

Supplemental materials

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(n=40,417); the first tertile represents the lowest value group among the tertiles

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Table S1. Adjusted incidence rates for all-cause mortality and cause-specific mortality

GA levels (%)	All-cause mortality			Infection-related mortality			Cardiovascular-related mortality			Cancer-related mortality		
	IR	95% CL		IR	95% CL		IR	95% CL		IR	95% CL	

All patients (n=40,417)

<=15.8%	0.096098	0.087684	0.104512	0.020047	0.015956	0.024138	0.032507	0.027743	0.037271	0.01064	0.007807	0.013473
15.9-17.2%	0.088971	0.081256	0.096686	0.021773	0.017718	0.025829	0.031218	0.026759	0.035677	0.008222	0.005903	0.01054
17.3-18.3%	0.09853	0.090282	0.106777	0.022615	0.018463	0.026767	0.037418	0.032426	0.042409	0.008983	0.006512	0.011455
18.4-19.3%	0.09574	0.087776	0.103704	0.021904	0.017875	0.025933	0.035329	0.030609	0.04005	0.008785	0.006377	0.011193
19.4-20.4%	0.098094	0.090413	0.105776	0.026437	0.022262	0.030612	0.034543	0.030082	0.039003	0.008984	0.006671	0.011296
20.5-21.5%	0.099225	0.091023	0.107428	0.024042	0.019803	0.028282	0.037772	0.032842	0.042703	0.006922	0.004734	0.009111
21.6-22.9%	0.102108	0.094222	0.109994	0.022332	0.018505	0.026159	0.037661	0.032958	0.042364	0.009378	0.006989	0.011766
23.0-24.8%	0.111033	0.102899	0.119166	0.028357	0.024126	0.032588	0.039027	0.034282	0.043771	0.009473	0.007058	0.011888
24.9-28.0%	0.117527	0.108945	0.126109	0.031922	0.027368	0.036475	0.041056	0.036043	0.046069	0.009276	0.006824	0.011729
>28.0%	0.133139	0.12379	0.142488	0.031665	0.02717	0.036161	0.050064	0.0443	0.055829	0.008128	0.005816	0.01044

Patients taking hypoglycemic agents (n=27,761)

<=15.8%	0.091132	0.078657	0.103607	0.018018	0.012065	0.023971	0.034488	0.027034	0.041943	0.006513	0.003176	0.009849
15.9-17.2%	0.085379	0.07478	0.095977	0.018659	0.013394	0.023925	0.032813	0.026401	0.039225	0.007724	0.004604	0.010845
17.3-18.3%	0.091162	0.080656	0.101667	0.02337	0.017777	0.028963	0.033838	0.027574	0.040102	0.008341	0.005176	0.011505
18.4-19.3%	0.089661	0.079964	0.099359	0.020649	0.015732	0.025567	0.033406	0.027653	0.039158	0.007857	0.004973	0.010742
19.4-20.4%	0.096096	0.086848	0.105344	0.024056	0.019215	0.028897	0.034657	0.02924	0.040075	0.009893	0.006906	0.01288
20.5-21.5%	0.091731	0.082697	0.100764	0.021214	0.016672	0.025756	0.035387	0.0299	0.040873	0.007631	0.005011	0.010252
21.6-22.9%	0.096988	0.08819	0.105786	0.020002	0.015863	0.024141	0.035956	0.03071	0.041202	0.008825	0.006136	0.011515

23.0-24.8%	0.103632	0.094927	0.112336	0.025753	0.021302	0.030205	0.037447	0.032285	0.042609	0.008437	0.005904	0.010969
24.9-28.0%	0.108884	0.099999	0.117768	0.028819	0.024165	0.033473	0.038987	0.033722	0.044251	0.00848	0.005936	0.011023
>28.0%	0.126653	0.117127	0.136179	0.030198	0.025609	0.034787	0.04759	0.041699	0.05348	0.007338	0.005019	0.009657

Patients not taking hypoglycemic agents

(n=12,656)

