Supplementary information

Development and validation of a risk prediction model for end-stage renal disease in patients with type 2 diabetes

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Supplementary Table 1. Baseline characteristic of the study population in excluded group and included group

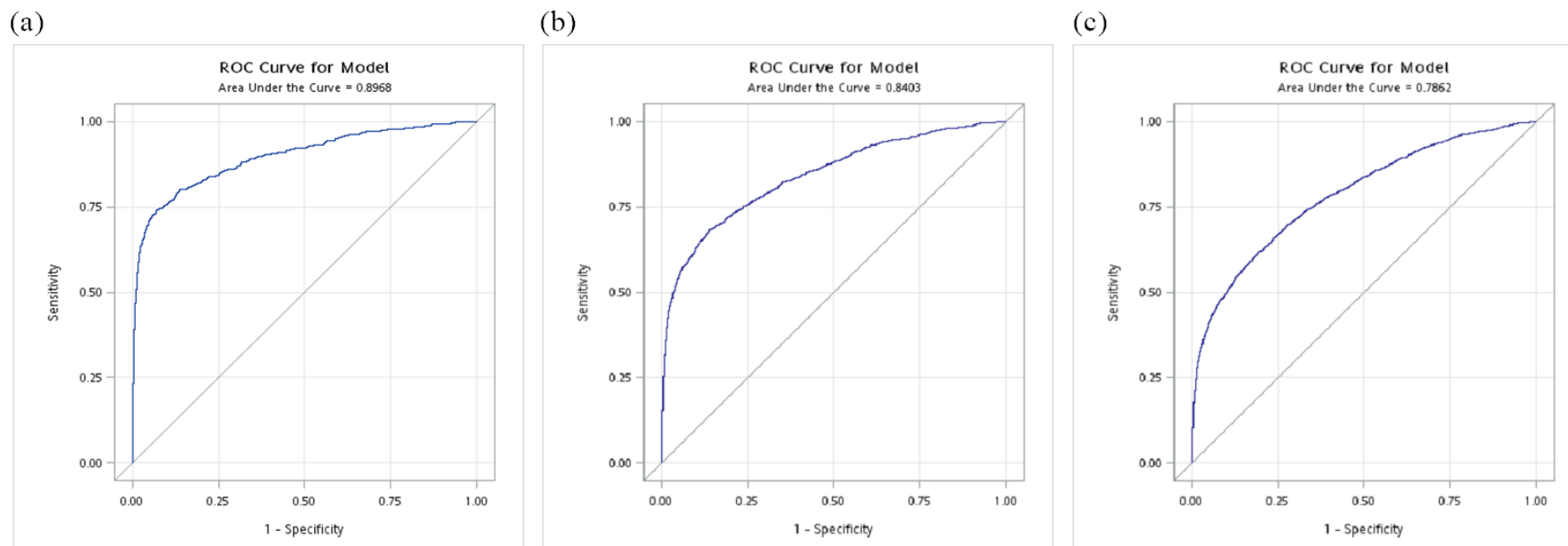| Variables	Excluded group (n=35,727) MEAN±SD* or n (%)	Included group (n=24,104) MEAN±SD* or n (%)	Standardized effect size
Socio-demographic factors			
Age (years)	60.13±11.42	61.09±10.76	-0.09
Gender			-0.02
Female	18553 (52.00)	12815 (53.17)	
Male	17128 (48.00)	11289 (46.83)	
Smoking habit	5734 (16.05)	3777 (15.67)	0.01
Alcohol drinking	2985 (8.36)	2186 (9.07)	-0.03
Age of diabetes onset (years)	54.37±11.15	54.44±10.83	-0.01
Duration of type 2 diabetes (years)	6.42±6.75	6.68±6.35	-0.04
Body mass index (kg/m^2)	25.56±4.00	25.71±3.75	-0.04
Obesity	12224 (34.22)	8854 (36.73)	-0.05
Diabetes-related factor and biomarker			
Systolic blood pressure (mm Hg)	134.58±18.43	134.86±17.72	-0.02
Diastolic blood pressure (mm Hg)	80.17±11.09	80.04±10.5	0.01
HbA1c level (%)	8.39±2.07	8.2±1.93	0.09
Fasting blood glucose (mg/dL)	179.15±71.6	171.67±64.83	0.11
Low-density lipoprotein (mg/dL)	118.08±31.43	117.86±31.27	0.01
High-density lipoprotein (mg/dL)	46.26±14.25	46.28±13.99	0.00
Creatinine (mg/dL)	1.06±0.63	1.05±0.53	0.02
Serum glutamate-pyruvate transaminase (u/l)	32.69±34.97	32.19±32.73	0.01
Total cholesterol (mg/dL)	198.85±47.60	195.72±42.04	0.07
Triglyceride (mg/dL)	181.43±146.12	171.92±130.92	0.07
eGFR (mg/dL)	75.86±23.12	73.38±21.78	0.11
Variation in fasting blood glucose (%)	34.28±28.60	32.01±25.67	0.09
Variation in HBA1c (%)	18.14±16.88	16.47±14.64	0.11
Variation in systolic blood pressure (%)	7.70±6.06	7.39±5.55	0.06
Variation in diastolic blood pressure (%)	7.92±6.61	7.71±6.1	0.03
Comorbidity			
Hypertension	15023 (42.05)	11031 (45.76)	-0.07
Stroke	2060 (5.77)	1176 (4.88)	0.04
Cardiovascular disease	3022 (8.46)	2150 (8.92)	-0.02
Peripheral Neuropathy	164 (0.46)	220 (0.91)	-0.06

