

Table S1. Multivariable Cox regression analyses using two variables of Group and one confounding factor.

Table S2. Patient clinical characteristics using the balanced cohort.

Table S3. Cox regression analyses for patient survival using the balanced cohort.

Table S4. Medication types and Health Insurance Review and Assessment Service codes.

Figure S1. Propensity score balance assessment using absolute standardized difference plot.

Figure S2. Kaplan–Meier curves of patient survival according to groups using the balanced cohort.

Table S1. Multivariable Cox regression analyses using two variables of group based on intensity of statin and one confounding factor.

	Multivariable	
	HR (95% CI)	<i>P</i>
Analysis using group + age		
Group 2	0.97 (0.86–1.08)	0.556
Group 3	0.95 (0.92–0.98)	<0.001
Group 4	1.10 (0.96–1.25)	0.155
Analysis using group + VA type		
Group 2	1.14 (1.02–1.28)	0.023
Group 3	1.07 (1.04–1.11)	<0.001
Group 4	1.22 (1.07–1.39)	0.003
Analysis using group + CCI score		
Group 2	0.99 (0.88–1.11)	0.881
Group 3	0.96 (0.93–0.99)	0.006
Group 4	0.99 (0.87–1.13)	0.853
Analysis using group + use of RASB		
Group 2	1.13 (1.01–1.27)	0.036
Group 3	1.07 (1.04–1.11)	<0.001
Group 4	1.24 (1.09–1.41)	0.001
Analysis using group + use of clopidogrel		
Group 2	1.08 (0.96–1.21)	0.200
Group 3	1.00 (0.97–1.04)	0.847
Group 4	1.10 (0.97–1.26)	0.153
Analysis using group + use of aspirin		
Group 2	1.12 (0.99–1.25)	0.063
Group 3	1.05 (1.02–1.09)	0.001
Group 4	1.21 (1.06–1.38)	0.005
Analysis using group + presence of MI or CHF		
Group 2	1.10 (0.98–1.24)	0.105
Group 3	1.04 (1.01–1.07)	0.014
Group 4	1.14 (1.00–1.30)	0.049
Analysis using group + underlying disease		
Group 2	1.06 (0.95–1.19)	0.294
Group 3	1.00 (0.97–1.03)	0.902
Group 4	1.11 (0.98–1.27)	0.113
Analysis using group + serum albumin		
Group 2	1.09 (0.98–1.23)	0.125
Group 3	1.07 (1.04–1.10)	<0.001
Group 4	1.16 (1.02–1.32)	0.024
Analysis using group + serum creatinine		

Group 2	1.04 (0.93–1.17)	0.511
Group 3	0.99 (0.96–1.02)	0.471
Group 4	1.10 (0.96–1.25)	0.165
Analysis using group + serum phosphorus		
Group 2	1.10 (0.98–1.23)	0.115
Group 3	1.05 (1.02–1.09)	0.001
Group 4	1.17 (1.03–1.33)	0.018
Analysis using group + DBP		
Group 2	1.14 (0.98–0.99)	0.033
Group 3	1.10 (1.06–1.14)	<0.001
Group 4	1.22 (1.06–1.41)	0.007

The reference group was Group 1.

Abbreviations: CCI, Charlson comorbidity index; CHF, congestive heart failure; CI, confidence interval; DBP, diastolic blood pressure; HR, hazard ratio; MI, myocardial infarction; RASB, renin-angiotensin system blocker; VA, vascular access

Table S2. Patient clinical characteristics using the balanced cohort.

