Association of ambulatory blood pressure with all-cause and cardiovascular mortality in hemodialysis patients: effects of heart failure and atrial fibrillation

Online Supplement

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Supplemental Table 1: Additional baseline characteristics of the study population

	AForHF	noAForHF	all	p
N	105	239	344	
Use of antihypertensive medication, n (%)	100 (95 %)	214 (90 %)	314 (91 %)	0.23
ACE inhibitors	44 (42 %)	86 (36 %)	130 (38 %)	0.58
ARBs	17 (16 %)	53 (22 %)	70 (20 %)	0.45
CCBs	25 (24 %)	101 (42 %)	126 (37 %)	0.005
Vasodilators	8 (8 %)	29 (12 %)	37 (11 %)	0.46
Beta-blockers	70 (67 %)	156 (65 %)	226 (66 %)	0.97
Diuretics	75 (71 %)	140 (59 %)	215 (63 %)	0.08
Others	16 (15 %)	33 (14 %)	49 (14 %)	0.94
Artrial fibrillation, n (%)	69 (66 %)	0 (0 %)	69 (20 %)	<0.001
Vasc. Disease, n (%)	75 (71 %)	123 (51 %)	198 (58 %)	0.003
History of myocardial infarction, n (%)	35 (33 %)	37 (15 %)	72 (21 %)	<0.001
Hypertensive heart disease/Left ventricular hypertrophy, n (%)	44 (42 %)	60 (25 %)	104 (30 %)	0.008
Central vascular disease, n (%)	16 (15 %)	36 (15 %)	52 (15 %)	1
Arterioclerosis, n (%)	50 (48 %)	66 (28 %)	116 (34 %)	0.001
Pulmonary hypertension, n (%)	16 (15 %)	8 (3 %)	24 (7 %)	<0.001
Heart failure, n (%)	62 (59 %)	0 (0 %)	62 (18 %)	<0.001
Heart rhythm disorder other than AF, n (%)	35 (33 %)	26 (11 %)	61 (18 %)	<0.001
Valvular heart disease, n (%)	41 (39 %)	34 (14 %)	75 (22 %)	<0.001
Other heart diseases / vascular diseases, n (%)	26 (25 %)	38 (16 %)	64 (19 %)	0.15
COPD, n (%)	15 (14 %)	21 (9 %)	36 (10 %)	0.31
Lung fibrosis, n (%)	0 (0 %)	2 (1 %)	2 (1 %)	0.64
CAD, n (%)	55 (52 %)	71 (30 %)	126 (37 %)	<0.001
PAOD, n (%)	32 (30 %)	40 (17 %)	72 (21 %)	0.02
Extreme Dippers, n (%)	3 (3 %)	9 (4 %)	12 (4 %)	0.94
Dippers, n (%)	17 (17 %)	57 (24 %)	74 (22 %)	0.38
Non Dippers, n (%)	48 (49 %)	92 (39 %)	140 (42 %)	0.27
Reverse Dippers, n (%)	30 (31 %)	76 (32 %)	106 (32 %)	0.95

Categorical data as total number (percentage). P-values (p) present the results of group-wise comparisons (AForHF vs. noAForHF). Dipping is defined as follows: Extreme Dipper (night–day blood pressure ratio < 0.8), Dippers (0.8 < ratio <= 0.9), Non Dippers (0.9 < ratio <= 1.0) and Reverse Dippers, i.e., risers (ratio > 1.0). Day was defined as 7 a.m. to 9 p.m. and night as 0 a.m. to 5 a.m. to exclude transition phases. Abbreviations: AF, atrial fibrillation; HF, heart failure; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; PAOD, peripheral artery occlusive disease.

Supplemental Table 2: Comparison of study population to the excluded patients (no 24h ABPM recording or with insufficient data quality)

Study population was mainly comparable with the excluded patients.

	Study population	Excluded patients	p
N	344	175	
Age (yr)	69.3 [55.7,77.2]	65.5 [52.6,77]	0.34
Sex-male, n (%)	234 (68 %)	124 (71 %)	0.80
Body weight (kg)	74.3 [65.5,85.5]	75.5 [64,86.5]	0.69
Height (m)	1.71 (0.0853 SD)	1.71 (0.0903 SD)	0.61
Body mass index (kg/m²)	25.2 [22.8,28.7]	25.3 [22.4,28.7]	0.81
Dialysis vintage (mo)	41.1 [22.7,76.6]	44.8 [21.6,83.8]	0.29
Ca-Pho-Product (mmol^2/l^2)	3.85 (1.15 SD)	4.14 (1.35 SD)	0.01
Effective time of dialysis (h)	4.23 [4,4.5]	4.35 [4.08,4.82]	0.009
UFV (ml)	2220 (1127 SD)	2277 (1210 SD)	0.60
UF rate (ml/h)	501 (248 SD)	510 (265 SD)	0.71
Kt/V ()	1.47 [1.25,1.67]	1.48 [1.26,1.71]	0.71
CVC / AVF, n (%)	21 (6 %) / 323 (94 %)	17 (10 %) / 158 (90 %)	0.33
Presence of diabetes, n (%)	135 (39 %)	74 (42 %)	0.80
Presence of hypertension, n (%)	326 (95 %)	163 (93 %)	0.75
Smokers, n (%)	80 (23 %)	38 (26 %)	0.78
Hemoglobin (g/dl)	11.7 (1.19 SD)	11.8 (1.2 SD)	0.41
Total protein (g/dl)	6.61 (0.529 SD)	6.71 (0.625 SD)	0.12
Serum albumin (g/dl)	3.99 (0.414 SD)	3.94 (0.405 SD)	0.18
Total cholesterol (mg/dl)	177 (44.2 SD)	178 (44.7 SD)	0.69
HDL cholesterol (mg/dl)	43 [36.8,52.3]	43 [36,53]	0.86
LDL cholesterol (mg/dl)	109 (36.3 SD)	111 (38.2 SD)	0.69
Triglycerides (mg/dl)	154 [111,199]	140 [97,223]	0.36
high-sensitive CRP (mg/dl)	0.47 [0.196,0.96]	0.385 [0.185,0.973]	0.46
Use of Statin, n (%)	136 (40 %)	60 (34 %)	0.51
Use of anticoagulation medication, n (%)	52 (15 %)	31 (18 %)	0.75
Use of antihypertensive medication, n (%)	314 (91 %)	158 (90 %)	0.93
ACE inhibitors	130 (38 %)	63 (36 %)	0.92
ARBs	70 (20 %)	51 (29 %)	0.08
CCBs	126 (37 %)	83 (47 %)	0.06
Vasodilators	37 (11 %)	31 (18 %)	0.08
Beta-blockers	226 (66 %)	117 (67 %)	0.97
Diuretics	215 (63 %)	105 (60 %)	0.86
Others	49 (14 %)	42 (24 %)	0.02
Artrial fibrillation, n (%)	69 (20 %)	40 (23 %)	0.76
Vasc. Disease, n (%)	198 (58 %)	104 (59 %)	0.92
History of myocardial infarction, n (%)	72 (21 %)	31 (18 %)	0.69

