

SUPPLEMENTARY MATERIAL (Intended for publication)

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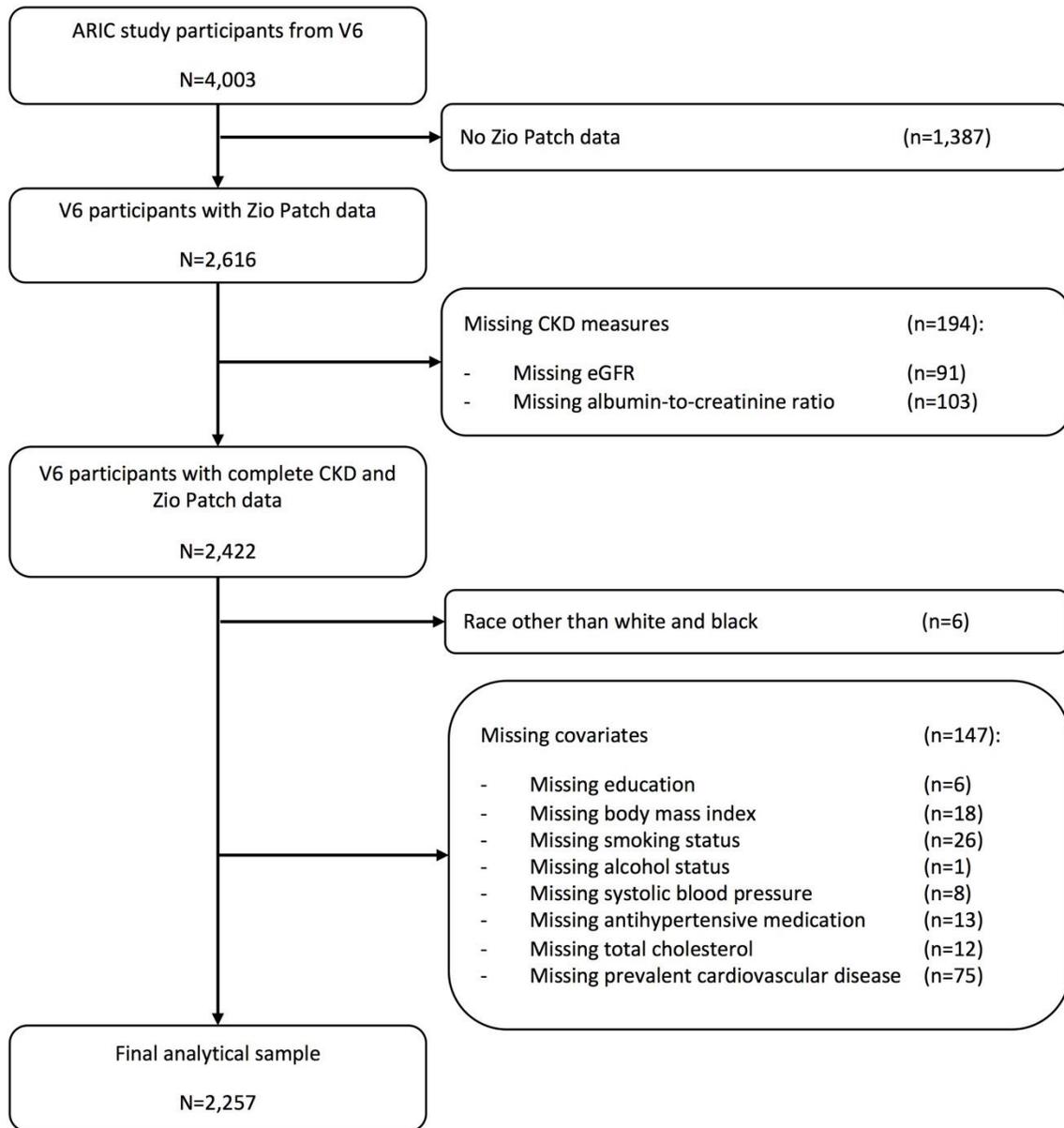
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Supplementary Table 11: Baseline characteristics comparing participants who did and did not undergo two-week continuous electrocardiogram (ECG) monitoring