	Group 1 (n = 52,967)	Group 2 (n = 36,234)	Group 3 (n = 50,524)	Group 4 (n = 32,427)	P
Age (years)	60.1 ± 0.1	61.3 ± 0.6	60.6 ± 0.1	60.7 ± 0.8	0.039
Sex (male, %)	31,791 (60.0%)	20,176 (55.7%)	29,421 (58.2%)	18,009 (55.5%)	0.230
Hemodialysis vintage (months)	52.3 ± 0.3	43.6 ± 2.2	49.3 ± 0.6	44.3 ± 3.0	<0.001
Body mass index (kg/m ²)	22.4 ± 0.0	22.6 ± 0.0	22.5 ± 0.0	22.8 ± 0.0	0.080
Underlying causes of ESRD					0.260
Diabetes mellitus	22,901 (43.2%)	18,029 (49.8%)	22,866 (45.3%)	15,924 (49.1%)	
Hypertension	14,118 (26.7%)	8,425 (23.3%)	12,781 (25.3%)	8,553 (26.4%)	
Glomerulonephritis	5,549 (10.5%)	3,689 (10.2%)	5,689 (11.3%)	2,575 (7.9%)	
Others	4,550 (8.6%)	2,792 (7.7%)	4,146 (8.2%)	1,768 (5.5%)	
Unknown	5,849 (11.0%)	3,299 (9.1%)	5,042 (10.0%)	3,607 (11.1%)	
CCI score	7.4 ± 0.0	7.7 ± 0.1	7.6 ± 0.0	7.9 ± 0.2	0.012
Follow-up duration (months)	61 ± 0	61 ± 1	60 ± 0	58 ± 2	0.638
Type of vascular access					0.446
Arteriovenous fistula	45,052 (85.1%)	31,632 (87.3%)	43,247 (85.6%)	27,458 (84.7%)	
Arteriovenous graft	7,915 (14.9%)	4,601 (12.7%)	7,275 (14.4%)	4,970 (15.3%)	
Kt/V _{urea}	1.53 ± 0.00	1.53 ± 0.01	1.54 ± 0.00	1.52 ± 0.02	0.888
Ultrafiltration volume (L/session)	2.28 ± 0.01	2.23 ± 0.04	2.24 ± 0.01	2.33 ± 0.05	0.191
Hemoglobin (g/dL)	10.7 ± 0.0	10.7 ± 0.0	10.7 ± 0.0	10.7 ± 0.0	0.121
Serum albumin (g/dL)	3.99 ± 0.00	3.99 ± 0.01	3.99 ± 0.00	3.99 ± 0.02	0.672
Serum phosphorus (mg/dL)	5.0 ± 0.0	4.9 ± 0.1	4.9 ± 0.0	5.0 ± 0.0	0.082
Serum calcium (mg/dL)	8.9 ± 0.0	8.9 ± 0.0	8.9 ± 0.0	8.9 ± 0.0	0.611
Systolic blood pressure (mmHg)	141 ± 0	141 ± 1	141 ± 0	142 ± 1	0.747
Diastolic blood pressure (mmHg)	78 ± 0	78 ± 0	78 ± 0	78 ± 1	0.470
Serum creatinine (mg/dL)	9.5 ± 0.0	9.4 ± 0.1	9.4 ± 0.0	9.4 ± 0.2	0.227
Use of RASB	16,031 (30.3%)	12,755 (35.2%)	16,320 (32.3%)	12,489 (38.5%)	0.020

Use of clopidogrel	8,311 (15.7%)	6,731 (18.6%)	8,649 (17.1%)	6,830 (21.1%)	0.028
Use of aspirin	22,264 (42.0%)	17,127 (47.3%)	22,350 (44.2%)	15,786 (48.7%)	0.070
MI or CHF	23,686 (44.7%)	17,470 (48.2%)	23,321 (46.2%)	15,827 (48.8%)	0.329

Data are expressed as mean \pm standard errors for continuous variables and as numbers (percentages) for categorical variables. *P*-values are tested using one-way analysis of variance and Pearson's χ^2 test for categorical variables.

Abbreviations: Group 1, patients without prescription for statins; Group 2, patients with prescription for low-intensity statins; Group 3, patients with prescription for moderate-intensity statins; Group 4, patients with prescription for high-intensity statins; CCI, Charlson comorbidity index; CHF, congestive heart failure; ESRD, end-stage renal disease; MI, myocardial infarction; RASB, renin-angiotensin system blockers.