<=15.8%	0.108856	0.096544	0.121168	0.024653	0.01825	0.031056	0.03293	0.026449	0.039411	0.015084	0.010344	0.019824
15.9-17.2%	0.098952	0.087027	0.110877	0.027534	0.020685	0.034383	0.031296	0.024803	0.03779	0.009247	0.005628	0.012866
17.3-18.3%	0.11264	0.09892	0.12636	0.02333	0.016645	0.030016	0.043355	0.035012	0.051698	0.01009	0.006079	0.014101
18.4-19.3%	0.107748	0.093715	0.121781	0.024625	0.017476	0.031774	0.038707	0.030506	0.046908	0.010534	0.00619	0.014877
19.4-20.4%	0.102424	0.088583	0.116265	0.031463	0.023404	0.039522	0.034275	0.0264	0.04215	0.007401	0.003738	0.011063
20.5-21.5%	0.116492	0.098813	0.134172	0.030648	0.021128	0.040168	0.043946	0.033336	0.054556	0.004053	0.000796	0.00731
21.6-22.9%	0.111736	0.095318	0.128154	0.027659	0.019199	0.036118	0.040915	0.031067	0.050763	0.010759	0.005758	0.015759
23.0-24.8%	0.129121	0.110096	0.148147	0.034605	0.024526	0.044684	0.042964	0.03207	0.053859	0.012398	0.006481	0.018315
24.9-28.0%	0.141109	0.118765	0.163454	0.040459	0.02851	0.052409	0.046783	0.033876	0.059689	0.011802	0.005346	0.018259
>28.0%	0.142643	0.117044	0.168242	0.03008	0.019129	0.041031	0.059711	0.04253	0.076892	0.010903	0.004071	0.017735

Abbreviations: GA, glycated albumin; IR, incidence rate (event/person-year); CL, confidence limits.

The adjusted variables were as follows: baseline: age, sex, vintage, dialysis modality, body mass index, smoking, vascular complications, hypoglycemic drug use, antihypertensive drug use, hemoglobin, albumin, C-reactive protein, Kt/V, the normalized protein catabolic rate, high-density cholesterol, calcium, phosphate, and parathyroid hormone.

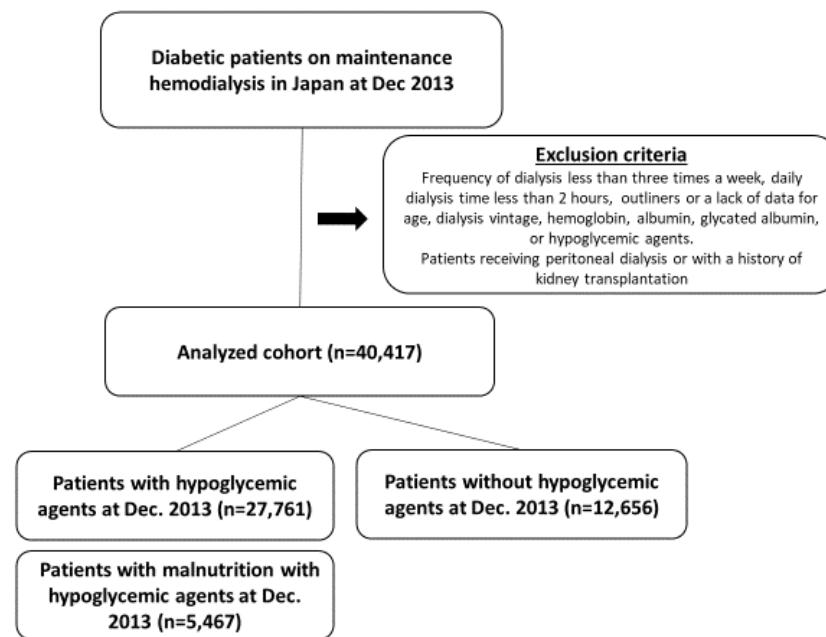
Hypoglycemic agents included insulin, dipeptidyl peptidase-4 inhibitor (DPP4i), and oral hypoglycemic agents (OHAs).

Table S2: Adjusted overall mortality and cause-specific mortality by deciles of serum hemoglobin A1c levels in dialysis patients with diabetes

