>st</sup> December 2019
Cataract surgery	Procedure codes: CJ	31 <sup>st</sup> December 2019

**Table S5.** Number of events, incidence rates and adjusted hazard ratios for the association between DOAC vs VKA initiation and outcomes in patients with CHA<sub>2</sub>DS<sub>2</sub>-VASc ≥ 2.

	<b>VKA: No of Events (IR/ 1000 person- years)*</b>	<b>DOAC: No of Events (IR/1000 person- years)*</b>	<b>Adjusted HR DOAC vs. VKA (95% CI)**</b>
<b>Kidney outcomes</b>			
CKD progression	2148 (41.6)	1153 (35.1)	0.87 (0.78-0.98)
Sustained 30% eGFR decline	2110 (40.8)	1147 (35.0)	0.88 (0.79-0.98)
Kidney Failure	193 (3.5)	41 (1.2)	0.41 (0.24-0.70)
AKI	3107 (61.8)	1740 (54.0)	0.88 (0.80-0.97)
<b>Cardiovascular outcomes</b>			
Composite of stroke and systemic embolism	1081 (17.6)	699 (15.3)	0.90 (0.75-1.08)
Ischemic stroke	957 (15.6)	626 (13.7)	0.86 (0.71-1.04)
<b>Bleeding outcomes</b>			
Major bleeding	1322 (21.7)	767 (16.8)	0.77 (0.66-0.89)
Intracranial bleeding	593 (9.5)	301 (6.5)	0.59 (0.47-0.76)
Gastrointestinal bleeding	575 (9.2)	376 (8.2)	0.96 (0.78-1.18)
Other bleeding	291 (4.6)	164 (3.5)	0.88 (0.66-1.19)
<b>Mortality</b>			
All-cause mortality	4690 (73.8)	3148 (67.3)	1.03 (0.94-1.13)
CV death	2301 (36.2)	1452 (31.1)	0.98 (0.83-1.15)

Abbreviations: VKA, vitamin K antagonist; DOAC, direct oral anticoagulants; IR, incidence rate; HR, hazard ratio; CI, confidence interval; eGFR, estimated glomerular filtration rate; AKI, acute kidney injury; CV, cardiovascular

\* Number of events, incidence rates were calculated in the original, unweighted population.

\*\*Analyses were adjusted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA<sub>2</sub>DS<sub>2</sub>-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors

**Table S6.** Number of events, incidence rates and adjusted hazard ratios for the association between DOAC vs. VKA initiation and outcomes among patients without history of venous thromboembolism and less than 3 months between AF diagnosis and treatment initiation (n = 28,314).

	<b>VKA: No of Events (IR/ 1000 person- years)*</b>	<b>DOAC: No of Events (IR/1000 person- years)*</b>	<b>Adjusted HR DOAC vs. VKA (95% CI)**</b>
<b>Kidney outcomes</b>			
CKD progression	1908 (35.0)	1026 (30.3)	0.89 (0.79-1.01)
Sustained 30% eGFR decline	1876 (34.4)	1020 (30.1)	0.90 (0.80-1.01)
Kidney Failure	160 (2.8)	35 (1.0)	0.41 (0.24-0.70)
AKI	2750 (51.8)	1523 (45.7)	0.90 (0.81-1.00)
<b>Cardiovascular outcomes</b>			
Composite of stroke or systemic embolism	936 (14.5)	612 (12.9)	0.96 (0.77-1.18)
Ischemic stroke	837 (12.9)	554 (11.7)	0.93 (0.74-1.17)
<b>Bleeding outcomes</b>			
Major bleeding	1204 (18.8)	681 (14.4)	0.80 (0.69-0.94)
Intracranial bleeding	544 (8.3)	273 (5.7)	0.61 (0.48-0.77)
Gastrointestinal bleeding	522 (8.0)	328 (6.9)	0.99 (0.79-1.23)
Other bleeding	259 (3.9)	142 (3.0)	0.95 (0.68-1.33)
<b>Mortality</b>			
All-cause mortality	4027 (60.5)	2653 (55.0)	1.04 (0.96-1.13)
CV death	1940 (29.2)	1229 (25.5)	0.97 (0.86-1.10)

\* Number of events, incidence rates were calculated in the original, unweighted population.

\*\* Analyses were adjusted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors

**Table S7.** Number of events, incidence rates and adjusted hazard ratios for the association between DOAC vs. VKA initiation and outcomes among patients with less than 3 months between AF diagnosis and treatment initiation (n = 31,182).

	<b>VKA: No of Events (IR/ 1000 person- years)*</b>	<b>DOAC: No of Events (IR/1000 person- years)*</b>	<b>Adjusted HR DOAC vs. VKA (95% CI)**</b>
<b>Kidney outcomes</b>			
CKD progression	2175 (36.5)	1148 (31.3)	0.89 (0.79-1.00)
Sustained 30% eGFR decline	2137 (35.8)	1142 (31.1)	0.89 (0.79-1.00)
Kidney Failure	192 (3.0)	42 (1.1)	0.48 (0.28-0.84)
AKI	3166 (54.6)	1721 (47.6)	0.87 (0.80-0.96)
<b>Cardiovascular outcomes</b>			
Composite of stroke or systemic embolism	1078 (15.3)	693 (13.5)	0.97 (0.79-1.17)
Ischemic stroke	955 (13.5)	625 (12.1)	0.91 (0.74-1.11)
<b>Bleeding outcomes</b>			
Major bleeding	1362 (19.4)	765 (14.9)	0.77 (0.66-0.90)
Intracranial bleeding	615 (8.6)	300 (5.8)	0.57 (0.44-0.72)
Gastrointestinal bleeding	587 (8.2)	377 (7.3)	1.00 (0.82-1.22)
Other bleeding	299 (4.1)	155 (3.0)	0.86 (0.63-1.19)
<b>Mortality</b>			
All-cause mortality	4641 (63.6)	3028 (57.7)	1.03 (0.95-1.11)
CV death	2249 (30.8)	1398 (26.6)	0.95 (0.84-1.07)

\* Number of events, incidence rates were calculated in the original, unweighted population.