Hypertensive heart disease/Left ventricular hypertrophy, n (%)	104 (30 %)	48 (27 %)	0.80
Central vascular disease, n (%)	52 (15 %)	33 (19 %)	0.55
Arteriosclerosis, n (%)	116 (34 %)	62 (35 %)	0.93
Pulmonary hypertension, n (%)	24 (7 %)	14 (8 %)	0.91
Heart failure, n (%)	62 (18 %)	37 (21 %)	0.69
Heart rythm disorder other than AF, n (%)	61 (18 %)	23 (13 %)	0.41
Valvular heart disease, n (%)	75 (22 %)	42 (24 %)	0.85
Other heart diseases / vascular diseases, n (%)	64 (19 %)	24 (14 %)	0.37
COPD, n (%)	36 (10 %)	21 (12 %)	0.87
Lung fibrosis, n (%)	2 (1 %)	0 (0 %)	0.60
CAD, n (%)	126 (37 %)	61 (35 %)	0.92
PAOD, n (%)	72 (21 %)	51 (29 %)	0.11

Results are presented as mean (standard deviation) and median [inter-quartile range] for normally and non-normally distributed data, respectively; categorical data as total number (percentage). P-values (p) present the results of group-wise comparisons (Study population vs. excluded patients). Abbreviations: UF, ultrafiltration; UFV, ultrafiltration volume; CVC, central venous catheter; AVF, arteriovenous fistula; AF, atrial fibrillation; HF, heart failure; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; PAOD, peripheral artery occlusive disease; CRP, C-reactive protein.

Supplemental Table 3: Reasons for cardiovascular death

In the table, the reasons for cardiovascular death are presented for the whole study population and the two dedicated subgroups based on atrial fibrillation and heart failure.

	AForHF (N = 105)	noAForHF (N = 239)	All (N=344)
Sudden cardiac death	8	10	18
Myocardial infarction	0	3	3
Heart failure	7	4	11
Major stroke	1	2	3
Cardiac surgical procedure	0	2	2
Pulmonary embolism	1	1	2
Aortal dissection	0	1	1
Ruptured aortic aneurysm	0	1	1
Mesenteric ischemia	2	1	3
Other cardiovascular reasons	1	2	3
Number of cardiovascular deaths	20	27	47

Abbreviations: AF, atrial fibrillation; HF, heart failure.

Supplemental Table 4: P-values for linear and nonlinear terms for univariate and adjusted nonlinear Cox regression analysis for the whole study population (additional adjustment models).

The p-values of the linear and nonlinear terms underpin the nonlinear association of SBP and PP with mortality independently of possible, additional confounders. Furthermore, the linear association of DBP with mortality is supported.

	Linear Term		Nonlinear Term	
	p (univariate)	p (adjusted[1-9]))	p (univariate)	p (adjusted[1-9]))
All-cause mortality				
SBP	0.001	[0.005; 0.06; 0.02; 0.003; 0.005; 0.01; 0.01; 0.005; 0.08]	0.04	[0.02; 0.05; 0.03; 0.02; 0.06; 0.05; 0.08; 0.02; 0.12]
DBP	<0.001	[<0.001; 0.01; 0.002; <0.001; 0.002; 0.003; <0.001; <0.001; 0.003]	0.86	[0.84; 0.77; 0.75; 0.82; 0.70; 0.81; 0.87; 0.80; 0.82]
PP	0.05	[0.85; 0.81; 0.99; 0.76; 0.45; 0.66; 0.93; 0.82; 0.61]	0.07	[0.001; 0.002; 0.002; <0.001; 0.004; 0.003; 0.002; <0.001; 0.004]
Cardiovascular mortality				
SBP	0.09	[0.22; 0.19; 0.28; 0.18; 0.44; 0.26; 0.31; 0.23; 0.53]	0.02	[0.006; 0.004; 0.006; 0.005; 0.005; 0.008; 0.01; 0.007; 0.02]
DBP	0.001	[0.05; 0.03; 0.07; 0.04; 0.22; 0.07; 0.05; 0.05; 0.11]	0.49	[0.22; 0.25; 0.21; 0.20; 0.12; 0.22; 0.30; 0.24; 0.32]
PP	0.09	[0.55; 0.54; 0.52; 0.61; 0.59; 0.61; 0.46; 0.54; 0.37]	0.07	[0.005; 0.004; 0.006; 0.005; 0.01; 0.007; 0.005; 0.005; 0.009]

Adjustment for (1) age and sex (Model 1), (2) Model 1 plus diabetes mellitus and serum albumin, (3) Model 1 plus ultrafiltration, (4) Model 1 plus smoking status (Model 4), (5) Model 1 plus total cholesterol, (6) Model 1 plus high-sensitive CRP (logarithmic), (7) Model 1 plus anticoagulation medication, (8) Model 1 plus dialysis vintage (logarithmic), (9) Model 1 plus CVC. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CRP, C-reactive protein; CVC, central venous catheter.