Table S3. Cox regression analyses for patient survival using the balanced cohort.

	Univariate		Multivariable	
	HR (95% CI)	<i>P</i>	HR (95% CI)	<i>P</i>
Group				
Ref: Group 1				
Group 2	0.95 (0.93–0.97)	<0.001	0.95 (0.92–0.97)	<0.001
Group 3	0.96 (0.94–0.98)	<0.001	0.93 (0.91–0.95)	<0.001
Group 4	1.05 (1.03–1.08)	<0.001	1.00 (0.97–1.03)	0.939
Ref: Group 2				
Group 3	1.02 (0.99–1.04)	0.182	0.98 (0.95–1.00)	0.107
Group 4	1.11 (1.08–1.14)	<0.001	1.06 (1.02–1.09)	<0.001
Ref: Group 3				
Group 4	1.09 (1.07–1.12)	<0.001	1.08 (1.05–1.11)	<0.001
Age (increase per 1 year)	1.06 (1.06–1.06)	<0.001	1.06 (1.06–1.06)	<0.001
Sex (ref: male)	0.82 (0.81–0.83)	<0.001	0.78 (0.77–0.80)	<0.001
Body mass index (increase 1 kg/m ²)	0.97 (0.97–0.97)	<0.001	0.96 (0.96–0.97)	0.005
Underlying cause of ESRD (ref: DM)	0.82 (0.82–0.83)	<0.001	0.87 (0.86–0.88)	<0.001
Vascular access (ref: arteriovenous fistula)	1.34 (1.31–1.36)	<0.001	1.16 (1.13–1.18)	<0.001
Hemodialysis vintage (increase per 1 month)	1.01 (1.01–1.01)	<0.001	1.00 (1.00–1.01)	<0.001
CCI score (increase per 1 score)	1.14 (1.14–1.14)	<0.001	1.08 (1.07–1.08)	<0.001
Ultrafiltration volume (increase per 1 kg/session)	0.92 (0.91–0.92)	<0.001	1.06 (1.05–1.07)	<0.001
KtV _{urea} (increase per 1 unit)	0.91 (0.88–0.94)	<0.001	0.66 (0.63–0.69)	<0.001
Hemoglobin (increase per 1 g/dL)	0.87 (0.86–0.88)	<0.001	0.93 (0.92–0.94)	<0.001
Serum albumin (increase per 1 g/dL)	0.39 (0.38–0.40)	<0.001	0.66 (0.64–0.68)	<0.001
Serum creatinine (increase per 1 mg/dL)	0.88 (0.87–0.88)	<0.001	0.95 (0.95–0.96)	<0.001
Serum phosphorus (increase per 1 mg/dL)	0.90 (0.89–0.91)	<0.001	1.07 (1.06–1.07)	<0.001
Serum calcium (increase per 1 mg/dL)	1.01 (0.99–1.02)	0.063	1.13 (1.12–1.14)	<0.001
Systolic blood pressure (increase per 1 mmHg)	1.01 (1.01–1.01)	<0.001	1.01 (1.01–1.01)	<0.001

Diastolic blood pressure (increase per 1 mmHg)	0.98 (0.98–0.98)	<0.001	0.99 (0.99–0.99)	0.009
Use of renin angiotensin system blocker	1.20 (1.18–1.21)	<0.001	1.05 (1.03–1.07)	<0.001
Use of clopidogrel	1.54 (1.51–1.56)	<0.001	1.18 (1.15–1.21)	<0.001
Use of aspirin	1.24 (1.22–1.25)	<0.001	1.00 (0.99–1.02)	0.640
MI or CHF	1.40 (1.38–1.43)	<0.001	1.03 (1.01–1.05)	<0.001

Multivariable analysis was adjusted for age, sex, body mass index, underlying cause of ESRD, vascular access, hemodialysis vintage, CCI score, ultrafiltration volume, Kt/V_{urea}, hemoglobin, serum albumin, serum creatinine, serum phosphorus, serum calcium, systolic blood pressure, diastolic blood pressure, use of renin–angiotensin system blockers, statin, clopidogrel, and aspirin, MI or CHF, and was performed using enter mode.