\*\* Analyses were adjusted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors

**Table S8.** Number of events, incidence rates and adjusted hazard ratios for the association between DOAC vs VKA initiation and outcomes accounting for treatment switch and discontinuation.

	<b>VKA: No of Events (IR/ 1000 person- years)*</b>	<b>DOAC: No of Events (IR/1000 person- years)*</b>	<b>Adjusted HR DOAC vs. VKA (95% CI)**</b>
<b>Kidney outcomes</b>			
CKD progression	1335 (40.4)	1066 (32.0)	0.77 (0.64-0.92)
Sustained 30% eGFR decline	1305 (39.5)	1064 (32.0)	0.79 (0.66-0.95)
Kidney Failure	120 (3.5)	29 (0.8)	0.30 (0.15-0.59)
AKI	1868 (57.0)	1563 (46.7)	0.79 (0.71-0.89)
<b>Cardiovascular outcomes</b>			
Composite of stroke and systemic embolism	511 (14.2)	581 (12.6)	0.67 (0.41-1.10)
Ischemic stroke	463 (12.9)	520 (11.3)	0.59 (0.36-0.98)
<b>Bleeding outcomes</b>			
Major bleeding	731 (20.4)	677 (14.7)	0.70 (0.57-0.87)
Intracranial bleeding	337 (9.3)	259 (5.6)	0.47 (0.33-0.67)
Gastrointestinal bleeding	299 (8.3)	336 (7.3)	1.02 (0.79-1.33)
Other bleeding	151 (4.2)	140 (3.0)	0.75 (0.54-1.04)
<b>Mortality</b>			
All-cause mortality	1552 (42.6)	2458 (52.7)	1.13 (0.95-1.35)
CV death	798 (21.9)	1141 (24.5)	0.97 (0.78-1.20)

Abbreviations: VKA, vitamin K antagonist; DOAC, direct oral anticoagulants; IR, incidence rate; HR, hazard ratio; CI, confidence interval; eGFR, estimated glomerular filtration rate; AKI, acute kidney injury; CV, cardiovascular

\* Number of events, incidence rates were calculated in the original, unweighted population.

\*\*Analyses were adjusted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors

**Table S9.** Number of events, incidence rates and adjusted hazard ratios for the association between DOAC vs. VKA initiation and falsification outcomes

	<b>VKA: No of Events (IR/ 1000 person- years)*</b>	<b>DOAC: No of Events (IR/1000 person- years)*</b>	<b>Adjusted HR DOAC vs. VKA (95% CI)**</b>
<i>Falsification outcomes</i>			
Pneumonia	1345 (18.4)	878 (15.9)	0.94 (0.81-1.08)
Cataract surgery	3590 (56.3)	2761 (54.5)	0.99 (0.88-1.10)

Abbreviations: VKA, vitamin K antagonist; DOAC, direct oral anticoagulants;; IR, incidence rate; HR, hazard ratio; CI, confidence interval; eGFR, estimated glomerular filtration rate; AKI, acute kidney injury; CV, cardiovascular

\* Number of events, incidence rates were calculated in the original, unweighted population.

\*\* Analyses were adjusted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors

**Table S10.** Frequency of creatinine measurement during follow-up in the observed and weighted population.

	Observed			Weighted*		
	Number of tests	Person-year	Crude Incidence rate (95% CI)	Number of tests	Person-year	Crude Incidence rate (95% CI)
<b>DOAC</b>	141796	40183	3.53 (3.51-3.55)	200984	54968	3.66 (3.64-3.67)
<b>VKA</b>	236921	65522	3.62 (3.60-3.63)	173461	46694	3.71 (3.70-3.73)

Abbreviations: CI = confidence interval; DOAC = Direct oral anticoagulant; VKA = Vitamin K antagonist.

\* Analyses were weighted for the following 50 variables: age, sex, calendar year, numbers of primary healthcare visits, numbers of outpatient specialist visits, numbers of diagnoses issued, numbers of procedure codes, education, estimate glomerular filtration rate, hypertension, anemia, liver disease, renal disease, alcohol abuse, prior bleeding, stroke/transient ischemic stroke/embolism, stroke, myocardial infarction, heart failure, congestive heart failure, vascular disease, chronic obstructive pulmonary disease, rheumatoid arthritis, diabetes, diabetic complications, cancer, deep vein thrombosis, knee/hip surgery, percutaneous coronary intervention, venous thromboembolism, fracture, risk scores (CHA2DS2-VASc, modified CHADS<sub>2</sub>, HAS-BLED), concomitant use of: aspirin, clopidogrel, non-steroidal anti-inflammatory drugs, other antiplatelet, corticosteroids, diuretics, beta blockers, calcium channel blockers, renin-angiotensin-aldosterone-system inhibitors, statin, insulin, other antidiabetic medications, antidepressants, digoxin, nitrate, proton-pump inhibitors using inverse probability of treatment weighting.