SUPPLEMENTAL MATERIAL

Table S1. Baseline characteristics of the study population according to eGFR (above/below 60 ml/min/1.73 m^2)

	No CKD eGFR≥60 ml/min/1.73 m^2 N=797	CKD eGFR <60 ml/min/1.73 m^2 N=316	P-value
Age, median (interquartile range)	61 (54-68)	68 (62-74)	<0.001
Male sex, N (%)	551 (69.1)	256 (81.0)	<0.001
Physiologic measures, median (interquartile range)			
Systolic blood pressure, mmHg	124 (111-139)	121 (109-138)	0.07
Heart rate, bpm	69 (61-77)	68 (62-74)	0.66
BMI, kg/m^2	27 (24-30)	28 (24-31)	<0.001
NT-proBNP, pg/mL	1,003 (512-2,012)	1,590 (866-3,145)	<0.001
eGFR, mL/min/1.73cm^2	83 (71-97)	49 (41-56)	<0.001
CKD stage, N (%)			
Stage 3A (eGFR 45-59 mL/min/1.73m^2)	-	194 (61.4)	
Stage 3B (eGFR 30-44 mL/min/1.73m^2)	-	100 (31.6)	
Stage 4 (eGFR 15-29 mL/min/1.73m^2)	-	22 (7.0)	
QRS duration, msec	143 (110-165)	150 (120-168)	0.009
LVEF, %, mean (SD)	24.3 (6.3)	23.5 (6.0)	0.04
Duration of HF, median (interquartile range), months	15 (8-54)	32 (10-96)	<0.001
Main cause of HF, N (%)			0.004
Idiopathic	623 (78.2)	223 (70.6)	
Valvular	25 (3.1)	16 (5.1)	
Hypertension	69 (8.7)	48 (15.2)	
Other	80 (10.0)	29 (9.2)	
NYHA class, N (%)			<0.001
II	465 (58.3)	130 (41.1)	
III/IV	332 (41.7)	186 (58.9)	
Medical history, N (%)			
Hospitalization for HF	509 (64.3)	211 (67.2)	0.36
Hypertension	213 (26.7)	134 (42.5)	<0.001
Diabetes	122 (15.3)	87 (27.5)	<0.001
Atrial fibrillation	273 (34.3)	172 (54.4)	<0.001
Stroke	80 (10.1)	35 (11.1)	0.60
Treatment, N (%)			

ACEI/ARB	784 (98.4)	290 (91.8)	<0.001
Beta-blocker	741 (93.0)	282 (89.2)	0.04
MRA	474 (59.5)	169 (53.5)	0.07
Amiodarone	29 (3.6)	37 (11.7)	<0.001
Loop diuretic	551 (69.1)	279 (88.3)	<0.001
Thiazide	60 (7.5)	31 (9.8)	0.21
Metolazone	8 (1.0)	2 (0.6)	0.55
EPO	1 (0.1)	4 (1.3)	0.01
CRT-P/CRT-D	445 (55.8)	198 (62.7)	0.04

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; BMI, body mass index; CKD, chronic kidney disease; CRT-D, cardiac resynchronization therapy defibrillator; CRT-P, cardiac resynchronization therapy pacemaker; eGFR, estimated glomerular filtration rate; EPO, erythropoietin; HF, heart failure; LVEF, left ventricular ejection fraction; MRA, mineralocorticoid receptor antagonist; NYHA; New York Heart Association; NT-proBNP, N-terminal pro-B-type natriuretic peptide; SD, standard deviation. According to the protocol, patients fulfilling criteria for CRT devices received a CRT-D if randomized to the ICD arm or received a CRT-P device if randomized to the control arm.