Abbreviations: Group 1, patients without prescription for statins; Group 2, patients with prescription for low-intensity statins; Group 3, patients with prescription for moderate-intensity statins; Group 4, patients with prescription for high-intensity statins; CCI, Charlson comorbidity index; CHF, congestive heart failure; CI, confidence interval; DM, diabetes mellitus; ESRD, end stage renal disease; HR, hazard ratio; MI, myocardial infarction.

Table S4. Medication types and Health Insurance Review and Assessment Service codes

Medications	Codes
Acepril	104201ATB, 104202ATB
Amlodipine	495901ATB, 459802ACH, 483201ATB, 486501ATB, 107601ATB, 107601ATD, 459801ACH, 459801ATB, 459901ATB, 464601ATB, 470801ATB, 476201ATB, 479701ATB, 483202ATB, 486502ATB, 107602ATB, 107602ATD, 470802ATB
Amlodipine+Atorvastatin	614500ATB, 472300ATB472400ATB472500ATB518900ATB
Amlodipine+Losartan+Chlorthalidone	662800ATB, 662900ATB, 663000ATB
Amlodipine+Losartan+Rosuvastatin	663900ATB, 664000ATB, 664100ATB, 664200ATB, 664300ATB, 664400ATB
Amlodipine+Olmesartan+Rosuvastatin	677300ATB, 677400ATB, 677500ATB, 677600ATB
Amlodipine+Rosuvastatin	673900ATB, 674000ATB, 674100ATB
Amlodipine+Rosuvastatin+Telmisartan	671200ATB, 671300ATB, 671400ATB, 671500ATB, 677000ATB, 677100ATB, 671600ATB, 671700ATB
Amlodipine+Telmisartan+Hydrochlorothiazide	663500ATB, 663600ATB, 663700ATB, 663800ATB
Amosulalol	107901ATB, 107902ATB
Arotinolol	110202ATB, 110201ATB
Atenolol	483102ATB, 111402ATB, 483101ATB, 111403ATB, 111401ATB
Atenolol+Chlorthalidone	262100ATB, 460200ATB
Azilsartan	662401ATB, 662403ATB, 662402ATB
Azilsartan+Chlorthalidone	673500ATB, 673600ATB
Barnidipine	114003ACH, 114001ACH, 114002ACH
Benidipine	115101ATB, 115102ATB, 115104ATB, 115103ATB
Betaxolol	116801ATB, 116803ATB
Bevantolol	117002ATB, 117001ATB
Bisoprolol	117904ATB, 117903ATB, 117902ATB, 117901ATB
Bisoprolol+Hydrochlorothiazide	469800ATB, 470000ATB, 469900ATB

