

SUPPLEMENTARY DATA

Supplementary Table 1. Renal event codes identified in national hospitalization and mortality records.

<i>Diagnoses and Procedures</i>	<i>ICD-9-CM-A</i>	<i>ICD-10-A 2nd edition</i>
Haemodialysis	3895, 3927, 3942, 3943, 3995, V560, V561, V568	1310000
Intermittent or continuous peritoneal dialysis	5498	1310006, 1310007, 1310008, 1310900, 1310901, 1311000
Kidney transplantation	5561, 5569	3650300
Death due to chronic renal failure	25040, 25041, 25042, 25043, 3895, 3927, 3942, 3943, 5561, 5836, 5837, 5851, 5859, 586 ,587 ,59000, 59001, 59010, 59011	3650300, E1020, E1021, E1022, E1023, E1120, E1121, E1122, E1123, E1320, E1321, E1322, E1323, E1420, E1421, E1422, E1423, I120, I130, I131, I132, N180, N188, N1890, N1891, N19, T8571, Y841, Z992

Supplementary Table 2. ANZDATA categories

<i>Code</i>	<i>Dialysis/treatment modality</i>
A	Hospital or outpatient in-training APD
B	Hospital based HD
D	Satellite based HD
E	Home APD
F	Home based HD
G	Renal transplant in Australia or NZ
H	Last dialysis after transplant
I	Transplant failure – on to dialysis
J	Recovered own renal function (off dialysis)
K	Lost to follow-up
L	Hospital or outpatient in-training CAPD
M	Home CAPD
X	Transplant outside Australia or NZ
Z	Death

SUPPLEMENTARY DATA

Supplementary Table 3. Characteristics of those with complete and incomplete data in the validation cohort

Characteristic*	Complete data n = 8,900	Incomplete data** n = 6,231	P Value
Female	51 (4,503)	52 (3,224)	0.2
Ethnicity			<0.001
<i>European</i>	41 (3,623)	42 (2,601)	
<i>Maori</i>	16 (1,421)	15 (921)	
<i>Pacific</i>	29 (2,576)	24 (1,464)	
<i>East Asian</i>	3 (308)	4 (234)	
<i>Indo Asian</i>	6 (517)	6 (366)	
<i>Other</i>	5 (455)	10 (645)	
Lowest SES quintile [€]	n/a	n/a	
Age, years	60 (13)	61 (15)	<0.001
Duration of diabetes, years	7 (3-12)	5 (2-9)	<0.001
serum.Creatinine, umol/L	83 (70-100)	89 (75-107)	
eGFR ^β , mls/min/1.73m ²	76 (61-91)	70 (55-85)	<0.001
Albuminuria [#]			<0.001
<i>No albuminuria</i>	58 (5165)	51 (961)	
<i>Microalbuminuria</i>	28 (2534)	37 (701)	
<i>Macroalbuminuria</i>	7 (647)	7 (126)	
<i>Advanced albuminuria</i>	6 (554)	5 (102)	
Body mass index mkg ⁻²	31 (27-36)	31 (27-35)	0.4
Systolic blood pressure, mmHg	136 (18)	138 (20)	<0.001
HbA1c, mmol/mol	58 (49-72)	55 (46-70)	<0.001
HbA1c, %	7.6 (6.7-8.8)	7.2 (6.4-8.6)	<0.001
HDL/Total cholesterol	4.4 (3.6-5.3)	4.8 (3.8-5.8)	<0.001
Smoking status			<0.001
<i>Non smoker</i>	67 (5,919)	76 (4,453)	
<i>Past smoker</i>	18 (1,562)	11 (626)	
<i>Current smoker</i>	16 (1,418)	14 (793)	