Table S2. Baseline characteristics of the study population according to treatment assignment and eGFR (above/below median)

	No CKD eGFR≥73 ml/min/1.73 m^2 N=563			CKD eGFR<73 ml/min/1.73 m^2 N=550		
	Control group N=280	ICD group N=283	P-value	Control group N=278	ICD group N=272	P-value
Age, median (interquartile range)	60 (54-66)	60 (53-69)	0.57	66 (60-72)	68 (62-73)	0.10
Male sex, N (%)	175 (62.5)	182 (64.3)	0.66	227 (81.7)	223 (82.0)	0.92
Physiologic measures, median (interquartile range)						
Systolic blood pressure, mmHg	125 (113-139)	123 (110-140)	0.54	123 (110-136)	122 (109-138)	0.61
Heart rate, bpm	69 (62-79)	69 (61-77)	0.55	68 (60-78)	68 (60-76)	0.70
BMI, kg/m^2	26 (23-30)	27 (23-30)	0.21	28 (25-30)	27 (24-31)	0.83
NT-proBNP, pg/mL	849 (467-1,767)	1,162 (497-2,136)	0.09	1,382 (712-2,721)	1,292 (746-2,685)	0.74
eGFR, mL/min/1.73cm^2	92 (82-105)	90 (80-103)	0.26	58 (49-65)	57 (45-65)	0.09
QRS duration, msec	145 (111-164)	145 (111-165)	0.78	147 (108-165)	148 (117-168)	0.41
LVEF, %	24.6 (6.1)	24.5 (6.1)	0.77	23.5 (6.1)	23.7 (6.5)	0.68
Duration of HF, median (interquartile range), months	15 (8-52)	14 (8-54)	0.82	19 (9-66)	34 (10-84)	0.04
Main cause of HF, N (%)			0.28			0.28
Idiopathic	210 (75.0)	225 (79.5)		213 (76.6)	198 (72.8)	
Valvular	8 (2.9)	12 (4.2)		13 (4.7)	8 (2.9)	
Hypertension	27 (9.6)	22 (7.8)		28 (10.1)	40 (14.7)	
Other	35 (12.5)	24 (8.5)		24 (8.6)	26 (9.6)	
NYHA class, N (%)			0.62			0.62
II	172 (61.4)	168 (59.4)		126 (45.3)	129 (47.4)	
III/IV	108 (38.6)	115 (40.6)		152 (54.7)	143 (52.6)	
Medical history, N (%)						
Hospitalization for HF	184 (66.0)	174 (61.9)	0.32	177 (64.6)	185 (68.0)	0.40

Hypertension	67 (23.9)	74 (26.2)	0.54	99 (35.7)	107 (39.3)	0.38
Diabetes	52 (18.6)	35 (12.4)	0.04	58 (20.9)	64 (23.5)	0.45
Atrial fibrillation	79 (28.2)	87 (30.7)	0.51	129 (46.4)	150 (55.2)	0.04
Stroke	32 (11.4)	23 (8.1)	0.19	32 (11.6)	28 (10.3)	0.65
Treatment, N (%)						
ACEI/ARB	275 (98.2)	281 (99.3)	0.25	267 (96.0)	251 (92.3)	0.06
Beta-blocker	264 (94.3)	262 (92.6)	0.41	251 (90.3)	246 (90.4)	0.95
MRA	167 (59.6)	170 (60.1)	0.92	151 (54.3)	155 (57.0)	0.53
Amiodarone	6 (2.1)	8 (2.8)	0.60	26 (9.4)	26 (9.6)	0.93
Loop diuretic	193 (68.9)	187 (66.1)	0.47	223 (80.2)	227 (83.5)	0.32
Thiazide	22 (7.9)	20 (7.1)	0.72	23 (8.3)	26 (9.6)	0.60
Metolazone	2 (0.7)	3 (1.1)	0.66	4 (1.4)	1 (0.4)	0.19
EPO	0 (0)	1 (0.4)	0.32	3 (1.1)	1 (0.4)	0.33
CRT-P/CRT-D	162 (57.9)	161 (56.9)	0.82	160 (57.6)	160 (58.8)	0.76

ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; BMI, body mass index; CKD, chronic kidney disease; CRT-D, cardiac resynchronization therapy defibrillator; CRT-P, cardiac resynchronization therapy pacemaker; eGFR, estimated glomerular filtration rate; EPO, erythropoietin; HF, heart failure; ICD, implantable cardioverter defibrillator; LVEF, left ventricular ejection fraction; MRA, mineralocorticoid receptor antagonist; NYHA; New York Heart Association; NT-proBNP, N-terminal pro-B-type natriuretic peptide; SD, standard deviation. According to the protocol, patients fulfilling criteria for CRT devices received a CRT-D if randomized to the ICD arm or received a CRT-P device if randomized to the control arm.