Supplementary Figure 1: Study flow diagram



Supplementary Table 1: Definitions of arrhythmia burden

Arrhythmia burden	Definition
Atrial fibrillation	irregularly irregular rhythm with absent P waves lasting >30 seconds (if <30 seconds will be classified as supraventricular tachycardia/atrial tachycardia unless atrial fibrillation episodes >30 seconds are evident at other times for the same person)
Atrial fibrillation burden (%)	percent of analyzable time in atrial fibrillation
Supraventricular tachycardia/atrial tachycardia	narrow complex tachycardia >4 beats with a rate >100 bpm
Supraventricular tachycardia /atrial tachycardia burden	no. of supraventricular tachycardia/atrial tachycardia episodes per hour or day
PAC burden	no. of PACs per hour or day or % of heart beats that are PACs
PVC burden	no. of PVCs per hour or day or % of heart beats that are PVCs
Non-sustained ventricular tachycardia	wide complex tachycardia >4 beats with a rate >100 bpm
Non-sustained ventricular tachycardia burden	no. of non-sustained ventricular tachycardia episodes per hour or day

Supplementary Table 2: List of drugs commonly associated with QT-prolongation and torsades de pointes

Antiarrhythmics	Antimicrobials	Antidepressants	Antipsychotics	Others
Amiodarone	Levofloxacin	Amitriptyline	Haloperidol	Cisapride
Sotalol	Ciprofloxacin	Desipramine	Droperidol	Sumatriptan
Quinidine	Gatifloxacin	Imipramine	Quetiapine	Zolmitriptan
Procainamide	Moxifloxacin	Doxepin	Thioridazine	Arsenic
Dofetilide	Clarithromycin	Fluoxetine	Ziprasidone	Dolasetron
Ibutilide	Erythromycin	Setraline		Methadone
	Ketoconazole	Venlafaxine		
	Itraconazole			

*Accessed from <https://www.uspharmacist.com/article/drug-induced-qt-prolongation>

Supplementary Table 3: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of major arrhythmias

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		PR (95% CI)	P	PR (95% CI)	P
Atrial fibrillation	Model 1	1.32 (1.18, 1.47)	<0.001	1.32 (1.19, 1.47)	<0.001
	Model 2	1.26 (1.12, 1.42)	<0.001	1.27 (1.13, 1.41)	<0.001
	Model 3	1.07 (0.94, 1.21)	0.30	1.27 (1.13, 1.44)	<0.001
Non-sustained ventricular tachycardia	Model 1	1.14 (1.08, 1.20)	<0.001	1.15 (1.09, 1.21)	<0.001
	Model 2	1.11 (1.05, 1.17)	<0.001	1.11 (1.05, 1.17)	<0.001
	Model 3	1.04 (0.98, 1.10)	0.19	1.07 (1.01, 1.13)	0.03
Long pause	Model 1	1.38 (1.13, 1.68)	0.001	1.35 (1.12, 1.64)	0.002
	Model 2	1.27 (1.01, 1.60)	0.05	1.21 (0.99, 1.48)	0.07
	Model 3	1.11 (0.85, 1.45)	0.45	1.13 (0.90, 1.42)	0.30
Atrioventricular block	Model 1	1.01 (0.79, 1.29)	0.94	1.03 (0.79, 1.35)	0.80
	Model 2	1.01 (0.78, 1.30)	0.96	1.01 (0.78, 1.31)	0.92
	Model 3	0.88 (0.68, 1.15)	0.36	0.96 (0.74, 1.25)	0.78

PR=prevalence ratio; CI=confidence interval

Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, medication, QT-prolonging drug, eGFR or ACR

Supplementary Table 4: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with percent time in atrial fibrillation and frequency of non-sustained ventricular tachycardia, long pause, and atrioventricular block