HbA1c level	All patients (n=20,420)		Patients with agents (n=14,024)		Patients without agents (n=6,396)		Malnourished patients with agents (n=2,626)	
Overall mortality	HR (95%CL)	p-value	HR (95%CL)	p-value	HR (95%CL)	p-value	HR (95%CL)	p-value
<=5.0%	1.24 (1.08, 1.42)	0.002	1.23 (1.02, 1.47)	0.03	1.29 (1.02, 1.63)	0.03	1.11 (0.85, 1.46)	0.45
5.1-5.3%	1.16 (1.00, 1.34)	0.05	1.10 (0.91, 1.33)	0.31	1.27 (0.99, 1.63)	0.06	1.00 (0.74, 1.33)	0.98
5.4-5.6%	1.05 (0.91, 1.21)	0.48	1.07 (0.90, 1.28)	0.42	1.07 (0.83, 1.38)	0.62	0.91 (0.69, 1.21)	0.53
5.7-5.8%	1.02 (0.87, 1.19)	0.82	1.04 (0.86, 1.26)	0.68	1.03 (0.78, 1.37)	0.82	1.11 (0.83, 1.49)	0.49
5.9-6.0%	1.12 (0.96, 1.30)	0.15	1.11 (0.93, 1.33)	0.26	1.16 (0.88, 1.53)	0.30	1.00 (0.74, 1.34)	0.98
6.1-6.3%	1.00		1.00		1.00		1.00	
6.4-6.6%	1.11 (0.95, 1.28)	0.19	1.05 (0.88, 1.24)	0.61	1.32 (0.98, 1.79)	0.07	0.81 (0.59, 1.10)	0.17
6.7-7.0%	1.04 (0.89, 1.22)	0.60	1.00 (0.84, 1.19)	0.98	1.24 (0.89, 1.74)	0.20	0.80 (0.58, 1.10)	0.17
7.1-7.6%	1.03 (0.88, 1.20)	0.76	0.99 (0.83, 1.18)	0.94	1.12 (0.78, 1.61)	0.54	0.91 (0.67, 1.23)	0.52
>7.6%	1.22 (1.05, 1.42)	0.01	1.20 (1.02, 1.42)	0.03	1.15 (0.75, 1.78)	0.52	1.13 (0.85, 1.50)	0.39
Infection-related mortality								
<=5.0%	1.32 (0.99, 1.77)	0.06	1.32 (0.92, 1.77)	0.13	1.67 (0.95, 2.93)	0.08	1.18 (0.72, 1.95)	0.51
5.1-5.3%	1.27 (0.94, 1.71)	0.12	0.99 (0.67, 1.46)	0.97	2.03 (1.14, 3.62)	0.02	0.94 (0.55, 1.62)	0.83
5.4-5.6%	1.34 (1.00, 1.78)	0.05	1.18 (0.84, 1.67)	0.34	1.95 (1.09, 3.48)	0.02	1.17 (0.71, 1.94)	0.53
5.7-5.8%	1.10 (0.79, 1.53)	0.58	1.15 (0.79, 1.68)	0.48	1.17 (0.59, 2.33)	0.66	1.19 (0.69, 2.04)	0.54
5.9-6.0%	1.09 (0.79, 1.52)	0.59	0.87 (0.58, 1.30)	0.49	1.94 (1.03, 3.66)	0.04	0.88 (0.50, 1.57)	0.68
6.1-6.3%	1.00		1.00		1.00		1.00	
6.4-6.6%	1.28 (0.93, 1.74)	0.13	1.28 (0.91, 1.80)	0.16	1.06 (0.47, 2.36)	0.90	1.07 (0.63, 1.83)	0.80
6.7-7.0%	1.09 (0.78, 1.52)	0.62	0.88 (0.60, 1.29)	0.51	2.43 (1.18, 4.99)	0.02	0.42 (0.20, 0.90)	0.03
7.1-7.6%	1.07 (0.76, 1.50)	0.72	0.96 (0.66, 1.40)	0.83	1.45 (0.63, 3.31)	0.38	0.76 (0.42, 1.39)	0.37
>7.6%	1.29 (0.94, 1.79)	0.12	1.17 (0.82, 1.66)	0.39	1.99 (0.80, 4.93)	0.14	0.97 (0.56, 1.69)	0.92
Cardiovascular-related mortality								