*% (n) for categorical data, otherwise mean (sd) or median (IQR) ; ** Percentages are of those with the variable present – see study flow diagrams for number missing for each variable in excluded cohorts; [€]SES = socioeconomic status using NZDep score(1); ^βeGFR = estimated glomerular filtration rate; [#] Microalbuminuria indicates a urine albumin creatinine ratio of ≥ 2.5 mg/mmol in men or ≥ 3.5 mg/mmol in women, and < 30 mg/mmol in both; Macroalbuminuria indicates a urine albumin creatinine ratio of ≥ 30 mg/mmol and < 100 mg/mmol; Advanced albuminuria indicates a urine albumin creatinine ratio of ≥ 100 mg/mmol; ^αCVD = history of cardiovascular disease prior to baseline

SUPPLEMENTARY DATA

Supplementary Table 4. Hazard ratios of first renal event when BP-lowering medications status was added to model 4 in the derivation cohort with full data (including data on medication status) (n=15,856)

Medication status variables added to model 4	ACEI/ARB [‡] & other BP lowering meds	ACEI/ARB [‡]	Other BP lowering meds	ACEI/ARB [‡] & interaction term
Female	1.30	1.30	1.30	1.30
Ethnicity ^α				
<i>European</i>	1	1	1	1
<i>Maori</i>	2.87	2.83	2.87	2.82
<i>Pacific</i>	1.19*	1.19*	1.21*	1.19*
<i>East Asian</i>	0.81*	0.81*	0.81*	0.81*
<i>Indo Asian</i>	0.76*	0.76*	0.76*	0.76*
<i>Other ethnicity</i>	0.73*	0.73*	0.73*	0.73*
Age of onset, per year	1.02	1.02	1.02	1.02
Duration, per year	1.05	1.05	1.05	1.05
Serum creatinine, per 10μmol/L	1.34	1.34	1.34	1.34
Albuminuria [‡]				
<i>No albuminuria</i>	1	1	1	1
<i>Microalbuminuria</i>	1.80	1.80	1.80	1.8
<i>Macroalbuminuria</i>	3.71	3.70	3.77	3.7
<i>Advance albuminuria</i>	9.29	9.26	9.53	9.27
Systolic BP, per 10mmHg	1.06	1.05	1.06	1.07*
HbA1c, per 10 mmol/mol (per %)	1.18 (1.20)	1.19 (1.20)	1.18 (1.20)	1.19 (1.20)
Smoking status ^β				
<i>Non-smoker</i>	1	1	1	1
<i>Past smoker</i>	1.33 [#]	1.33 [#]	1.33 [#]	1.32 [#]
<i>Current smoker</i>	1.05* [#]	1.05* [#]	1.05* [#]	1.05* [#]
History of CVD	1.66	1.66	1.67	1.66
ACEI/ARB [‡]	1.13*	1.122*		1.13*
Blood pressure medication	0.97*		0.98*	
ACEI*SBP [#]				0.98*
C-statistic:	0.883	0.883	0.882	0.883
Akaike Information Criterion:	6,087	6,085	6,086	6,086
BIC:	6,232	6,222	6,224	6,332

* Not statistically significant at p<0.05; ^α Compared with European ethnicity (‘Ethnicity as a whole was statistically significant in every model in which it was included, although some individual ethnic groups compared with European were not significantly different, possibly due to smaller sample sizes); ^β smoking status was not statistically significant in any of the models where it was included (P>0.05); [‡] Compared with no albuminuria. Microalbuminuria indicates a urine albumin creatinine ratio of ≥2.5mg/mmol in men or ≥3.5mg/mmol in women, and <30mg/mmol in both; Macroalbuminuria indicates a urine albumin creatinine ratio of ≥30mg/mmol and <100mg/mmol. Advanced albuminuria indicates a urine albumin creatinine ratio of ≥100mg/mmol. [‡] ACEI/ARB = currently taking Angiotensin Converting Enzyme Inhibitor or Angiotensin II Receptor Blocker medication; [#] Interaction term of ACEI/ARB status and systolic blood pressure

SUPPLEMENTARY DATA

Supplementary Table 5. Coefficients for the Diabetes Cohort Study (DCS) 5-year renal risk equations of models 1, 2, 3 and 4*