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
Percent time		Difference in percent time (95% CI), %	P	Difference in percent time (95% CI), %	P
Atrial fibrillation	Model 1	0.02 (0.01, 0.03)	<0.001	0.02 (0.02, 0.03)	<0.001
	Model 2	0.02 (0.01, 0.02)	<0.001	0.02 (0.01, 0.03)	<0.001
	Model 3	0.01 (-0.00, 0.02)	0.08	0.02 (0.01, 0.03)	<0.001
Frequency		RR (95% CI)	P	RR (95% CI)	P
Non-sustained ventricular tachycardia	Model 1	1.08 (0.89, 1.31)	0.44	1.22 (0.63, 2.36)	0.55
	Model 2	1.08 (0.93, 1.26)	0.31	1.23 (0.62, 2.41)	0.56
	Model 3	1.02 (0.71, 1.48)	0.90	1.11 (0.48, 2.58)	0.80
Long pause	Model 1	1.82 (1.38, 2.39)	<0.001	2.07 (1.05, 4.06)	0.04
	Model 2	2.05 (1.34, 3.13)	0.001	1.98 (1.06, 3.72)	0.03
	Model 3	1.22 (0.74, 2.00)	0.43	1.51 (0.85, 2.69)	0.16
Atrioventricular block	Model 1	0.22 (0.10, 0.52)	<0.001	0.42 (0.19, 0.91)	0.03
	Model 2	0.30 (0.20, 0.46)	<0.001	0.50 (0.21, 1.18)	0.11
	Model 3	0.26 (0.19, 0.35)	<0.001	1.81 (0.72, 4.55)	0.21

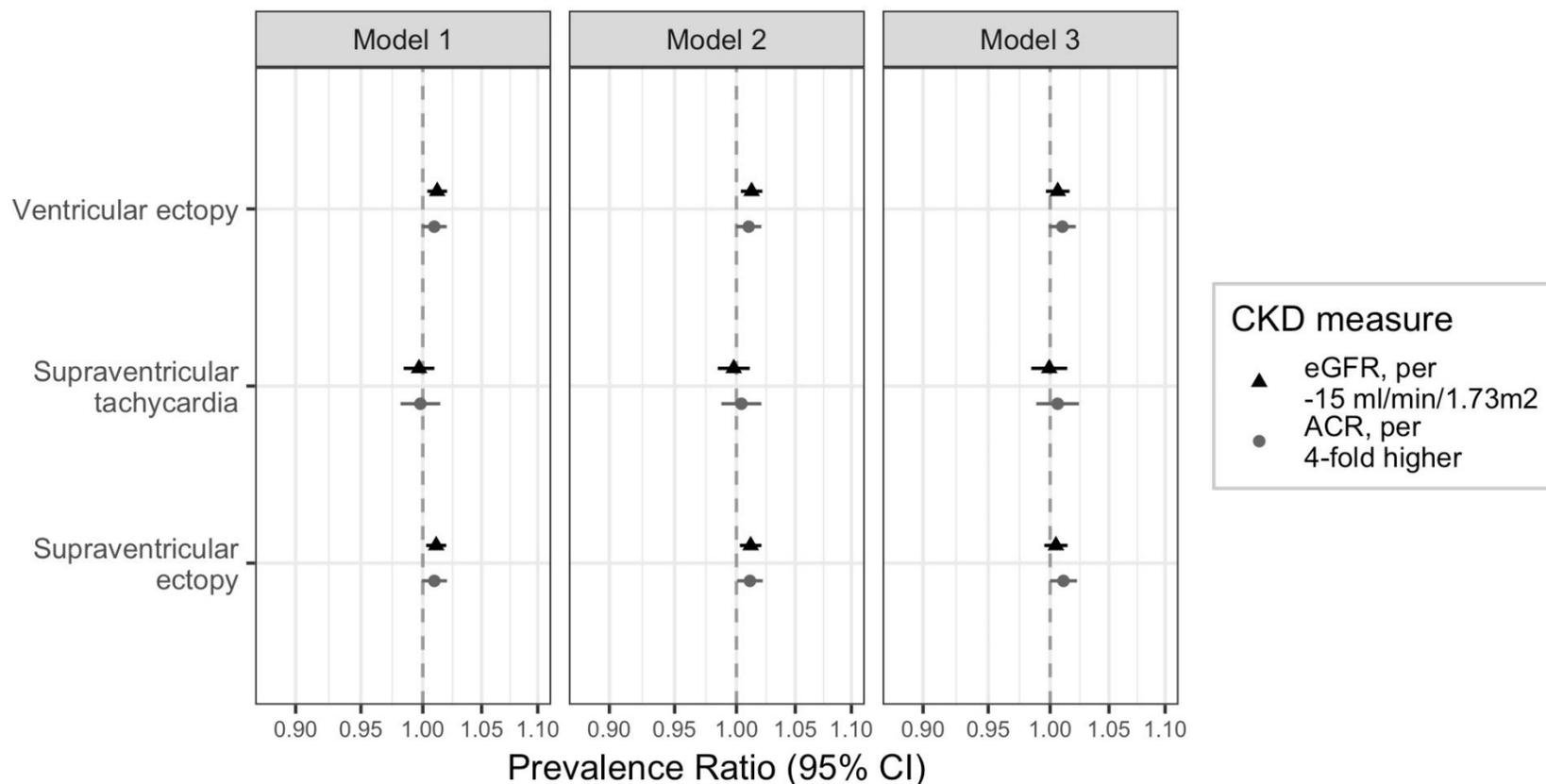
RR=rate ratio; CI=confidence interval

Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR

Supplementary Figure 2: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of minor arrhythmias



Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR

*Supraventricular tachycardia and ectopy were examined among participants who do not have chronic atrial fibrillation

Supplementary Table 5: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of minor arrhythmias

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		PR (95% CI)	P	PR (95% CI)	P
Ventricular ectopy	Model 1	1.01 (1.00, 1.02)	0.004	1.01 (0.99, 1.02)	0.07
	Model 2	1.01 (1.00, 1.02)	0.01	1.01 (0.99, 1.02)	0.06
	Model 3	1.01 (0.99, 1.02)	0.21	1.01 (0.99, 1.02)	0.07
Supraventricular tachycardia[§]	Model 1	1.00 (0.98, 1.01)	0.64	1.00 (0.98, 1.01)	0.81
	Model 2	1.00 (0.98, 1.01)	0.74	1.00 (0.99, 1.02)	0.63
	Model 3	1.00 (0.98, 1.01)	0.92	1.01 (0.99, 1.02)	0.49
Supraventricular ectopy[§]	Model 1	1.01 (1.00, 1.02)	0.01	1.01 (0.99, 1.02)	0.07
	Model 2	1.01 (1.00, 1.02)	0.01	1.01 (1.00, 1.02)	0.04
	Model 3	1.00 (0.99, 1.01)	0.33	1.01 (0.99, 1.02)	0.05

PR=prevalence ratio; CI=confidence interval

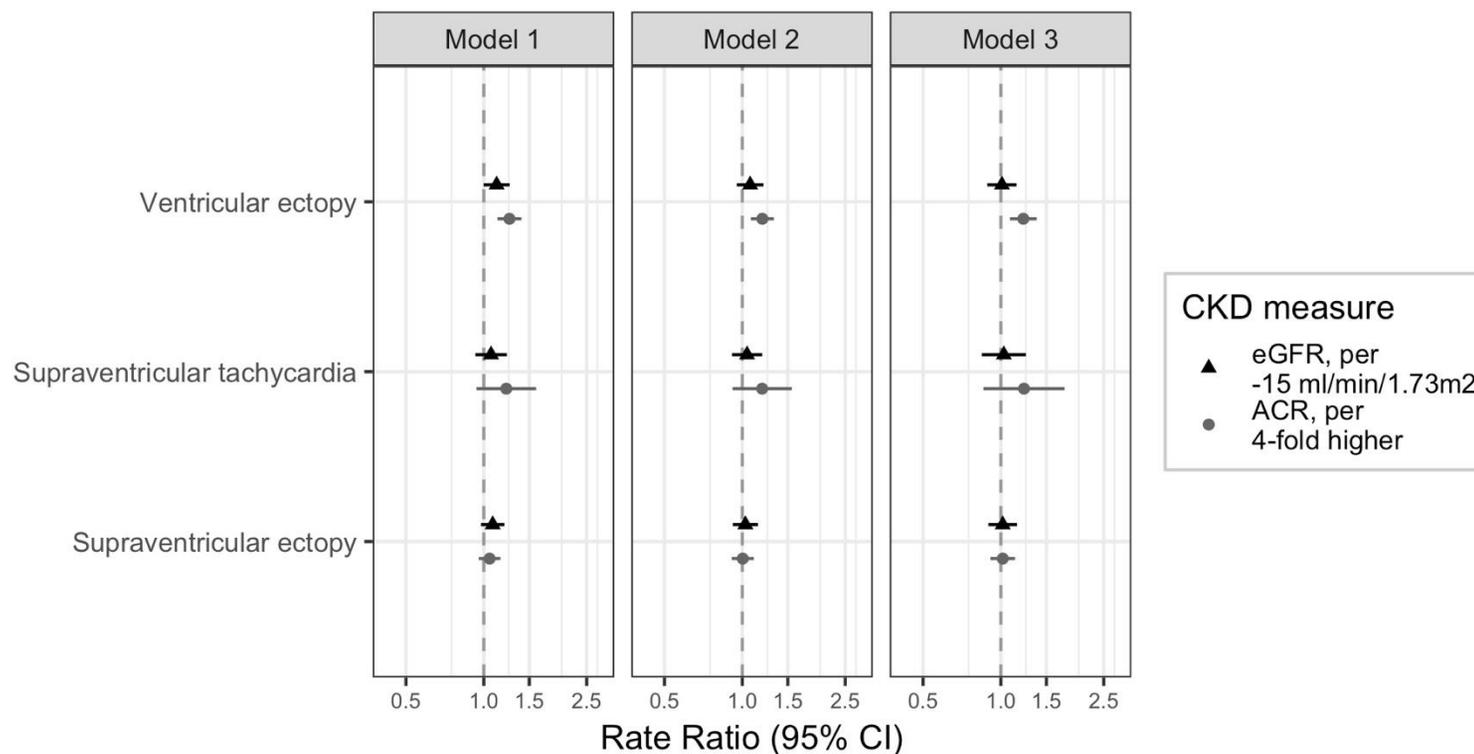
Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, medication, QT-prolonging drug, eGFR or ACR