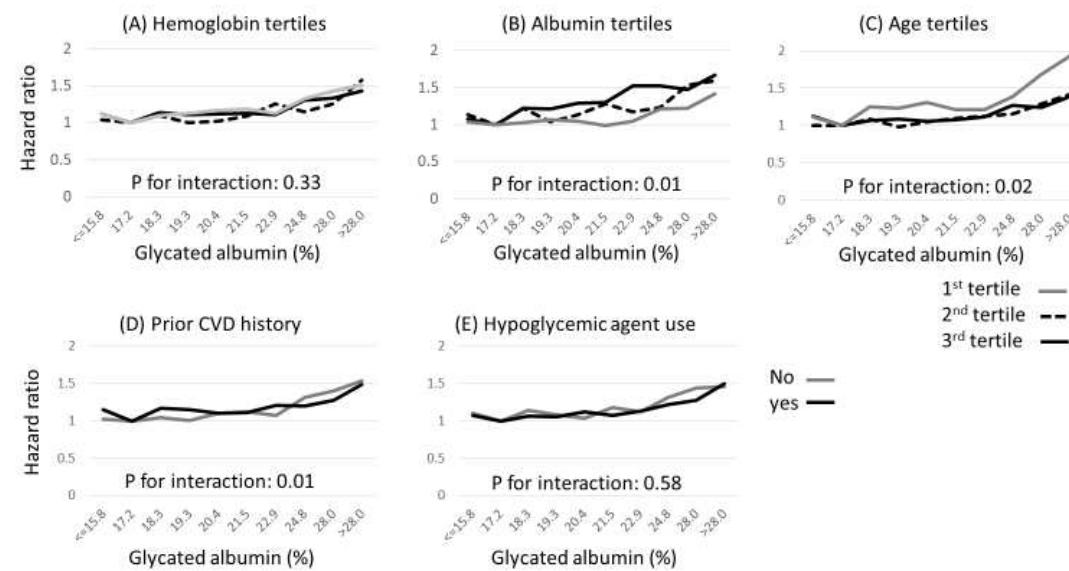
<=5.0%	1.26 (1.01, 1.57)	0.05	1.50 (1.13, 2.00)	0.01	1.06 (0.72, 1.55)	0.78	1.39 (0.87, 2.22)	0.17
5.1-5.3%	1.10 (0.87, 1.40)	0.43	1.04 (0.76, 1.42)	0.80	1.15 (0.77, 1.71)	0.50	1.16 (0.70, 1.93)	0.57
5.4-5.6%	1.06 (0.84, 1.34)	0.61	1.14 (0.86, 1.51)	0.36	0.97 (0.65, 1.46)	0.90	0.82 (0.48, 1.38)	0.45
5.7-5.8%	0.98 (0.76, 1.26)	0.86	0.91 (0.66, 1.25)	0.56	1.10 (0.71, 1.72)	0.66	0.92 (0.52, 1.61)	0.77
5.9-6.0%	1.12 (0.87, 1.43)	0.38	1.15 (0.86, 1.55)	0.34	1.05 (0.67, 1.65)	0.82	1.05 (0.62, 1.77)	0.85
6.1-6.3%	1.00		1.00		1.00		1.00	
6.4-6.6%	1.15 (0.91, 1.45)	0.26	1.12 (0.85, 1.47)	0.42	1.25 (0.77, 2.02)	0.36	0.96 (0.56, 1.63)	0.87
6.7-7.0%	1.15 (0.90, 1.46)	0.26	1.16 (0.88, 1.52)	0.29	1.13 (0.66, 1.91)	0.66	1.19 (0.71, 2.00)	0.51
7.1-7.6%	0.92 (0.71, 1.19)	0.51	0.83 (0.62, 1.12)	0.22	1.36 (0.79, 2.33)	0.26	0.91 (0.53, 1.56)	0.74
>7.6%	1.31 (1.03, 1.66)	0.03	1.29 (0.99, 1.67)	0.06	1.29 (0.99, 2.49)	0.45	1.60 (1.00, 2.56)	0.05
Cancer-related mortality								
<=5.0%	0.95 (0.61, 1.47)	0.81	0.58 (0.27, 1.24)	0.16	1.05 (0.56, 1.98)	0.87	0.23 (0.05, 1.07)	0.06
5.1-5.3%	0.87 (0.54, 1.39)	0.56	1.01 (0.53, 1.92)	0.99	0.70 (0.34, 1.43)	0.33	0.95 (0.36, 2.53)	0.92
5.4-5.6%	0.73 (0.46, 1.17)	0.20	0.91 (0.50, 1.66)	0.76	0.55 (0.26, 1.17)	0.12	0.98 (0.38, 2.54)	0.97
5.7-5.8%	1.17 (0.74, 1.85)	0.50	1.43 (0.81, 2.52)	0.22	0.84 (0.39, 1.82)	0.66	1.74 (0.76, 4.03)	0.19
5.9-6.0%	1.07 (0.67, 1.72)	0.77	1.24 (0.69, 2.24)	0.47	0.88 (0.40, 1.95)	0.75	0.78 (0.28, 2.17)	0.64
6.1-6.3%	1.00		1.00		1.00		1.00	
6.4-6.6%	0.91 (0.56, 1.47)	0.70	0.91 (0.50, 1.63)	0.74	0.97 (0.42, 2.25)	0.94	0.56 (0.19, 1.66)	0.30
6.7-7.0%	0.89 (0.54, 1.47)	0.66	1.07 (0.61, 1.90)	0.80	0.45 (0.13, 1.59)	0.22	0.79 (0.28, 2.19)	0.64
7.1-7.6%	0.70 (0.40, 1.21)	0.20	0.82 (0.44, 1.53)	0.54	0.36 (0.08, 1.58)	0.18	0.49 (0.15, 1.58)	0.23
>7.6%	0.50 (0.27, 0.93)	0.03	0.52 (0.26, 1.05)	0.07	0.53 (0.12, 2.33)	0.40	0.28 (0.07, 1.02)	0.05