Candesartan	122601ATB, 122602ATB, 122603ATB
Candesartan+Amlodipine	652900ATB, 653000ATB, 653100ATB
Candesartan+Hydrochlorothiazide	423700ATB
Candesartan+Rosuvastatin	661800ATB, 661900ATB, 673700ATB, 662000ATB, 662100ATB
Captopril	122901ATB, 122902ATB, 122903ATB
Captopril+Hydrochlorothiazide	262200ATB, 262300ATB
Carteolol	124801ATB
Carvedilol	125005ATB, 125003ATB, 662201ATB, 125008ACR, 125001ATB, 662202ATB, 125007ACR, 125002ATB, 125006ACR, 125004ACR
Celiprolol	129101ATB
Cilazapril	133001ATB, 133002ATB, 133003ATB
Cilnidipine	133102ATB, 133101ATB
Clonidine	136505ATR
Diltiazem	145706ATB, 145707ACR, 145707ATR, 145703ACR, 145706ATR, 145707ATB
Doxazocin	149101ATB, 149102ATB, 149104ATR, 149103ATB
Efonidipine	441202ATB, 441201ATB
Enalapril	151603ATB, 151601ATB
Enalapril+Hydrochlorothiazide	453700ATB, 440300ATB
Eprosartan	429201ATB
Eprosartan+Hydrochlorothiazide	460500ATB
Felodipine	157503ATR, 157501ATR
Felodipine+Metoprolol	262400ATR
Fimasartan	515203ATB, 515201ATB, 515202ATB
Fimasartan+Amlodipine	651900ATB, 652000ATB, 652700ATB, 652100ATB
Fimasartan+Hydrochlorothiazide	522000ATB, 526800ATB
Fimasartan+Rosuvastatin	655000ATB, 654900ATB, 654800ATB, 654700ATB, 654600ATB
Fosinopril	163501ATB, 163502ATB

Hydralazine	170701ATB
Imidapril	173402ATB, 173401ATB
Irbesartan	177301ATB, 177303ATB
Irbesartan+Atorvastatin	524000ATB, 524100ATB, 527100ATB, 527000ATB
Irbesartan+Hydrochlorothiazide	385700ATB, 385800ATB, 553800ATB
Lacidipine	180301ATB, 180302ATB, 180303ATB
Lercanidipine	182001ATB, 182002ATB
Lisinopril	184501ATB
Lisinopril+Hydrochlorothiazide	499200ATB, 499300ATB
Losartan	185701ATB, 185702ATB
Losartan+Amlodipine	503000ATB, 637400ATB, 513900ATB, 637500ATB, 502700ATB, 637600ATB
Losartan+Hydrochlorothiazide	262500ATB, 486900ATB, 378900ATB
Manidipine	188001ATB, 188002ATB
Metoprolol	194003ATR, 193802ATB, 262400ATR
Metoprolol+Hydrochlorothiazide	262600ATB
Metoprolol+felodipine	262400ATR
Minoxidil	196102ATB
Nadolol	198301ATB
Nebivolol	489501ATB, 489502ATB, 489503ATB
Nicardipine	201003ACR, 201002ATB
Nifedipine	201407ACS, 201405ATR, 528201ATR, 201409ATR, 528202ATR, 201401ACS, 201401ATB, 201408ATR
Nimodipine	201901ATB, 356202ATR, 356203ATR, 356201ATB, 356202ATB
Nisoldipine	356202ATR
Olmesartan	468502ATB, 468501ATB, 468503ATB, 520902ATB, 520901ATB

Olmesartan+Amlodipine	547800ATB, 632800ATB, 500500ATB, 547700ATB, 629500ATB, 631300ATB, 500600ATB, 547900ATB, 632900ATB, 547600ATB, 548000ATB, 582200ATB, 629600ATB, 633000ATB, 547500ATB, 582400ATB, 629400ATB
Olmesartan+Amlodipine+Hydrochlorothiazide	519800ATB, 519700ATB, 520100ATB, 520000ATB, 519900ATB
Olmesartan+Hydrochlorothiazide	513600ATB, 489100ATB
Olmesartan+Rosuvastatin	644200ATB, 644100ATB, 526900ATB, 526300ATB, 526400ATB, 653200ATB, 526500ATB
Perindopril	211301ATB, 501601ATB, 211302ATB, 501602ATB
Perindopril+Indapamide	556200ATB
Propranolol	219901ATB, 219904ATB, 219906ACR, 219905ACR
Quinapril	221901ATB
Ramipril	222401ATB, 222402ATB, 222404ATB
Ramipril+Felodipine	447100ATB, 447200ATB
Ramipril+Hydrochlorothiazide	448600ATB, 448700ATB
Telmisartan	378801ATB, 378802ATB, 378803ATB
Telmisartan+Amlodipine	521200ATB, 511600ATB, 521300ATB, 511700ATB, 521400ATB, 511500ATB, 644800ATB, 623100ATB
Telmisartan+Hydrochlorothiazide	443200ATB, 443300ATB, 502600ATB
Telmisartan+Rosuvastatin	631600ATB, 629900ATB, 630000ATB, 631700ATB, 630100ATB, 630200ATB
Temocapril	235002ATB
Terazosin	235501ATB, 235502ATB, 235503ATB, 616501ATB
Valsartan	247103ATB, 247101ATB, 247102ATB, 247104ATB
Valsartan+Amlodipine	522600ATB, 492900ATB, 522900ATB, 523200ATB, 522700ATB, 492800ATB, 522800ATB, 523000ATB, 523300ATB, 495800ATB, 523100ATB, 523400ATB
Valsartan+Hydrochlorothiazide	356400ATB, 442600ATB
Valsartan+Lercanidipine	522200ATB, 522300ATB, 522400ATB
Valsartan+Pitavastatin	635000ATB, 635200ATB, 634900ATB, 635100ATB