Supplemental Table 5: P-values for linear and nonlinear terms for univariate and adjusted nonlinear Cox regression analysis for the AForHF group (additional adjustment models).

In patients with AF or HF, linear terms for the association of SBP, DBP and PP with mortality are significant, but not the nonlinear terms.

	Linear Term		Nonlinear Term	
	p (univariate)	p (adjusted[1-9])	p (univariate)	p (adjusted[1-9])
All-cause mortality				
SBP	<0.001	[<0.001; <0.001; <0.001;<0.001; 0.002;<0.001; <0.001; <0.001; 0.001]	0.40	[0.61; 0.64; 0.58; 0.67; 0.61; 0.39; 0.60; 0.63; 0.50]
DBP	<0.001	[0.002; 0.004; 0.002;<0.001; 0.02;0.005; 0.002; 0.002; 0.006]	0.30	[0.49; 0.57; 0.49; 0.54; 0.62; 0.46; 0.46; 0.52; 0.36]
PP	0.02	[0.02; 0.01; 0.02; 0.02; 0.01; 0.005; 0.02; 0.02; 0.03]	0.10	[0.03; 0.04; 0.04; 0.03; 0.05; 0.10; 0.03; 0.03; 0.04]
Cardiovascular mortality				
SBP	<0.001	[<0.001; <0.001; <0.001; <0.001; 0.002; <0.001; 0.001; <0.001; 0.001]	0.27	[0.48; 0.50; 0.47; 0.52; 0.45; 0.50; 0.48; 0.50; 0.44]
DBP	0.005	[0.01; 0.009; 0.01; 0.01; 0.04; 0.01; 0.01; 0.01; 0.02]	0.68	[0.44; 0.44; 0.41; 0.42; 0.35; 0.43; 0.45; 0.38; 0.47]
PP	0.002	[0.003; 0.001; 0.003; 0.003; 0.002; 0.003; 0.004; 0.003; 0.003]	0.53	[0.44; 0.47; 0.46; 0.43; 0.77; 0.46; 0.48; 0.45; 0.49]

Adjustment for (1) age and sex (Model 1), (2) Model 1 plus diabetes mellitus and serum albumin, (3) Model 1 plus ultrafiltration, (4) Model 1 plus smoking status (Model 4), (5) Model 1 plus total cholesterol, (6) Model 1 plus high-sensitive CRP (logarithmic), (7) Model 1 plus anticoagulation medication, (8) Model 1 plus dialysis vintage (logarithmic), (9) Model 1 plus CVC. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CRP, C-reactive protein; CVC, central venous catheter.

Supplemental Table 6: P values for linear and nonlinear terms for univariate and adjusted nonlinear Cox regression analysis for the noAForHF group (additional adjustment models).

In patients without AF or HF, nonlinear terms for the association of SBP, DBP and PP with mortality are not significant, indicating a linear association (partly significant).

	Linear Term		Nonlinear Term	
	p (univariate)	p (adjusted[1-9])	p (univariate)	p (adjusted[1-9])
All-cause mortality				
SBP	0.25	[0.27; 0.12; 0.24; 0.33; 0.43; 0.20; 0.45; 0.26; 0.08]	0.24	[0.28; 0.48; 0.29; 0.25; 0.37; 0.31; 0.33; 0.25; 0.57]
DBP	0.008	[0.22; 0.82; 0.22; 0.19; 0.21; 0.33; 0.14; 0.22; 0.38]	0.66	[0.67; 0.49; 0.68; 0.71; 0.66; 0.64; 0.75; 0.69; 0.60]
PP	<0.001	[0.003; 0.02; 0.003; 0.005; 0.01; 0.004; 0.009; 0.003; <0.001]	0.51	[0.54; 0.30; 0.54; 0.53; 0.65; 0.53; 0.41; 0.46; 0.57]
Cardiovascular mortality				
SBP	0.02	[0.01; 0.02; 0.01; 0.02; 0.007; 0.01; 0.02; 0.02; 0.009]	0.73	[0.76; 0.78; 0.76; 0.76; 0.77; 0.73; 0.71; 0.80; 0.74]
DBP	0.39	[0.85; 0.95; 0.87; 0.92; 0.44; 0.73; 0.94; 0.88; 0.76]	0.33	[0.32; 0.32; 0.32; 0.34; 0.31; 0.30; 0.35; 0.32; 0.29]
PP	<0.001	[<0.001; <0.001; <0.001; <0.001; <0.001; <0.001; <0.001; <0.001; <0.001]	0.66	[0.62; 0.57; 0.62; 0.59; 0.82; 0.62; 0.54; 0.67; 0.66]

Adjustment for (1) age and sex (Model 1), (2) Model 1 plus diabetes mellitus and serum albumin, (3) Model 1 plus ultrafiltration, (4) Model 1 plus smoking status (Model 4), (5) Model 1 plus total cholesterol, (6) Model 1 plus high-sensitive CRP (logarithmic), (7) Model 1 plus anticoagulation medication, (8) Model 1 plus dialysis vintage (logarithmic), (9) Model 1 plus CVC. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CRP, C-reactive protein; CVC, central venous catheter.

Supplemental Table 7: Univariate and adjusted proportional hazard ratios for all-cause mortality including 95% confidence interval for systolic/diastolic and pulse pressure per mm Hg increase (additional adjustment models).

The hazard ratios indicate an opposite association with all-cause mortality in the two subgroups for SBP (although not significant in the noAForHF group) and PP. DBP remains reversely associated.