Table S3. Device complications according to CKD status among patients randomized to an ICD

	No CKD eGFR≥60 ml/min/1.73 m2 N=394	CKD eGFR <60 ml/min/1.73 m2 N=161	P-value
Device infection, N (%)	18 (4.6)	9 (5.6)	0.61
Serious device infection, N (%)	9 (2.3)	6 (3.7)	0.39
Bleeding requiring intervention, N (%)	0 (0.0)	1 (0.6)	N/A
Pneumothorax, N (%)	11 (2.8)	0 (0.0)	0.04

CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; ICD, implantable cardioverter defibrillator; N/A, not applicable.
The results were analyzed from the data for the original follow-up period.

Table S4. Effect of ICD implantation compared with usual care according to eGFR (above/below 60 ml/min/1.73 m^2)

Outcome	No CKD eGFR≥60 ml/min/1.73 m^2 N=797		CKD eGFR <60 ml/min/1.73 m^2 N=316		P-value for interaction
	Control group N=403	ICD group N=394	Control group N=155	ICD group N=161	
Death from any cause					
N (%)	144 (35.7)	121 (30.7)	81 (52.3)	87 (54.0)	
Event rate per 100 person-years (95% CI)	4.6 (3.9-5.5)	3.8 (3.2-4.6)	8.2 (6.6-10.2)	8.2 (6.7-10.2)	
HR (95% CI)*	0.82 (0.64-1.04)		1.02 (0.75-1.38)		0.31
Cardiovascular death					
N (%)	105 (26.1)	83 (21.1)	58 (37.4)	64 (39.8)	
Event rate per 100 person-years (95% CI)	3.4 (2.8-4.1)	2.6 (2.1-3.3)	5.9 (4.5-7.6)	6.1 (4.7-7.7)	
HR (95% CI)*	0.77 (0.58-1.03)		1.05 (0.73-1.51)		0.20
Sudden cardiovascular death					
N (%)	33 (8.2)	19 (4.8)	23 (14.8)	16 (9.9)	
Event rate per 100 person-years (95% CI)	1.1 (0.8-1.5)	0.6 (0.4-0.9)	2.3 (1.5-3.5)	1.5 (0.9-2.5)	
HR (95% CI)*	0.57 (0.32-1.00)		0.65 (0.34-1.24)		0.70
Non-cardiovascular death					
N (%)	39 (9.7)	38 (9.6)	23 (14.8)	23 (14.3)	
Event rate per 100 person-years (95% CI)	1.3 (0.9-1.7)	1.2 (0.9-1.7)	2.3 (1.5-3.5)	2.2 (1.4-3.3)	
HR (95% CI)*	0.94 (0.60-1.47)		0.94 (0.52-1.68)		0.93

CI, confidence interval; CKD, chronic kidney disease; HR, hazard ratio; ICD, implantable cardioverter-defibrillator; eGFR, estimated glomerular filtration rate.

*Stratified according to center and cardiac resynchronization therapy implantation (preexisting or planned).

Table S5. Effect of ICD implantation compared with usual care according to eGFR (above/below median)