Valsartan+Rosuvastatin	629700ATB, 525000ATB, 525200ATB, 629800ATB, 525100ATB, 525300ATB
Valsartan+Sacubitril	651401ATB, 651402ATB, 651403ATB
Verapamil	247606ATB, 247607ATB, 247603ATR, 247605ATR, 247601ACR
Zofenopril	510401ATB, 510402ATB, 510403ATB
Atorvastatin+Amlodipine	472300ATB, 472400ATB
Atorvastatin+Ezetimibe	633800ATB, 633900ATB, 634800ATB
Pitavastatin+Fenofibrate	679300ACH
Rosuvastatin+Ezetimibe	640700ATB, 640800ATB, 640900ATB
Rosuvastatin+Ezetimibe+Telmisartan	671400ATB, 671500ATB, 671700ATB
Aspirin	110701ATB, 110702ATB, 110801ATB, 110802ATB, 111001ACE, 111001ATB, 111001ATE, 111002ATE, 111003ACE, 111003ATE
Clopidogrel	133201ACR, 133201ATB, 133201ATR, 133202ATB, 133203ATR, 506100ATB
Cilostazol	136901ATB, 492501ATB, 495201ATB, 498801ATB, 501501ATB
Ticlopidine	498900ATB, 239201ATB, 239202ATB
Aspirin+Bethocarbamol	256800ATB
Aspirin+Clopidogrel	517900ACH, 517900ACE, 517900ATE, 667500ACE
Aspirin+Dipyridamole	489700ACR
Atorvastatin 10mg	111501ATB, 502201ATB, 633800ATB, 472300ATB, 524000ATB, 527100ATB, 614500ATB, 671800ATR, 671900ATR, 673800ATR
Atorvastatin 20mg	111502ATB, 502202ATB, 633900ATB, 472400ATB, 518900ATB, 524100ATB, 527000ATB, 672000ATR, 672100ATR
Atorvastatin 40mg	111503ATB, 502203ATB, 634800ATB, 472500ATB,
Atorvastatin 80mg	111504ATB, 502204ATB
Fluvastatin 20mg	162401ACH
Fluvastatin 40mg	162402ACH
Fluvastatin 80mg	162403ATR
Lovastatin 20mg	185801ATB