	AForHF (N = 105)		noAForHF (N = 239)	
	HR	**p**	**HR**	**p**
SBP	0.97 (0.96, 0.98)	<0.001	1.01 (0.99, 1.03)	0.30
SBP[1]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.03)	0.30
SBP[2]	0.97 (0.96, 0.99)	<0.001	1.01 (1.00, 1.03)	0.12
SBP[3]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.03)	0.28
SBP[4]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.02)	0.37
SBP[5]	0.97 (0.96, 0.99)	0.001	1.01 (0.99, 1.03)	0.45
SBP[6]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.03)	0.23
SBP[7]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.02)	0.47
SBP[8]	0.97 (0.96, 0.99)	<0.001	1.01 (0.99, 1.03)	0.29
SBP[9]	0.97 (0.96, 0.99)	0.001	1.01 (1.00, 1.03)	0.09
DBP	0.96 (0.94, 0.98)	<0.001	0.97 (0.95, 0.99)	0.007
DBP[1]	0.96 (0.94, 0.99)	0.001	0.98 (0.96, 1.01)	0.21
DBP[2]	0.96 (0.94, 0.99)	0.004	1.00 (0.97, 1.02)	0.80
DBP[3]	0.96 (0.94, 0.99)	0.002	0.98 (0.96, 1.01)	0.21
DBP[4]	0.96 (0.94, 0.98)	<0.001	0.98 (0.96, 1.01)	0.18
DBP[5]	0.97 (0.95, 1.00)	0.02	0.98 (0.95, 1.01)	0.20
DBP[6]	0.97 (0.94, 0.99)	0.004	0.99 (0.96, 1.01)	0.32
DBP[7]	0.96 (0.94, 0.99)	0.002	0.98 (0.95, 1.01)	0.14
DBP[8]	0.96 (0.94, 0.99)	0.001	0.98 (0.96, 1.01)	0.21
DBP[9]	0.97 (0.94, 0.99)	0.004	0.99 (0.96, 1.01)	0.36
PP	0.97 (0.95, 1.00)	0.03	1.04 (1.02, 1.07)	<0.001
PP[1]	0.97 (0.95, 1.00)	0.04	1.03 (1.01, 1.06)	0.004
PP[2]	0.97 (0.94, 1.00)	0.02	1.03 (1.01, 1.05)	0.01
PP[3]	0.97 (0.95, 1.00)	0.04	1.03 (1.01, 1.06)	0.003
PP[4]	0.97 (0.95, 1.00)	0.04	1.03 (1.01, 1.06)	0.005
PP[5]	0.97 (0.94, 1.00)	0.02	1.03 (1.01, 1.06)	0.01
PP[6]	0.97 (0.94, 0.99)	0.01	1.03 (1.01, 1.06)	0.004
PP[7]	0.97 (0.95, 1.00)	0.04	1.03 (1.01, 1.05)	0.009
PP[8]	0.97 (0.95, 1.00)	0.04	1.03 (1.01, 1.06)	0.003
PP[9]	0.97 (0.95, 1.00)	0.06	1.04 (1.02, 1.06)	<0.001

Adjustment for (1) age and sex (Model 1), (2) Model 1 plus diabetes mellitus and serum albumin, (3) Model 1 plus ultrafiltration, (4) Model 1 plus smoking status (Model 4), (5)

Model 1 plus total cholesterol, (6) Model 1 plus high-sensitive CRP (logarithmic), (7) Model 1 plus anticoagulation medication, (8) Model 1 plus dialysis vintage (logarithmic), (9) Model 1 plus CVC. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CRP, C-reactive protein; CVC, central venous catheter.

Supplemental Table 8: Univariate and adjusted proportional hazard ratios for cardiovascular mortality including 95% confidence interval for systolic/diastolic and pulse pressure per mm Hg increase (additional adjustment models).

For cardiovascular mortality, the effects in the two dedicated subgroups are even more pronounced for SBP and PP. Opposed associations are independent of other possible risk predictors.

	AForHF (N = 105)		noAForHF (N = 239)	
	HR	**p**	**HR**	**p**
SBP	0.95 (0.93, 0.98)	<0.001	1.03 (1.00, 1.05)	0.02
SBP[1]	0.95 (0.93, 0.98)	<0.001	1.03 (1.01, 1.05)	0.01
SBP[2]	0.94 (0.91, 0.97)	<0.001	1.03 (1.00, 1.05)	0.02
SBP[3]	0.95 (0.93, 0.98)	<0.001	1.03 (1.01, 1.05)	0.01
SBP[4]	0.95 (0.93, 0.98)	<0.001	1.03 (1.00, 1.05)	0.02
SBP[5]	0.96 (0.93, 0.98)	0.001	1.03 (1.01, 1.06)	0.005
SBP[6]	0.95 (0.93, 0.98)	<0.001	1.03 (1.01, 1.05)	0.01
SBP[7]	0.95 (0.93, 0.98)	<0.001	1.03 (1.00, 1.05)	0.02
SBP[8]	0.95 (0.93, 0.98)	<0.001	1.03 (1.00, 1.05)	0.02
SBP[9]	0.95 (0.93, 0.98)	<0.001	1.03 (1.01, 1.05)	0.008
DBP	0.95 (0.91, 0.98)	0.005	0.98 (0.95, 1.02)	0.32
DBP[1]	0.95 (0.91, 0.99)	0.02	1.00 (0.97, 1.04)	0.89
DBP[2]	0.95 (0.91, 0.99)	0.01	1.00 (0.96, 1.04)	0.90
DBP[3]	0.95 (0.91, 0.99)	0.02	1.00 (0.96, 1.04)	0.91
DBP[4]	0.95 (0.91, 0.99)	0.01	1.00 (0.96, 1.04)	0.95
DBP[5]	0.96 (0.92, 1.00)	0.06	1.02 (0.97, 1.06)	0.45
DBP[6]	0.95 (0.91, 0.99)	0.02	1.01 (0.97, 1.05)	0.76
DBP[7]	0.95 (0.91, 0.99)	0.02	1.00 (0.96, 1.04)	0.98
DBP[8]	0.95 (0.91, 0.99)	0.02	1.00 (0.97, 1.04)	0.92
DBP[9]	0.95 (0.92, 0.99)	0.03	1.00 (0.97, 1.04)	0.80
PP	0.93 (0.88, 0.97)	0.003	1.06 (1.03, 1.09)	<0.001
PP[1]	0.93 (0.88, 0.98)	0.006	1.06 (1.03, 1.09)	<0.001
PP[2]	0.92 (0.87, 0.97)	0.002	1.06 (1.03, 1.10)	<0.001
PP[3]	0.93 (0.88, 0.98)	0.006	1.06 (1.03, 1.09)	<0.001
PP[4]	0.93 (0.88, 0.98)	0.006	1.05 (1.02, 1.09)	<0.001
PP[5]	0.92 (0.87, 0.97)	0.003	1.06 (1.03, 1.09)	<0.001
PP[6]	0.93 (0.88, 0.98)	0.006	1.05 (1.02, 1.09)	<0.001
PP[7]	0.93 (0.88, 0.98)	0.007	1.05 (1.02, 1.09)	<0.001
PP[8]	0.93 (0.88, 0.98)	0.006	1.06 (1.02, 1.09)	<0.001
PP[9]	0.93 (0.88, 0.98)	0.006	1.06 (1.03, 1.09)	<0.001