Variable	Model 1	Model 2	Model 3	Model 4
Female	0.365306	0.390283	0.3953829	0.401069
Maori	1.314935	0.979872	0.8542370	0.821956
Pacific	0.802603	0.427067	0.2981239	0.296149
East Asian	-0.077877	-0.287620	-0.1609350	-0.13847
Indo-Asian	0.094135	0.004172	-0.0554317	-0.04065
Other Ethnicity	-0.323325	-0.296537	-0.2198805	-0.22365
Age of diabetes onset	0.009930	0.018867	0.022637	0.024199
Duration of diabetes	0.050521	0.047775	0.0421126	0.043467
Serum creatinine/10	0.373758	0.302314	0.303411	0.305281
Micro-albuminuria		0.788083	0.6505872	0.6442
Macro-albuminuria		1.480748	1.3108120	1.303188
Advanced albuminuria		2.537043	2.3032280	2.290089
Systolic blood pressure/10			0.048168	0.049809
HbA1c mmol/mol/10			0.158272	0.158597
HbA1c %			0.172976	0.173331
Ex-smoker				-0.00395
Current smoker				0.252272
Previous CVD			0.493728	0.498804
Intercept#	-4.526207	-4.668685	-6.523799	-6.695133
Intercept@			-6.895697	-7.0671736
Exponent	0.99396408	0.99515777	0.99555499	0.99558399

When HbA1c is assessed as mmol/mol; @when HbA1c assessed as %; *An example of a renal risk equation: Model4=(female*0.401069) + (Maori*0.821956) + (Pacific*0.296149) + (East Asian*-0.138466)+ (Indo-Asian*-0.040645) + (other*-0.223648) + (age_onset*0.024199) + (duration*0.043467) + (scr/10*0.305281) + (microalb*0.644200) + (macroalb*1.303188)+ (advanced alb* 2.290089) + (Systolic BP/10*0.049809) + (HbA1c/10*0.158597) + (ex-smoker*-0.003952) + (current smoker*0.252272) + (cvd event*0.498804) -6.6945133

Thus, the 5-year renal risk =1-0.99558399^exp(Model4)

SUPPLEMENTARY DATA

Supplementary Table 6. Performance of the DCS 5-year renal risk models in the DCSS validation cohort (Discrimination, Calibration and Net Reclassification Improvement).

	Model 1	Model 2	Model 3	Model 4		
<i>Discrimination</i>						
C-statistic (95% confidence interval)	0.862 (0.827-0.897)	0.918 (0.896-0.940)	0.915 (0.892-0.938)	0.914 (0.881-0.937)		
<i>Calibration</i>						
Hosmer-Lemeshow Chi-2 p-values	0.323	0.693	0.693	0.663		
Net Reclassification Improvement comparisons*						
	Events		Non-events		Net Reclassification Improvement (Events & Non-Events)	
	(n = 121)		(n = 5,756)			
Model 2 vs Model 1	17	14.0%	-28	-0.5%	-11	13.6%
Model 3 vs Model 1	15	12.4%	5	0.1%	20	12.5%
Model 4 vs Model 1	17	14.0%	1	0.0%	18	14.1%
Model 3 vs Model 2	-2	-1.7%	33	0.6%	31	-1.1%
Model 4 vs Model 2	0	0.0%	29	0.5%	29	0.5%
Model 4 vs Model 3	2	1.7%	-4	-0.1%	-2	1.6%