[§]Among participants who do not have chronic atrial fibrillation

Supplementary Figure 3: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with frequency of minor arrhythmias



Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR

*Supraventricular tachycardia and ectopy were examined among participants who do not have chronic atrial fibrillation

Supplementary Table 6: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with frequency of minor arrhythmias

Frequency of arrhythmia episodes		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		RR (95% CI)	P	RR (95% CI)	P
Ventricular ectopy	Model 1	1.12 (0.99, 1.26)	0.05	1.26 (1.13, 1.40)	<0.001
	Model 2	1.07 (0.95, 1.21)	0.25	1.20 (1.08, 1.32)	0.001
	Model 3	1.01 (0.89, 1.15)	0.89	1.22 (1.08, 1.38)	0.001
Supraventricular tachycardia [§]	Model 1	1.07 (0.93, 1.23)	0.37	1.22 (0.94, 1.59)	0.14
	Model 2	1.04 (0.91, 1.19)	0.54	1.19 (0.92, 1.55)	0.19
	Model 3	1.03 (0.84, 1.25)	0.79	1.23 (0.86, 1.76)	0.26
Supraventricular ectopy [§]	Model 1	1.08 (0.97, 1.20)	0.14	1.05 (0.96, 1.16)	0.30
	Model 2	1.03 (0.92, 1.15)	0.64	1.00 (0.91, 1.11)	0.94
	Model 3	1.02 (0.89, 1.16)	0.80	1.02 (0.91, 1.13)	0.76

RR=rate ratio; CI=confidence interval

Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR

[§]Among participants who do not have chronic atrial fibrillation

Supplementary Table 7: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of major arrhythmias using additional arrhythmia events captured from hospitalization records

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		PR (95% CI)	P	PR (95% CI)	P
Atrial fibrillation	Model 1	1.31 (1.18, 1.45)	<0.001	1.29 (1.17, 1.43)	<0.001
	Model 2	1.25 (1.12, 1.40)	<0.001	1.24 (1.12, 1.37)	<0.001
	Model 3	1.07 (0.95, 1.21)	0.24	1.23 (1.09, 1.38)	0.001
Non-sustained ventricular tachycardia	Model 1	1.14 (1.08, 1.20)	<0.001	1.15 (1.10, 1.22)	<0.001
	Model 2	1.11 (1.05, 1.17)	<0.001	1.11 (1.05, 1.17)	<0.001
	Model 3	1.04 (0.98, 1.10)	0.19	1.07 (1.01, 1.13)	0.02
Long pause	Model 1	1.38 (1.14, 1.66)	0.001	1.32 (1.09, 1.60)	0.004
	Model 2	1.27 (1.01, 1.58)	0.04	1.18 (0.97, 1.45)	0.11
	Model 3	1.13 (0.87, 1.46)	0.36	1.11 (0.89, 1.39)	0.36
Atrioventricular block	Model 1	1.07 (0.84, 1.37)	0.56	1.03 (0.80, 1.32)	0.82
	Model 2	1.06 (0.83, 1.35)	0.66	1.00 (0.78, 1.28)	0.99
	Model 3	0.94 (0.72, 1.22)	0.63	0.95 (0.74, 1.23)	0.70