Abbreviations: HbA1c, hemoglobin A1c; HR, hazard ratio; CL, confidence limits; agents, hypoglycemic agents included insulin, dipeptidyl peptidase-4 inhibitor (DPP4i), and oral hypoglycemic agents (OHAs). The adjusted baseline variables were as follows: age, sex, vintage, dialysis modality, body mass index, smoking, vascular complications, hypoglycemic drug use, antihypertensive drug use, hemoglobin, albumin, C-reactive protein, Kt/V, the normalized protein catabolic rate, high-density lipoprotein cholesterol, calcium, phosphate, and parathyroid hormone.

Supplemental Figure S1. Flowchart of the study

Supplemental Figure S2: Subgroup analyses of all-cause mortality (hazard ratios) stratified by deciles of glycemic albumin levels

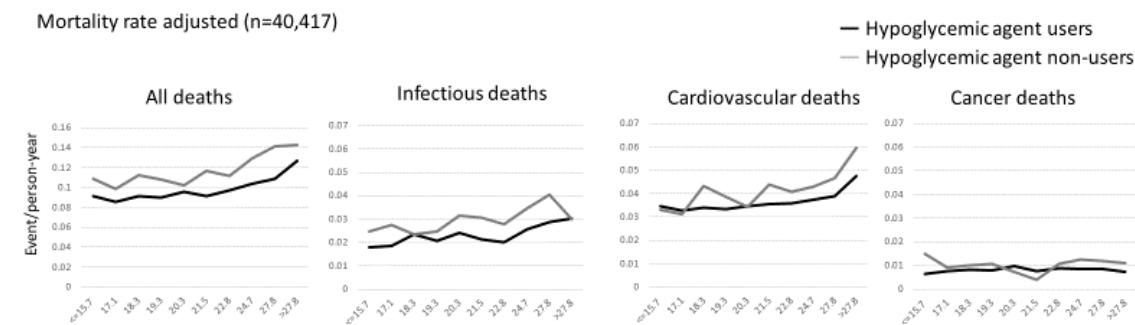
(n=40,417); the first tertile represents the lowest value group among the tertiles



The adjusted baseline variables were as follows: age, sex, vintage, dialysis modality, body mass index, smoking, vascular complications, hypoglycemic drug use, antihypertensive drug use, hemoglobin, albumin, C-reactive protein, Kt/V, the normalized protein catabolic rate, high-density lipoprotein cholesterol, calcium, phosphate, and parathyroid hormone. Hypoglycemic agents

included insulin, dipeptidyl peptidase-4 inhibitor (DPP4i), and oral hypoglycemic agents (OHAs).

Supplemental Figure S3: Adjusted incidence rates for overall mortality and cause-specific mortality



We calculated the incidence rates (IRs) for mortality adjusting for age, sex, vintage, dialysis modality, body mass index, smoking, vascular complications, antihypertensive drug use, hemoglobin, albumin, C-reactive protein, Kt/V, the normalized protein catabolic rate, high-density lipoprotein cholesterol, calcium, phosphate, and parathyroid hormone at baseline. Hypoglycemic agents included insulin, dipeptidyl peptidase-4 inhibitor (DPP4i), and oral hypoglycemic agents (OHAs).