Adjustment for (1) age and sex (Model 1), (2) Model 1 plus diabetes mellitus and serum albumin, (3) Model 1 plus ultrafiltration, (4) Model 1 plus smoking status (Model 4), (5)

Model 1 plus total cholesterol, (6) Model 1 plus high-sensitive CRP (logarithmic), (7) Model 1 plus anticoagulation medication, (8) Model 1 plus dialysis vintage (logarithmic), (9) Model 1 plus CVC. Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CRP, C-reactive protein; CVC, central venous catheter.

Supplemental Table 9: Incidence rates per person year for each year of follow-up (FU) and total FU period.

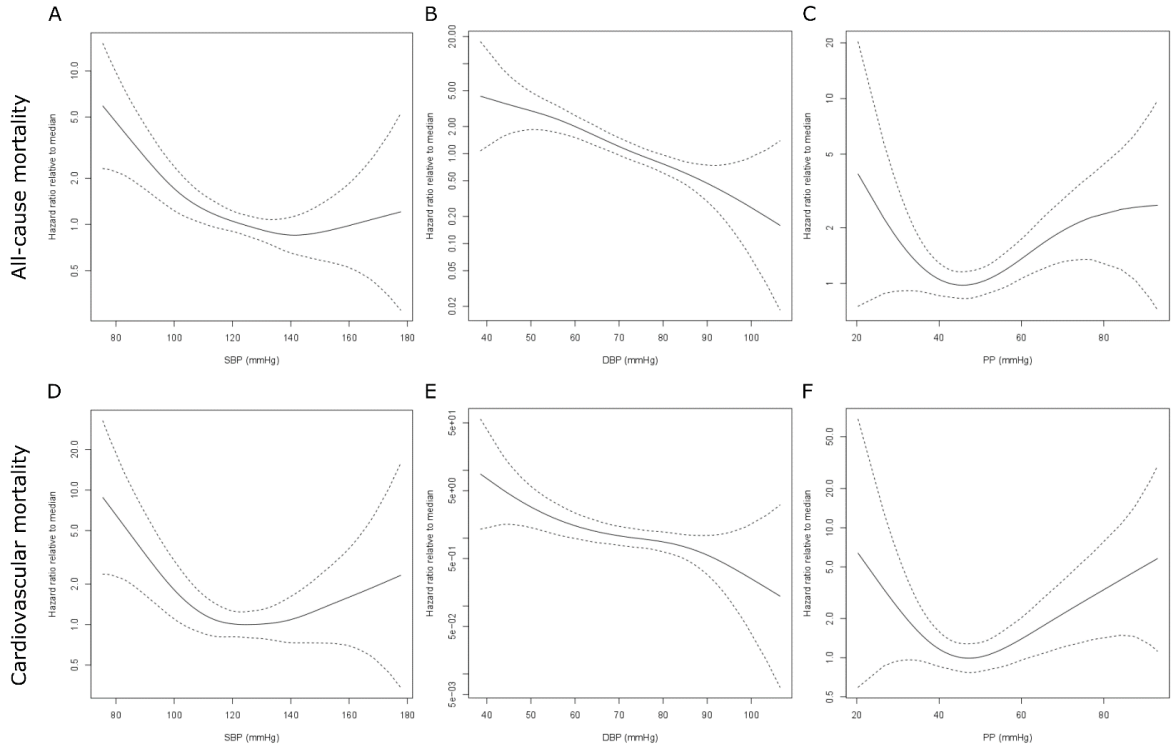
As expected, these are significantly higher for patients with atrial fibrillation and/or heart failure for the whole follow-up period and especially in the first follow-up years. Incidence rates level after time. p indicates p-value from group comparison (AForHF vs. noAForHF).

	AForHF	noAForHF	all	p
All-cause mortality				
FU year 1	0.20 [0.12,0.32]	0.02 [0.00,0.04]	0.07 [0.04,0.11]	<0.001
FU year 2	0.30 [0.19,0.45]	0.08 [0.05,0.13]	0.14 [0.10,0.19]	<0.001
FU year 3	0.21 [0.10,0.37]	0.09 [0.05,0.15]	0.12 [0.08,0.17]	0.03
FU year 4	0.15 [0.04,0.39]	0.06 [0.02,0.13]	0.08 [0.04,0.14]	0.13
FU year 5	0.32 [0.07,0.93]	0.15 [0.06,0.29]	0.17 [0.09,0.31]	0.24
total FU	0.23 [0.17,0.30]	0.07 [0.05,0.09]	0.11 [0.09,0.13]	<0.001
Cardiovascular mortality				
FU year 1	0.07 [0.03,0.15]	0.01 [0.00,0.03]	0.03 [0.01,0.05]	0.001
FU year 2	0.10 [0.04,0.20]	0.03 [0.01,0.07]	0.05 [0.03,0.08]	0.04
FU year 3	0.06 [0.01,0.16]	0.05 [0.02,0.10]	0.05 [0.03,0.09]	0.89
FU year 4	0.08 [0.01,0.28]	0.04 [0.01,0.10]	0.05 [0.02,0.10]	0.50
FU year 5	0.11 [0.00,0.59]	0.02 [0.00,0.10]	0.03 [0.00,0.11]	0.16
total FU	0.08 [0.05,0.12]	0.03 [0.02,0.05]	0.04 [0.03,0.06]	0.003

Abbreviations: AF, atrial fibrillation; HF, heart failure; FU, follow-up.