PR=prevalence ratio; CI=confidence interval

Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, medication, QT-prolonging drug, eGFR or ACR

Supplementary Table 8: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of major arrhythmias after excluding participants taking antiarrhythmic medications

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		PR (95% CI)	P	PR (95% CI)	P
Atrial fibrillation	Model 1	1.32 (1.15, 1.50)	<0.001	1.34 (1.18, 1.52)	<0.001
	Model 2	1.26 (1.09, 1.45)	0.001	1.27 (1.12, 1.44)	<0.001
	Model 3	1.07 (0.92, 1.25)	0.36	1.23 (1.07, 1.42)	0.004
Non-sustained ventricular tachycardia	Model 1	1.14 (1.08, 1.20)	<0.001	1.15 (1.09, 1.22)	<0.001
	Model 2	1.11 (1.05, 1.17)	<0.001	1.11 (1.05, 1.17)	<0.001
	Model 3	1.04 (0.98, 1.10)	0.24	1.07 (1.01, 1.13)	0.03
Long pause	Model 1	1.40 (1.10, 1.77)	0.01	1.34 (1.07, 1.68)	0.01
	Model 2	1.26 (0.95, 1.67)	0.11	1.19 (0.93, 1.52)	0.18
	Model 3	1.13 (0.81, 1.56)	0.48	1.08 (0.83, 1.40)	0.56
Atrioventricular block	Model 1	1.04 (0.81, 1.33)	0.79	1.06 (0.82, 1.38)	0.64
	Model 2	1.02 (0.79, 1.32)	0.88	1.04 (0.80, 1.34)	0.78
	Model 3	0.88 (0.67, 1.16)	0.38	0.97 (0.74, 1.27)	0.84

PR=prevalence ratio; CI=confidence interval

Model 1: Crude

Model 2: Age, sex, race, study center, education

Model 3: Model 2 + body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, medication, QT-prolonging drug, eGFR or ACR

Supplementary Table 9: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of major arrhythmias after adjusting for beta blockers and calcium-channel blockers

		eGFR, per -15 ml/min/1.73m ²		ACR, per 4-fold increase	
		PR (95% CI)	P	PR (95% CI)	P
Atrial fibrillation	Model 1	1.07 (0.95, 1.22)	0.27	1.26 (1.11, 1.43)	<0.001
	Model 2	1.07 (0.94, 1.21)	0.31	1.27 (1.12, 1.44)	<0.001
	Model 3	1.07 (0.94, 1.22)	0.28	1.24 (1.09, 1.42)	0.001
Non-sustained ventricular tachycardia	Model 1	1.04 (0.98, 1.10)	0.22	1.07 (1.01, 1.13)	0.03
	Model 2	1.04 (0.98, 1.10)	0.19	1.07 (1.01, 1.14)	0.03
	Model 3	1.04 (0.98, 1.10)	0.22	1.07 (1.01, 1.14)	0.03
Long pause	Model 1	1.10 (0.84, 1.44)	0.48	1.12 (0.89, 1.40)	0.34
	Model 2	1.11 (0.85, 1.45)	0.45	1.10 (0.88, 1.39)	0.40
	Model 3	1.10 (0.84, 1.44)	0.49	1.08 (0.86, 1.37)	0.50
Atrioventricular block	Model 1	0.88 (0.68, 1.14)	0.34	0.95 (0.73, 1.24)	0.72
	Model 2	0.89 (0.68, 1.15)	0.37	0.92 (0.72, 1.18)	0.53
	Model 3	0.88 (0.68, 1.15)	0.35	0.91 (0.71, 1.17)	0.46

PR=prevalence ratio; CI=confidence interval

Model 1: Age, sex, race, study center, education, body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR, beta blocker

Model 2: Age, sex, race, study center, education, body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR, calcium-channel blocker

Model 3: Age, sex, race, study center, education, body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR, beta blocker, calcium-channel blocker

Supplementary Table 10: Associations of estimated glomerular filtration rate (eGFR) and albumin-creatinine ratio (ACR) with prevalence of major arrhythmias stratified beta blockers and calcium-channel blockers