Diabetes retinopathy	543 (1.52)	324 (1.34)	0.02
Disease of peripheral circulatory disturbance	1441 (4.03)	955 (3.96)	0.00
Hypoglycemia	1383 (3.87)	1016 (4.22)	-0.02
Chronic kidney disease	375 (1.05)	232 (0.96)	0.01
Ketoacidosis	355 (0.99)	196 (0.81)	0.02
Postural hypotension	25 (0.07)	21 (0.09)	-0.01
Arterial embolism and thrombosis	69 (0.19)	38 (0.16)	0.01
Peripheral vascular disease	214 (0.6)	208 (0.86)	-0.03
Hyperlipidemia	8207 (22.97)	6394 (26.53)	-0.08
Outcome			
ESRD	2126 (5.95)	1215 (5.04)	0.04

*: SD = standard deviation

Supplementary Table 2. ESRD risk score based on the final multivariate Cox's proportional hazards model with multiple imputation dataset (n=52,528) and complete dataset (n=24,104)
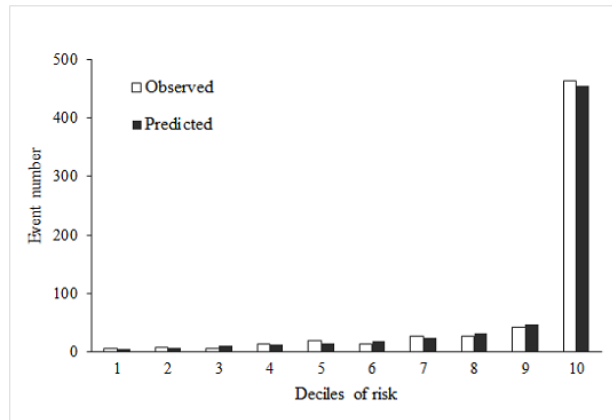
Risk factor	β (SE) Dataset with multiple imputation	β (SE) Complete dataset
Socio-demographic factors		
Age	0.01 (0.002)	0.02 (0.004)
Gender (male)	0.03 (0.04)	-0.01 (0.07)
Age of diabetes onset (years) (ref: <45)		
≥45	-0.62 (0.05)	-0.56 (0.10)
Diabetes-related factor and biomarker		
Creatinine (mg/dL) (ref: <2.0)		
2.0–4.0	2.59 (0.05)	2.57 (0.10)
>4.0	3.10 (0.10)	2.65 (0.22)
Variation in HbA1c (%) (ref: <8.5)		
8.5–17.5	0.06 (0.05)	0.23 (0.09)
>17.5	0.26 (0.05)	0.48 (0.09)
Variation in systolic blood pressure (%) (ref: <4.4)		
4.4-8.7	-0.06 (0.05)	-0.08 (0.09)
>8.7	0.04 (0.05)	0.24 (0.09)
Diabetes-related disorders		
Diabetes retinopathy	1.18 (0.08)	0.88 (0.17)
Albuminuria	0.40 (0.06)	0.50 (0.09)
Medication use		
Anti-diabetes medications (ref: no medication)	ref	ref
Oral only	-0.57 (0.07)	-0.60 (0.21)
Insulin	0.33 (0.09)	0.45 (0.23)
Insulin+oral agent	0.15 (0.09)	0.12 (0.23)
Hypertension medications		
No		
SBP<130 and DBP<85	ref	ref
SBP:130-139 or DBP:85-89	0.02 (0.10)	0.12 (0.21)
SBP:140-159 or DBP:90-99	0.37 (0.09)	0.46 (0.20)
SBP≥160 or DBP≥100	0.89 (0.10)	0.72 (0.25)
Yes		
SBP<130 and DBP<85	0.73 (0.09)	0.99 (0.17)
SBP:130-139 or DBP:85-89	0.79 (0.08)	1.06 (0.17)
SBP:140-159 or DBP:90-99	1.13 (0.08)	1.33 (0.16)
SBP≥160 or DBP≥100	1.46 (0.08)	1.65 (0.17)
Hyperlipidemia medications		
No		
Total cholesterol: <200	ref	ref
Total cholesterol: 200-239	0.21 (0.06)	0.34 (0.12)