Pitavastatin 1mg	470902ATB
Pitavastatin 2mg	470901ATB, 634900ATB, 635000ATB
Pitavastatin 4mg	470903ATB, 635100ATB, 635200ATB
Pravastatin 5mg	216602ATB
Pravastatin 10mg	216601ATB
Pravastatin 20mg	216603ATB
Pravastatin 40mg	216604ATB, 519300ACH
Rosuvastatin 5mg	454003ATB, 640700ATB, 663400ACS, 526900ATB, 629700ATB, 629800ATB, 631600ATB, 631700ATB, 644200ATB, 654800ATB, 655000ATB, 661800ATB, 663900ATB, 664200ATB, 671200ATB, 671300ATB, 664600ATB, 631600ATB, 631700ATB, 673700ATB, 673900ATB, 672500ATR, 672600ATR,
Rosuvastatin 10mg	454001ATB, 640800ATB, 525000ATB, 525100ATB, 526300ATB, 629900ATB, 630100ATB, 644100ATB, 653200ATB, 654700ATB, 654900ATB, 661900ATB, 662000ATB, 664000ATB, 664300ATB, 671400ATB, 671500ATB, 671600ATB, 664700ATB, 674000ATB, 672700ATR, 672800ATR
Rosuvastatin 20mg	454002ATB, 640900ATB, 525200ATB, 525300ATB, 526400ATB, 526500ATB, 630000ATB, 630200ATB, 654600ATB, 622100ATB, 664100ATB, 664400ATB, 671700ATB, 664800ATB, 674100ATB, 672900ATR, 673000ATR
Simvastatin 5mg	227806ATB
Simvastatin 10mg	471000ATB, 227803ATB,
Simvastatin 20mg	227801ATB, 227801ATR, 471100ATB, 631400ATB,
Simvastatin 40mg	227802ATB, 507800ATB, 631500ATB
Simvastatin 80mg	227805ATB

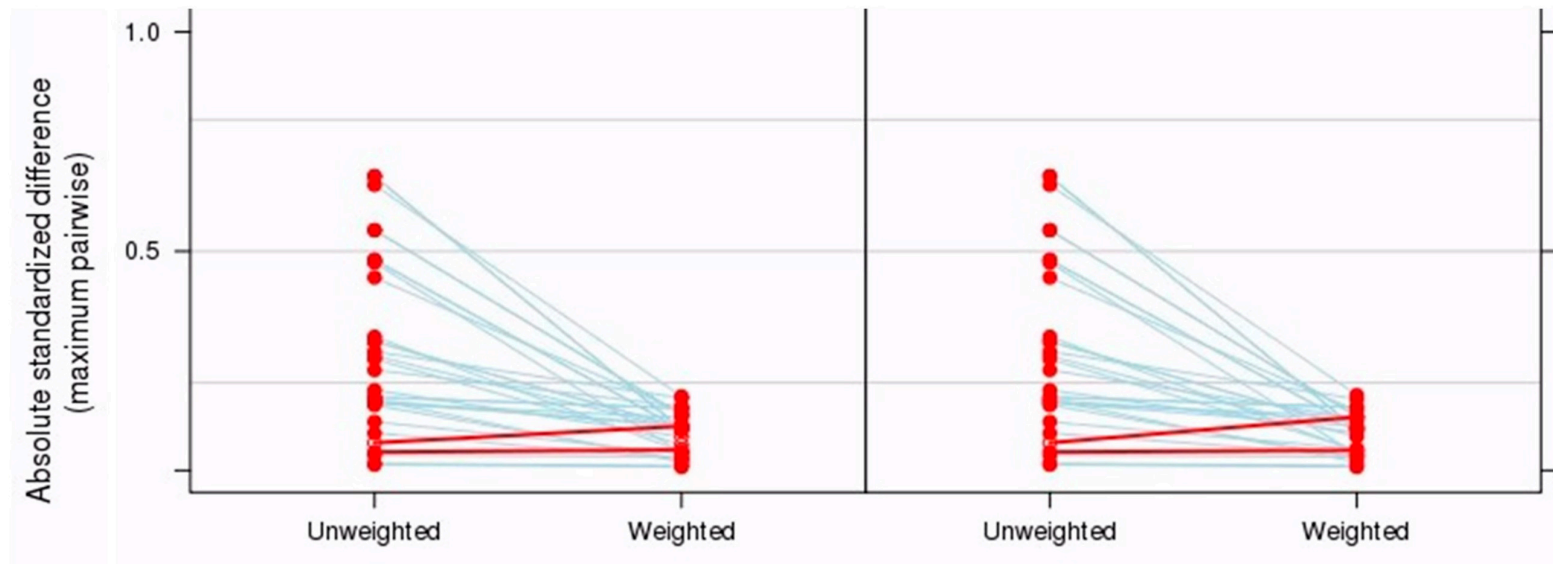


Figure S1. Propensity score balance assessment using absolute standardized difference plot. Left: effect size. Right: Kolmogorov–Smirnov statistics.