Outcome	eGFR≥73 ml/min/1.73 m^2 N=563		eGFR<73ml/min/1.73 m^2 N=550		P-value for interaction
	Control group N=280	ICD group N=283	Control group N=278	ICD group N=272	
Death from any cause					
N (%)	88 (31.4)	80 (28.3)	137 (49.3)	128 (47.1)	
Event rate per 100 person-years (95% CI)	4.0 (3.3-5.0)	3.5 (2.8-4.4)	7.2 (6.1-8.5)	6.6 (5.6-7.9)	
HR (95% CI)*	0.86 (0.63-1.17)		0.91 (0.71-1.16)		0.78
HR (95% CI)†	0.88 (0.65-1.20)		0.81 (0.63-1.03)		0.64
Cardiovascular death					
N (%)	65 (23.2)	56 (19.8)	98 (35.3)	91 (33.5)	
Event rate per 100 person-years (95% CI)	3.0 (2.3-3.8)	2.5 (1.9-3.2)	5.1 (4.2-6.2)	4.7 (3.8-5.8)	
HR (95% CI)*	0.81 (0.56-1.17)		0.91 (0.68-1.21)		0.67
HR (95% CI)†	0.86 (0.59-1.24)		0.79 (0.59-1.07)		0.71
Sudden cardiovascular death					
N (%)	26 (9.3)	16 (5.7)	30 (10.8)	19 (7.0)	
Event rate per 100 person-years (95% CI)	1.2 (0.8-1.7)	0.7 (0.4-1.1)	1.6 (1.1-2.2)	1.0 (0.6-1.5)	
HR (95% CI)*	0.61 (0.33-1.15)		0.63 (0.35-1.12)		0.95
HR (95% CI)†	0.63 (0.33-1.18)		0.52 (0.29-0.95)		0.73
Non-cardiovascular death					
N (%)	23 (8.2)	24 (8.5)	39 (14.0)	37 (13.6)	
Event rate per 100 person-years (95% CI)	1.1 (0.7-1.6)	1.1 (0.7-1.6)	2.0 (1.5-2.8)	1.9 (1.4-2.6)	
HR (95% CI)*	1.00 (0.56-1.77)		0.92 (0.58-1.44)		0.86
HR (95% CI)†	0.96 (0.54-1.72)		0.84 (0.53-1.33)		0.83

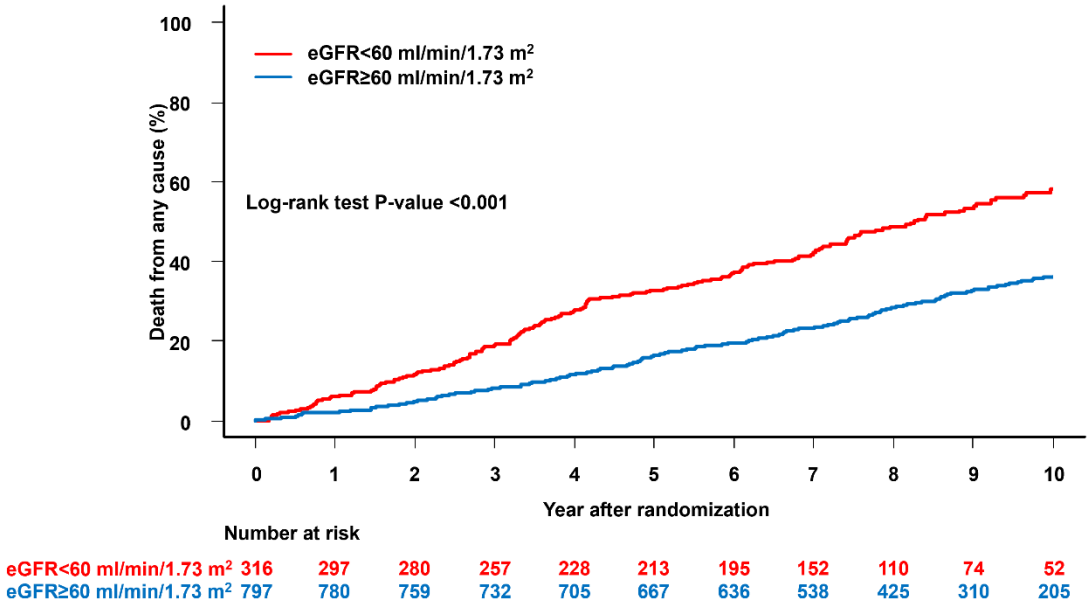
CI, confidence interval; CKD, chronic kidney disease; HR, hazard ratio; ICD, implantable cardioverter-defibrillator; eGFR, estimated glomerular filtration rate.

*Stratified according to center and cardiac resynchronization therapy implantation (preexisting or planned).