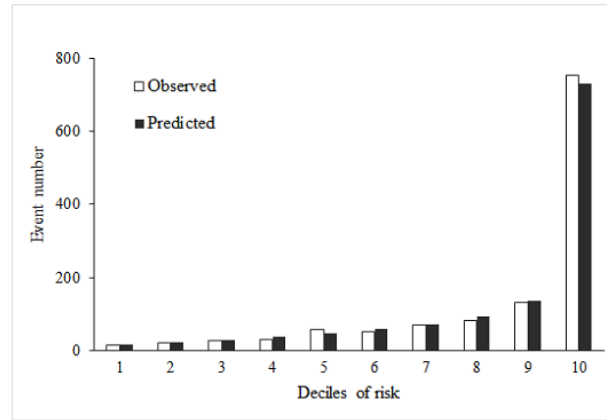|		
Total cholesterol: ≥240	0.71 (0.07)	0.53 (0.17)
Yes		
Total cholesterol: <200	0.29 (0.06)	0.36 (0.11)
Total cholesterol: 200-239	0.31 (0.06)	0.35 (0.11)
Total cholesterol: ≥240	0.89 (0.06)	0.91 (0.11)

Supplementary Figure 1. Receiver-operating characteristiccurve (ROC) for (a) 3-year (b) 5-year (c) 8-year ESRD riskin sensitivity analysis (N=52,528)