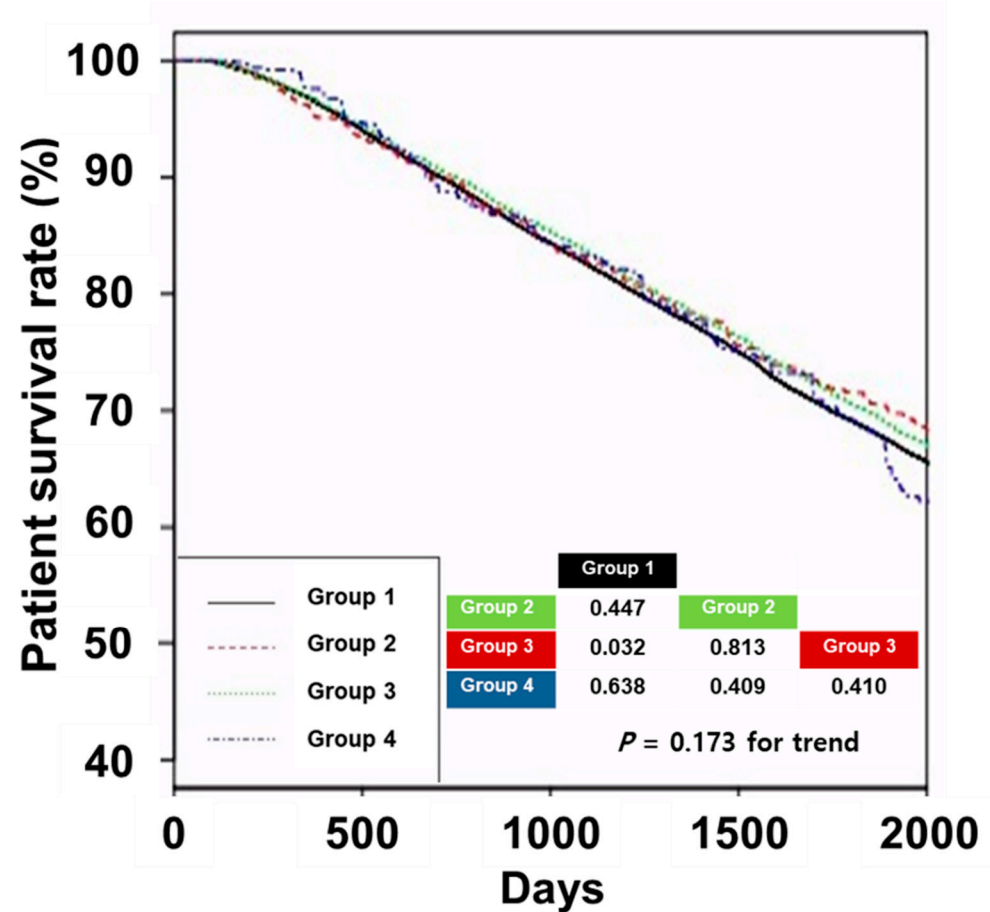


Figure S2. Kaplan–Meier curves of patient survival according to groups using the balanced cohort. The 5-year survival rates in Groups 1, 2, 3, and 4 were 68.7%, 71.5%, 70.2%, and 68.5%, respectively. The P -values for pairwise comparison or trend with log-rank tests were added to the lower right corner of the graph.