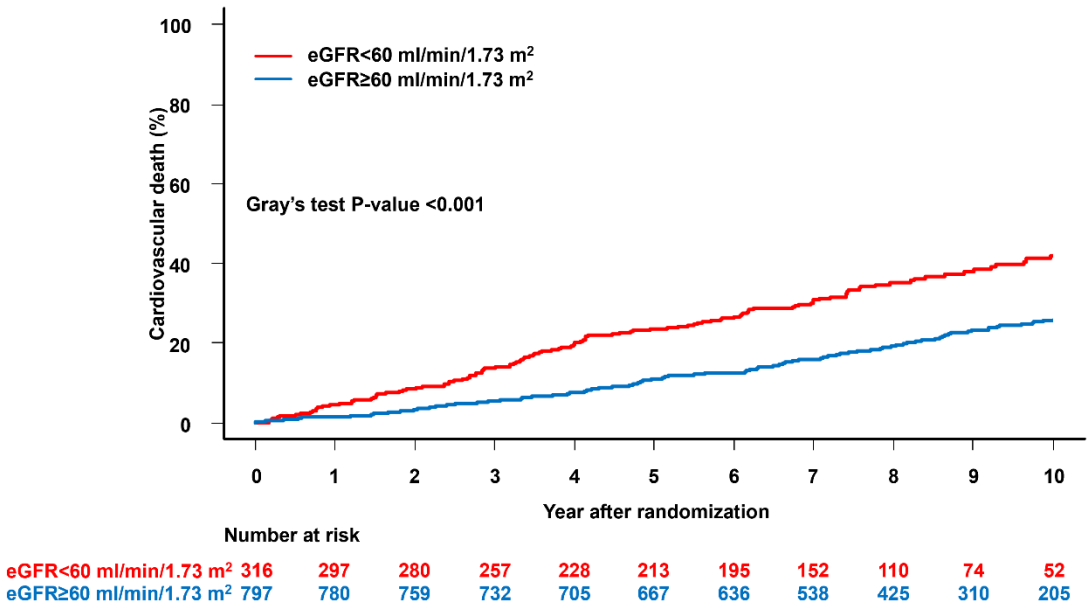
† Stratified according to center and cardiac resynchronization therapy implantation (preexisting or planned) and adjusted for duration of heart failure, diabetes and atrial fibrillation.