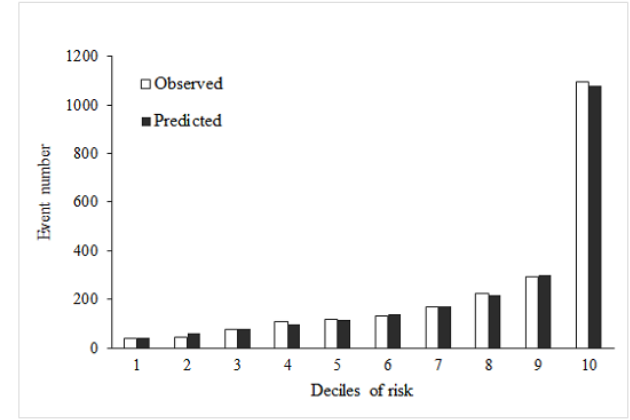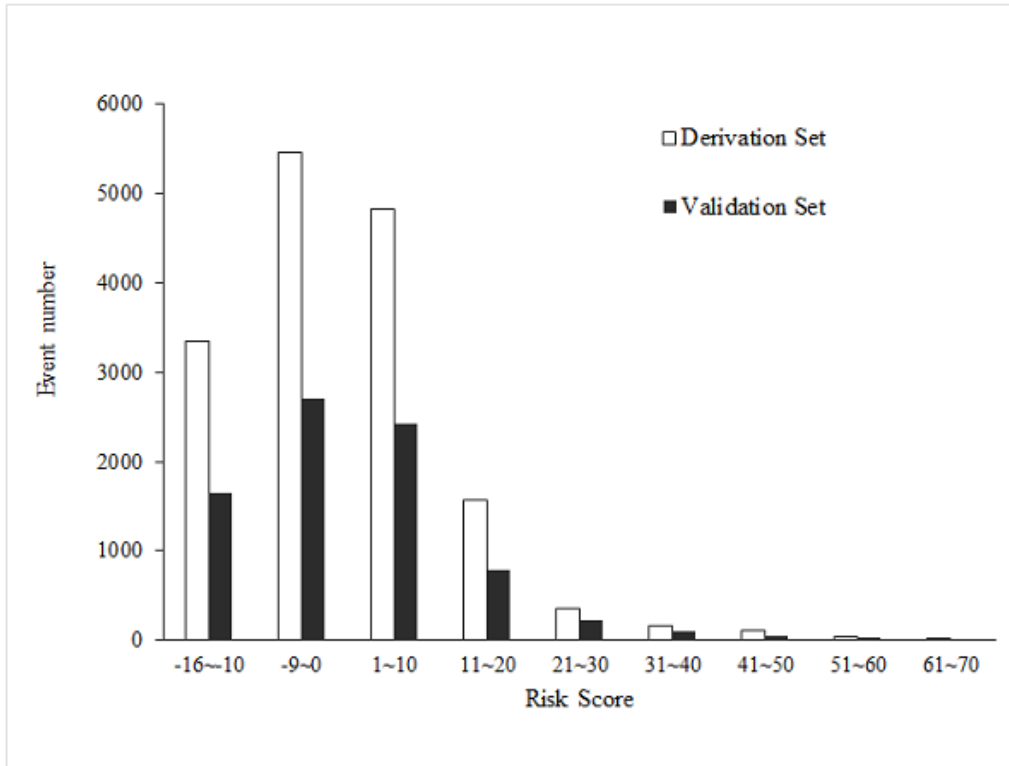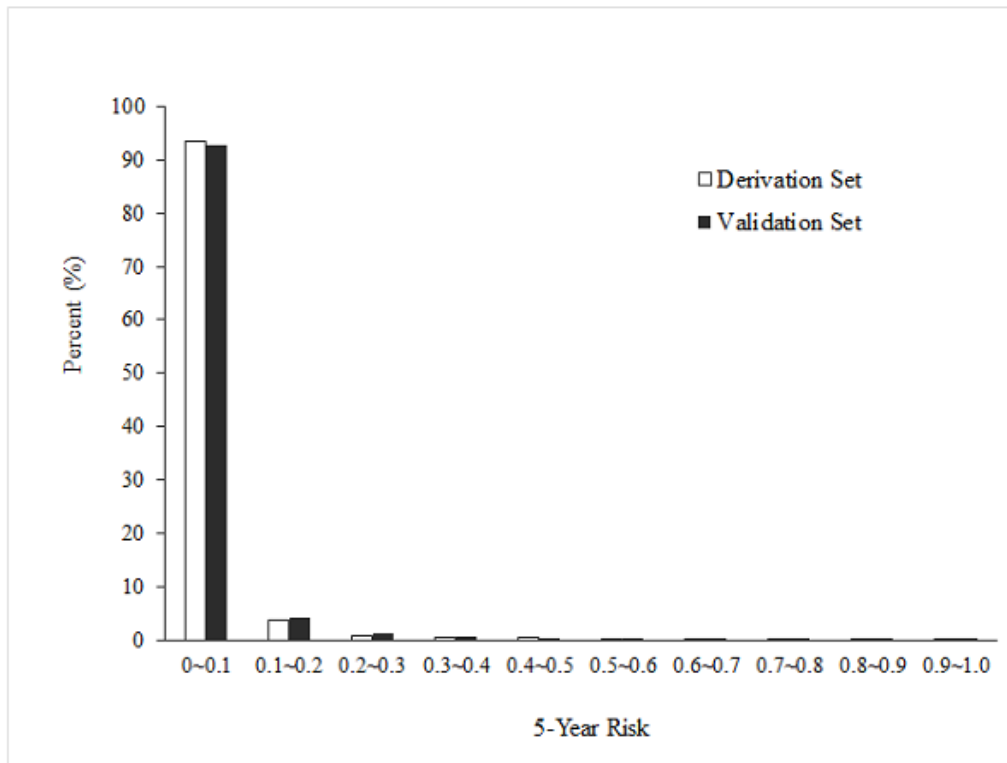
Supplementary Figure 2. Predicted versus observed ESRD numbers according to deciles of (a) 3-year (b) 5-year and (c) 8-year risk in sensitivity analysis (N=52,528)

(a)

(b)

Supplementary Figure 3. The distributions of risk score (a) and 5-year risk (b) for derivation and validation sets