* using 5% 5-year renal risk cut off

SUPPLEMENTARY DATA

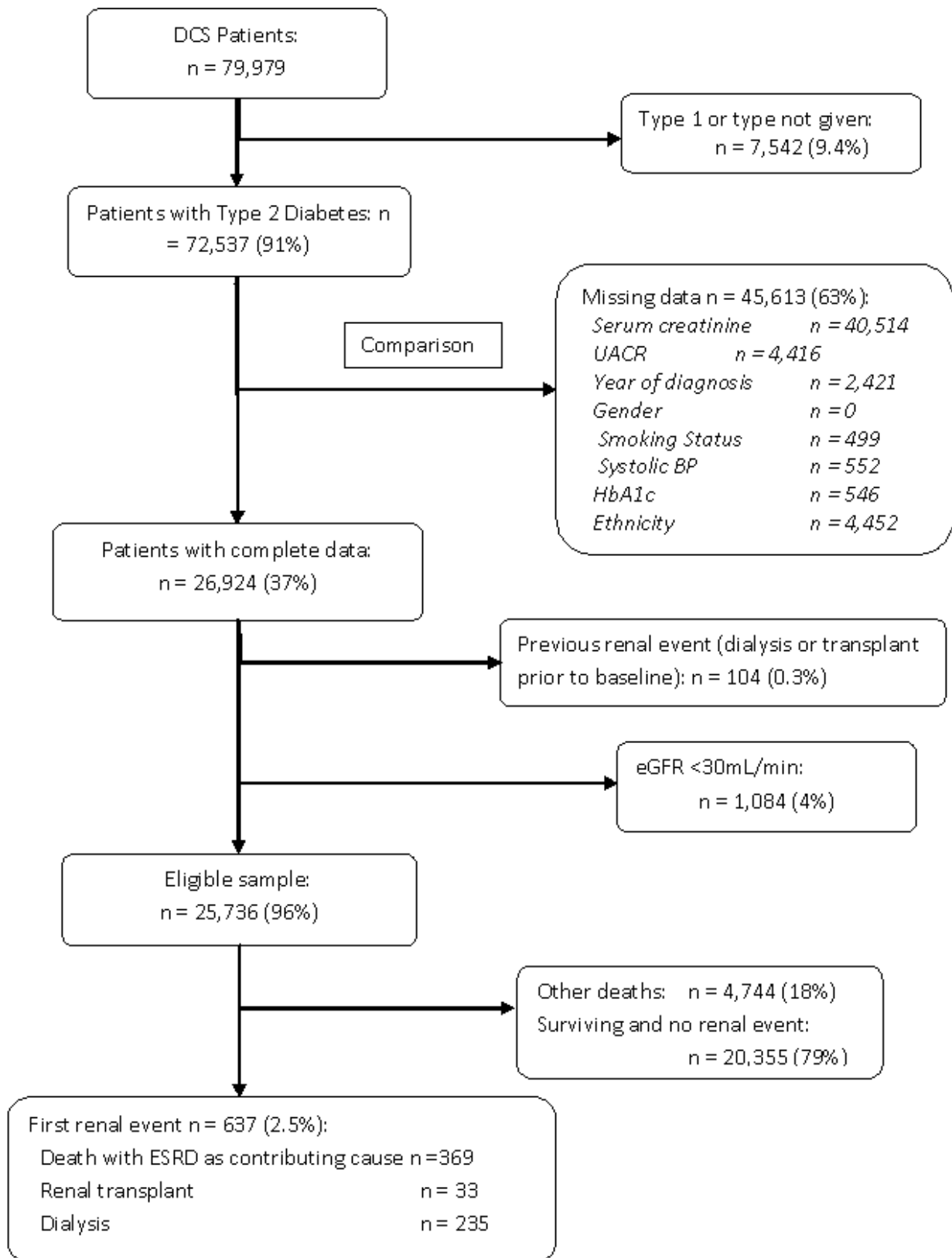
Supplementary Table 7. Sensitivity, specificity, positive predictive values and number needed to identify as ‘high risk’ per renal event in the next 5 years, for different risk cut-off points of DCS risk models 1, 2, 3 and 4 in the validation cohort

Risk Cut off for treatment	Model 1				Model 2				Model 3				Model 4			
	Sensitivity	Specificity	PPV*	NNI*	Sensitivity	Specificity	PPV	NNI	Sensitivity	Specificity	PPV	NNI	Sensitivity	Specificity	PPV	NNI
1.5%	79%	78%	7.0%	14.2	87%	79%	9.0%	11.1	84%	83%	9.2%	10.8	84%	83%	9.2%	10.9
2.5%	68%	88%	10.3%	9.7	77%	88%	12.3%	8.1	76%	89%	13.0%	7.7	77%	89%	13.1%	7.6
5.0%	49%	94%	15.0%	6.7	63%	94%	17.4%	5.7	61%	94%	18.4%	5.4	63%	94%	18.6%	5.4
7.5%	38%	97%	20.1%	5.0	56%	96%	22.6%	4.4	54%	96%	23.6%	4.2	54%	96%	23.5%	4.3