Figure S1. Absolute risk of outcomes according to chronic kidney disease

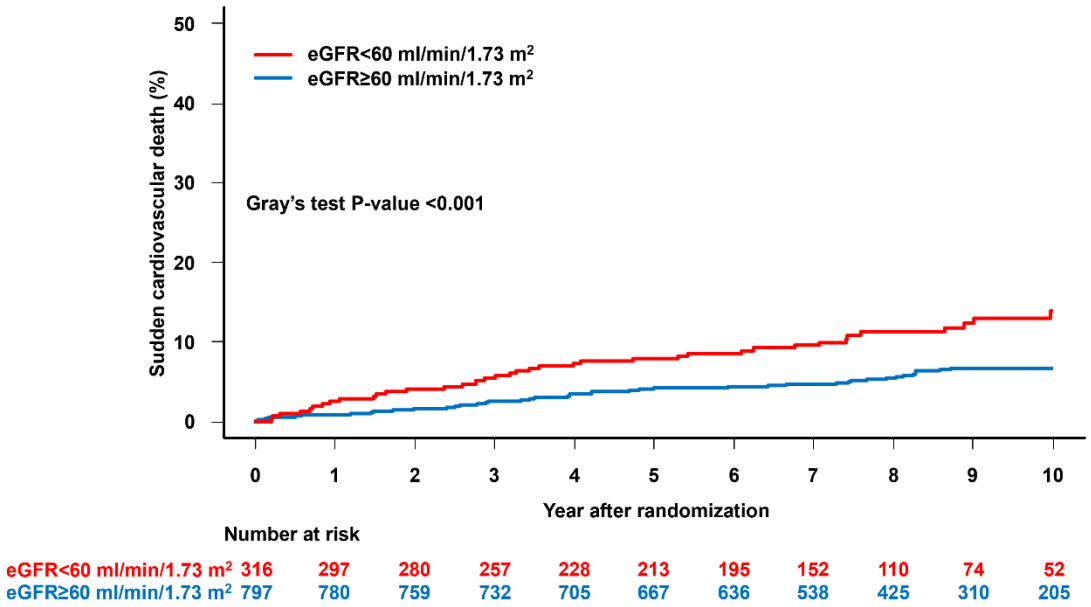
A) Death from any cause



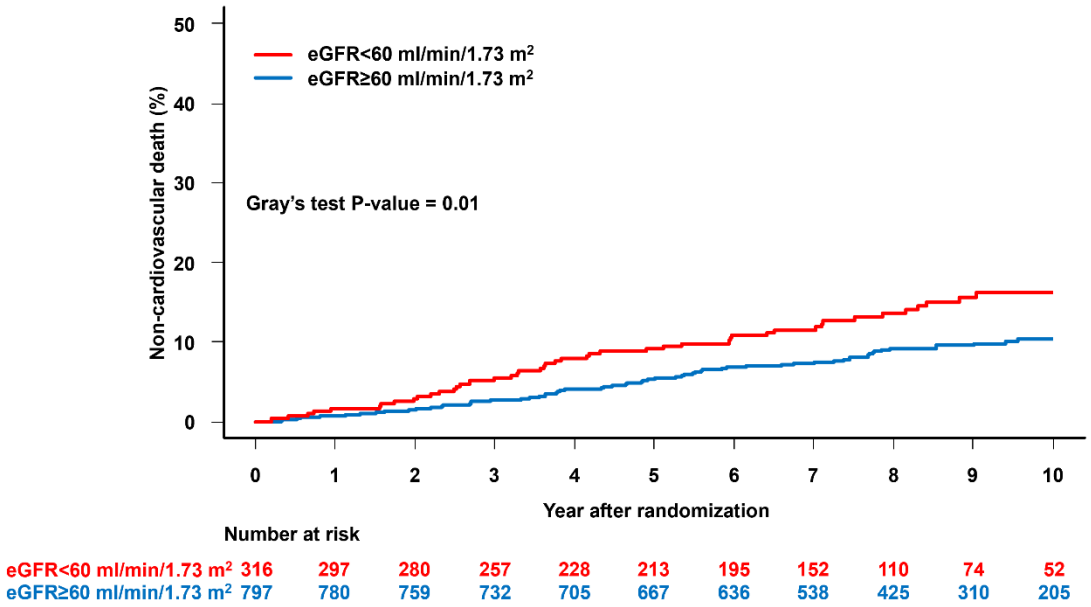
B) Cardiovascular death



C) Sudden cardiovascular death



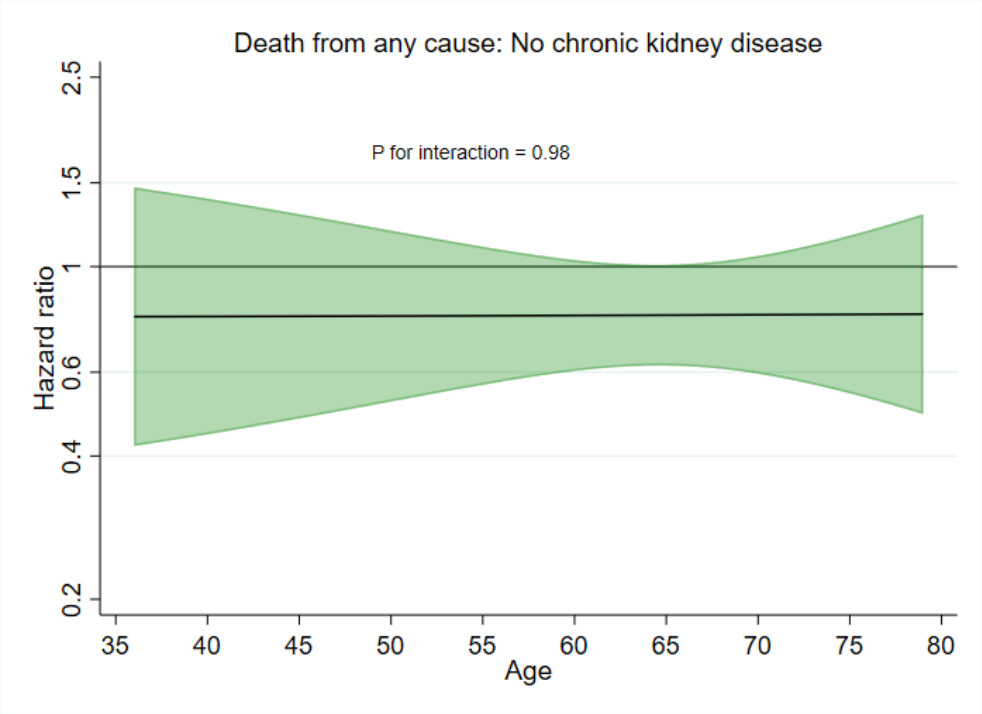
D) Non-cardiovascular death



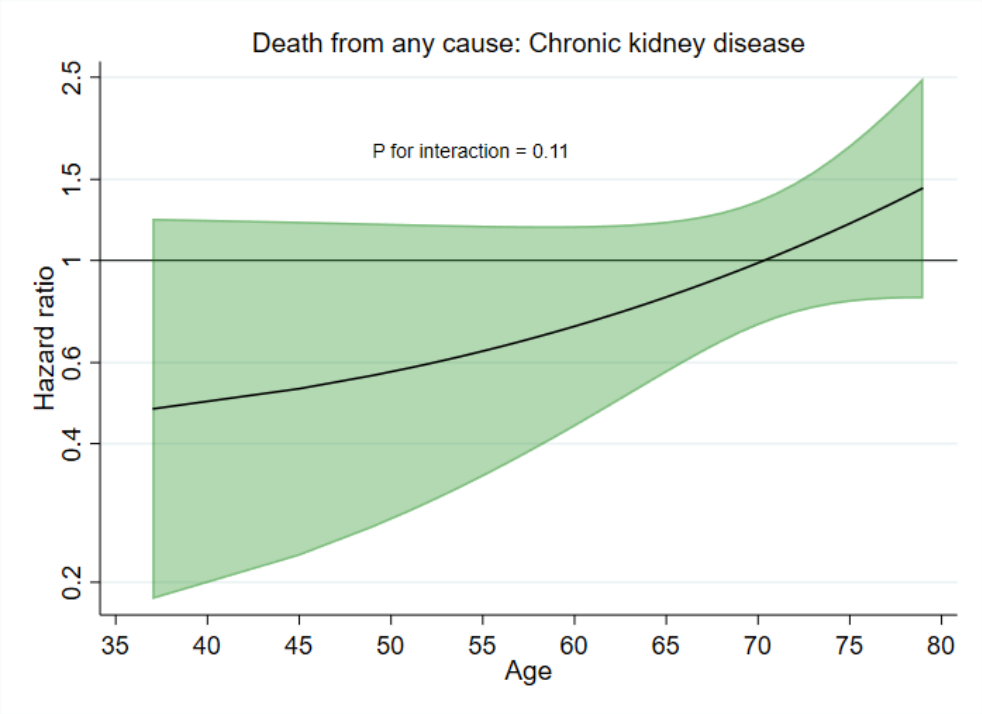
Cumulative incidence of death from any cause (using the Kaplan-Meier estimator), cardiovascular death, sudden cardiovascular death, and non-cardiovascular death (using the Aalen-Johansen estimator, taking the competing risk of other causes of death into account).
eGFR = estimated glomerular filtration rate.

Figure S2. Effect of ICD implantation on death from any cause according to age in patients with and without chronic kidney disease

A) Death from any cause: No chronic kidney disease (eGFR ≥60 ml/min/1.73 m^2)



B) Death from any cause: Chronic kidney disease (eGFR <60 ml/min/1.73 m^2)



The figures show the effect of ICD implantation versus usual care on death from any cause according to continuous age in patients with (a) and without chronic kidney disease (b), respectively. Models were stratified according to center and cardiac resynchronization therapy (preexisting or planned). eGFR = estimated glomerular filtration rate; ICD = implantable cardioverter defibrillator.