Supplemental Figure 1: Univariate association of systolic blood pressure (A,D), diastolic blood pressure (B,E) and pulse pressure (C,F) with all-cause mortality (A-C) and cardiovascular mortality (D-F) in the total study cohort.

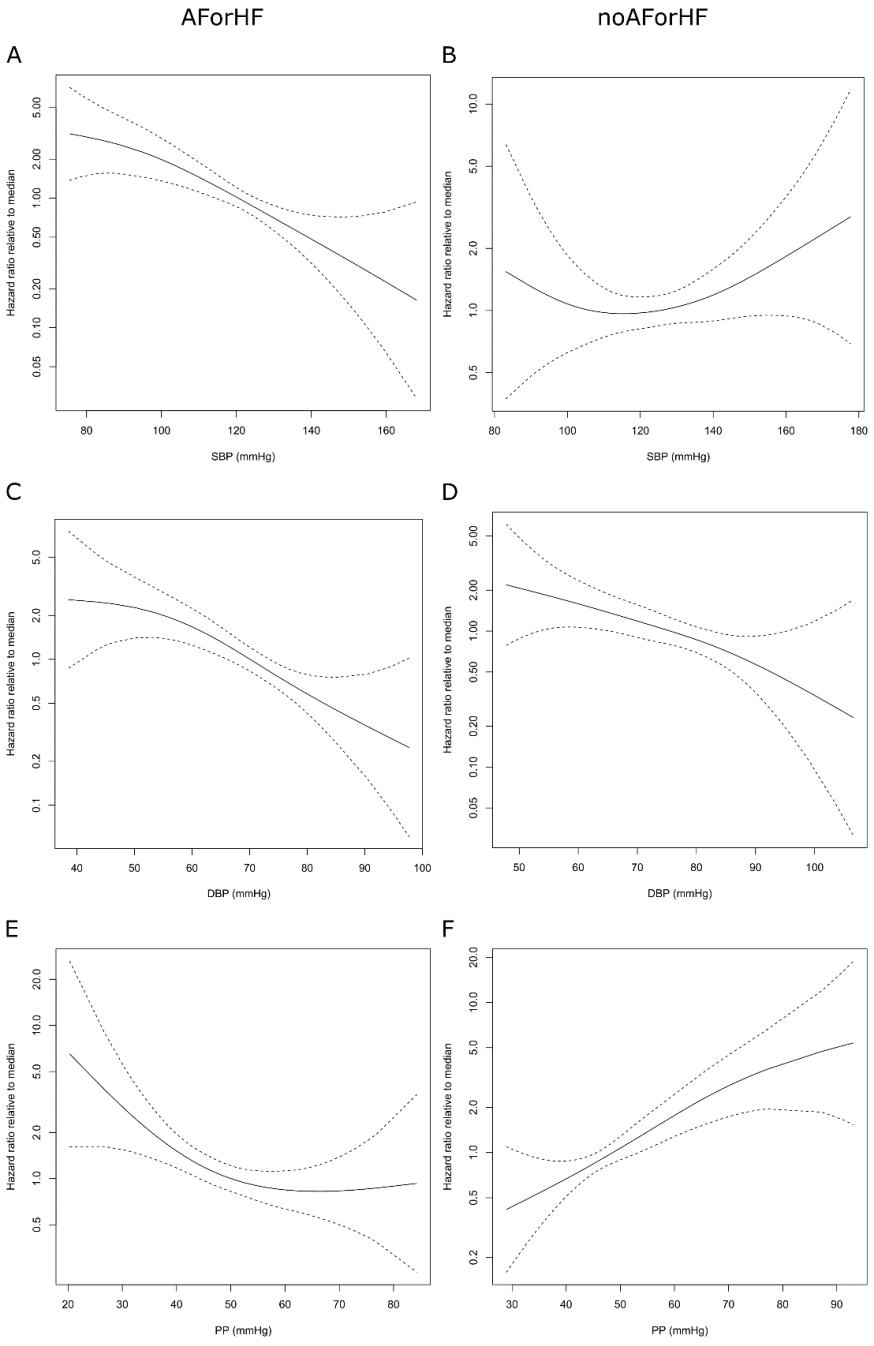
In the Figure, one can see the nonlinear association of SBP and PP with all-cause and cardiovascular mortality in the study population. Opposed, DBP shows an inverse, linear relationship.



Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure.

Supplemental Figure 2: Univariate association of systolic blood pressure (A, B), diastolic blood pressure (C,D) and pulse pressure (E,F) with all-cause mortality for the AForHF group (A,C,E) and the noAForHF group (B,D,F).