* PPV = positive predictive value; NNI = number needed to identify as ‘high risk’ per renal event in the next 5 years (ie: 1/PPV)

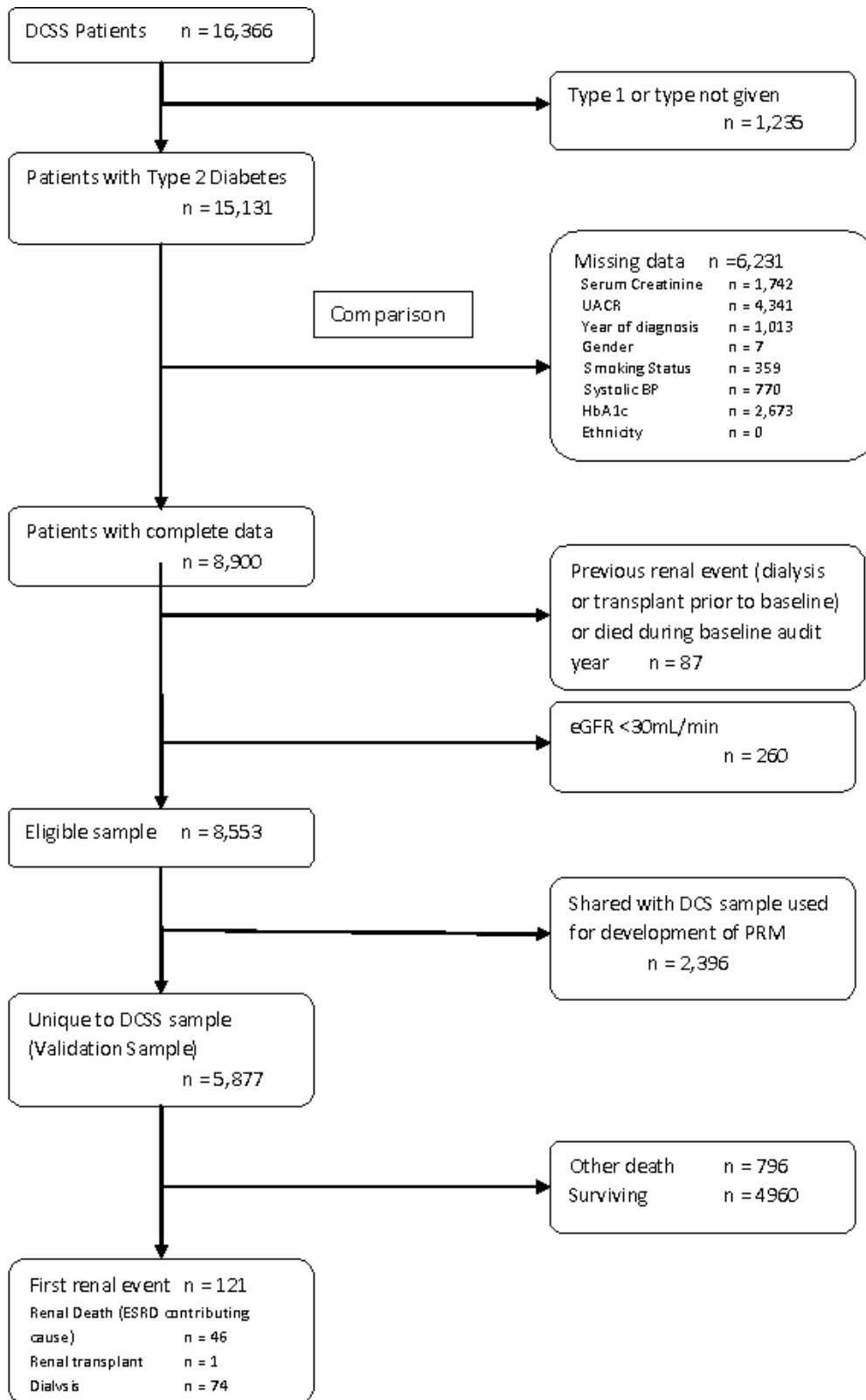
SUPPLEMENTARY DATA

Supplementary Figure 1. Flow diagram of participants included in the risk model derivation study from the Diabetes Cohort Study (DCS)



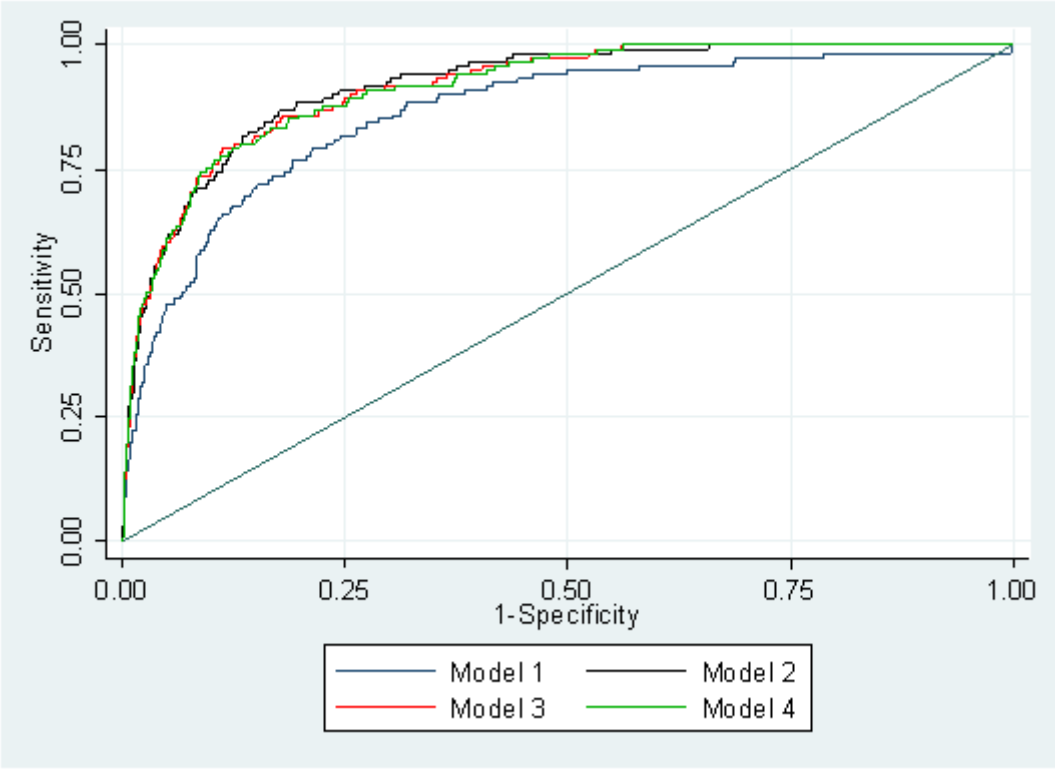
SUPPLEMENTARY DATA

Supplementary Figure 2. Flow diagram of participants included in the validation study from the Diabetes Care Support Services (DCSS) cohort



SUPPLEMENTARY DATA

Supplementary Figure 3: Receiver operating curve for the DCS 5-year renal risk models 1, 2, 3 and 4 in the validation cohort



*C statistics for Models 1, 2, 3 and 4 are 0.862, 0.918, 0.915 and 0.914, respectively

SUPPLEMENTARY DATA

References

1. Salmond C, Crampton P and Sutton F: NZDep91: A New Zealand index of deprivation. *Aust N Z J Public Health* 1998; 22:835-7