CKD measure: eGFR		No medication PR (95% CI)	Yes medication PR (95% CI)	P interaction
Arrhythmia	Medication			
Atrial fibrillation	Beta-blocker	1.14 (0.94, 1.37)	1.03 (0.88, 1.20)	0.47
	Calcium channel blocker	1.20 (1.02, 1.40)	0.87 (0.72, 1.05)	0.02
Non-sustained ventricular tachycardia	Beta-blocker	1.04 (0.97, 1.12)	1.03 (0.95, 1.12)	0.88
	Calcium channel blocker	1.04 (0.97, 1.11)	1.05 (0.96, 1.15)	0.86
Long pause	Beta-blocker	1.15 (0.78, 1.68)	1.07 (0.78, 1.47)	0.77
	Calcium channel blocker	1.29 (0.93, 1.79)	0.90 (0.63, 1.28)	0.12
Atrioventricular block	Beta-blocker	0.83 (0.62, 1.11)	0.94 (0.61, 1.44)	0.63
	Calcium channel blocker	0.86 (0.63, 1.18)	0.93 (0.61, 1.43)	0.76
CKD measure: ACR		No medication PR (95% CI)	Yes medication PR (95% CI)	P interaction
Arrhythmia	Medication			
Atrial fibrillation	Beta-blocker	1.40 (1.16, 1.70)	1.16 (1.00, 1.35)	0.17
	Calcium channel blocker	1.37 (1.18, 1.59)	1.11 (0.91, 1.36)	0.14
Non-sustained ventricular tachycardia	Beta-blocker	1.05 (0.97, 1.13)	1.09 (1.01, 1.18)	0.56
	Calcium channel blocker	1.10 (1.02, 1.18)	1.03 (0.94, 1.12)	0.35
Long pause	Beta-blocker	1.08 (0.76, 1.54)	1.14 (0.87, 1.50)	0.81
	Calcium channel blocker	1.17 (0.89, 1.54)	1.02 (0.72, 1.44)	0.52
Atrioventricular block	Beta-blocker	0.90 (0.63, 1.30)	1.00 (0.69, 1.45)	0.73
	Calcium channel blocker	0.75 (0.52, 1.07)	1.11 (0.78, 1.57)	0.20

PR=prevalence ratio; CI=confidence interval

Models adjusted for age, sex, race, study center, education, body mass index, current smoking and alcohol, systolic blood pressure, antihypertensive drugs, diabetes, prevalent cardiovascular disease, total and HDL cholesterol, antiarrhythmic medication, QT-prolonging drug, eGFR or ACR

Supplementary Table 9: Baseline characteristics comparing participants who did and did not undergo two-week continuous electrocardiogram (ECG) monitoring

Characteristics	Underwent monitoring n=2257	Did not undergo monitoring n=1063*
Age, years (SD)	79.1 (4.6)	80.2 (4.9)
Male, %	56.7	60.1
White, %	23.5	18.3
Study center, %		
Forsyth County, NC	22.8	23.1
Jackson, MS	21.9	16.5
Minneapolis, MN	29.0	35.0
Washington County, MD	26.3	25.4
Education, %		
< High school	12.0	11.4
High school graduate	41.5	40.0
College or graduate school	46.5	48.6
Body mass index, kg/m ² (SD)	28.3 (5.3)	28.2 (5.6)
Current cigarette smoker, %	7.0	6.7
Current drinker, %	51.6	50.7
Systolic blood pressure, mmHg (SD)	134.9 (18.8)	135.5 (19.1)
Antihypertensive medication, %	76.3	77.6
Diabetes, %	33.4	32.5
Prevalent cardiovascular disease, %	23.8	27.8
Heart failure, %	12.5	16.7
Coronary heart disease, %	14.0	15.4
Stroke, %	4.4	5.2
Medication for arrhythmia, %	8.9	10.4
QT-prolonging medication, %	10.4	10.4
Total cholesterol, SI Units (SD)	4.5 (1.0)	4.5 (1.0)
High-density lipoprotein, SI Units (SD)	1.3 (0.4)	1.4 (0.4)
eGFR, ml/min/1.73m ² (SD)	58.4 (18.3)	55.4 (18.6)
Albumin-to-creatinine ratio, mg/g (IQR)	7.1 (3.5, 18.5)	8.2 (3.8, 23.7)

*Number represents participants who did not undergo two-week continuous ECG monitoring and who were not missing covariates of interest listed in this table