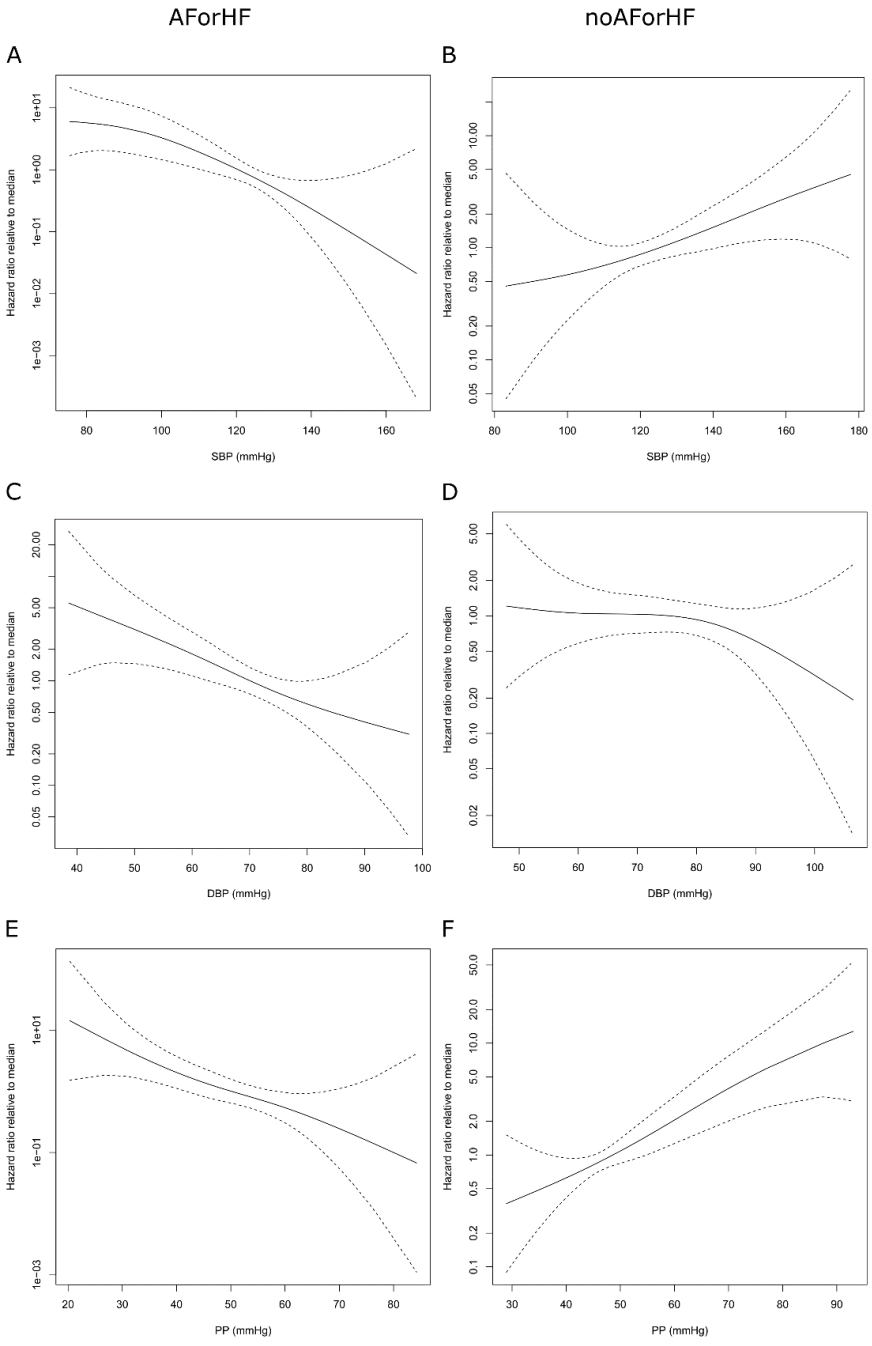
In the Figures, one can see that the nonlinear behavior of SBP and PP for all-cause mortality can be broken down to linear behavior in the dedicated subgroups.



Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure.

Supplemental Figure 3: Univariate association of systolic blood pressure (A, B), diastolic blood pressure (C,D) and pulse pressure (E,F) with CV mortality for the AForHF group (A,C,E) and the noAForHF group (B,D,F).

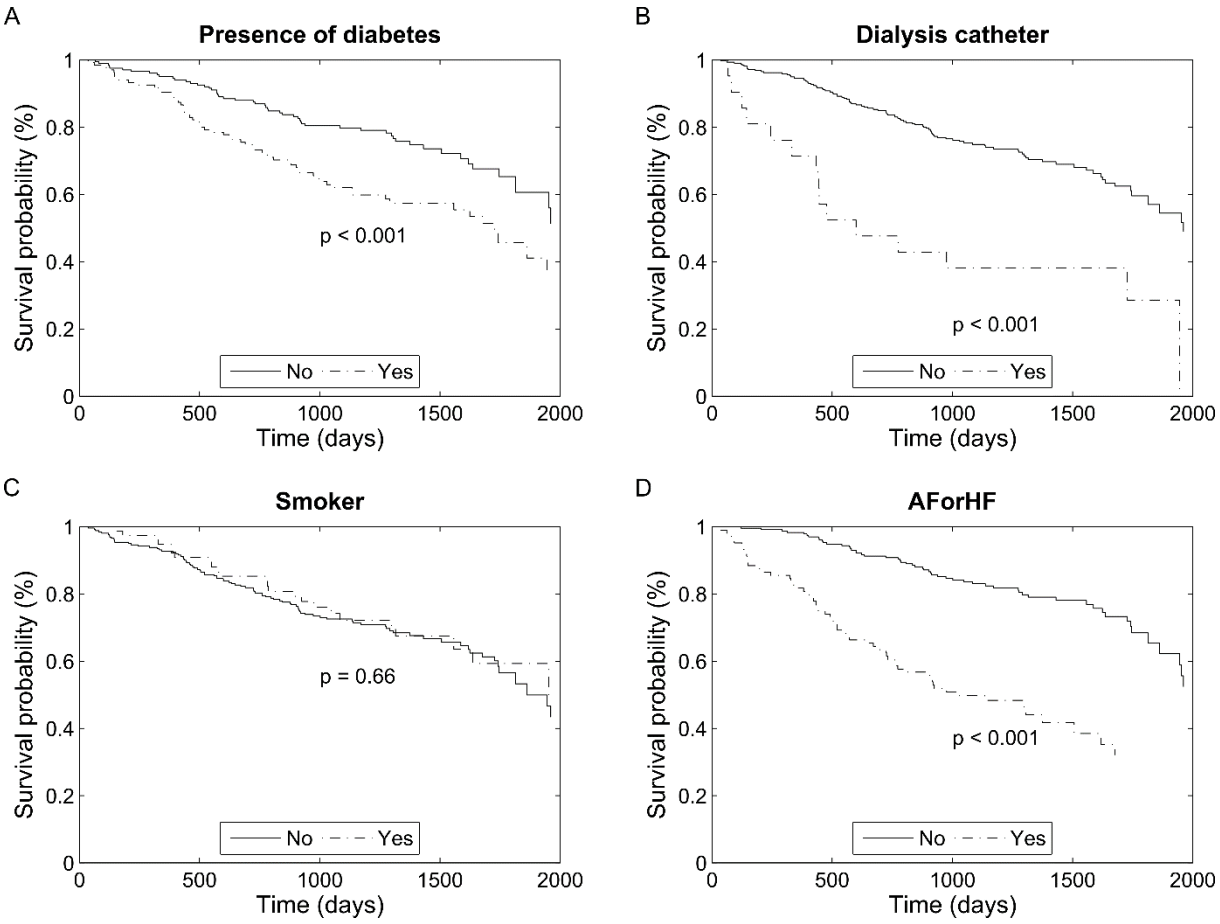
Again and even more pronounced, one can see that the nonlinear behavior of SBP and PP for CV mortality can be broken down to linear behavior.



Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; PP, pulse pressure; AF, atrial fibrillation; HF, heart failure; CV, cardiovascular.

Supplemental Figure 4: Kaplan-Meier curves for selected baseline characteristics for all-cause mortality

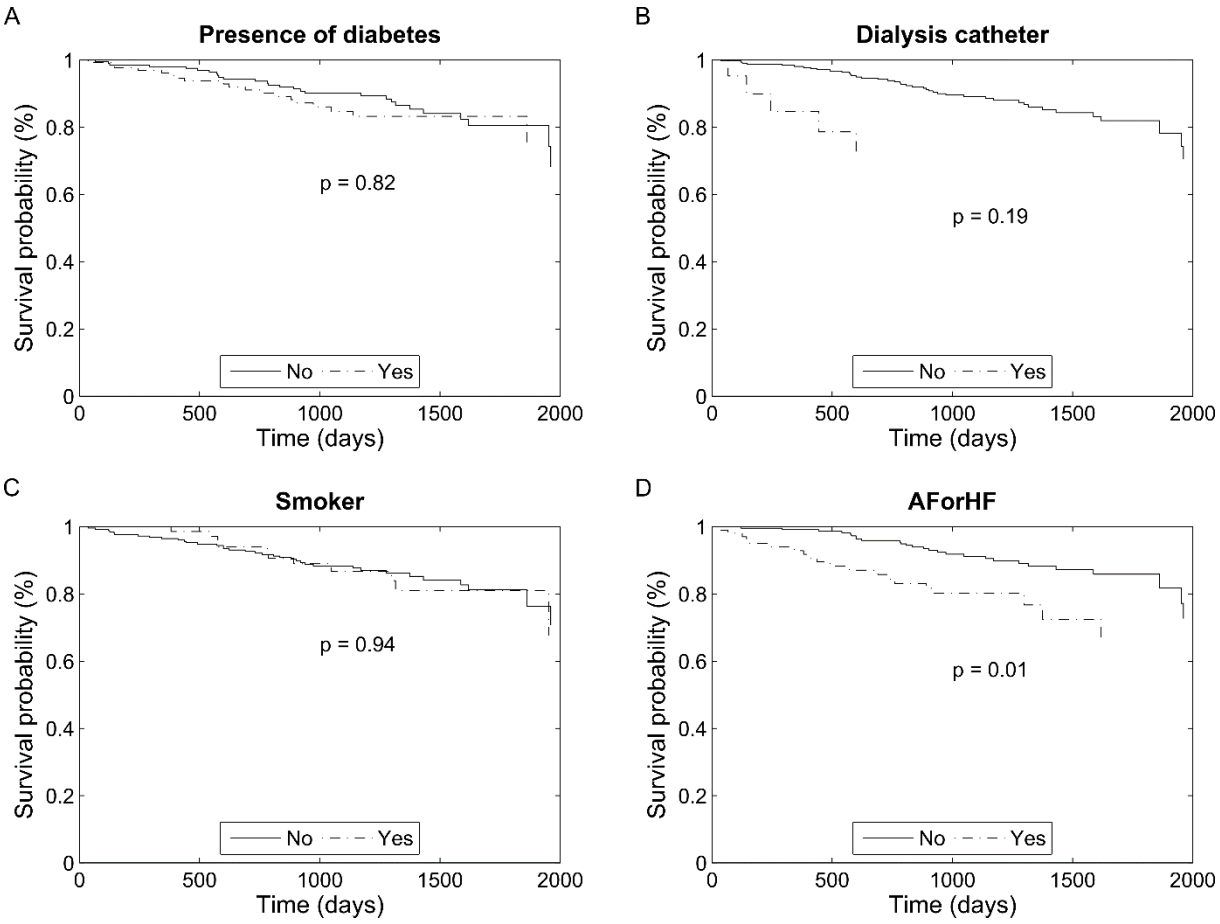
In the Kaplan-Meier curves, the survival probabilities for groups according to various, known risk factors for all-cause mortality are presented. There is a significant difference in the survival curves according to the logrank test with respect to presence of diabetes, dialysis access, and diagnosis of AF or HF, but not for smoking status.



Abbreviations: AF, atrial fibrillation; HF, heart failure.

Supplemental Figure 5: Kaplan-Meier curves for selected baseline characteristics for cardiovascular mortality

In the Kaplan-Meier curves, the survival probabilities for groups according to various, known risk factors for cardiovascular mortality are presented. There is a significant difference in the survival curves according to the logrank test for the diagnosis of AF or HF, but not for the other selected baseline characteristics.



Abbreviations: AF, atrial fibrillation; HF, heart failure.