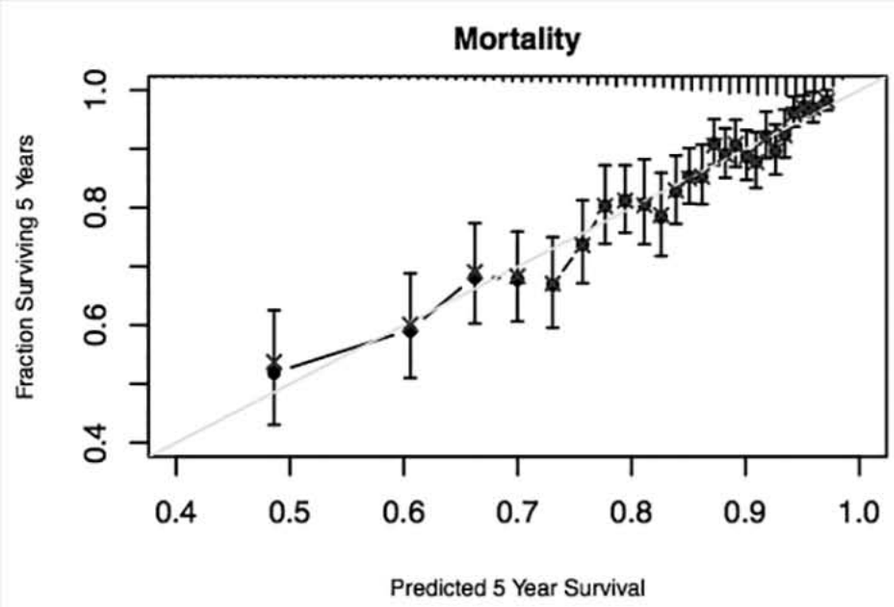
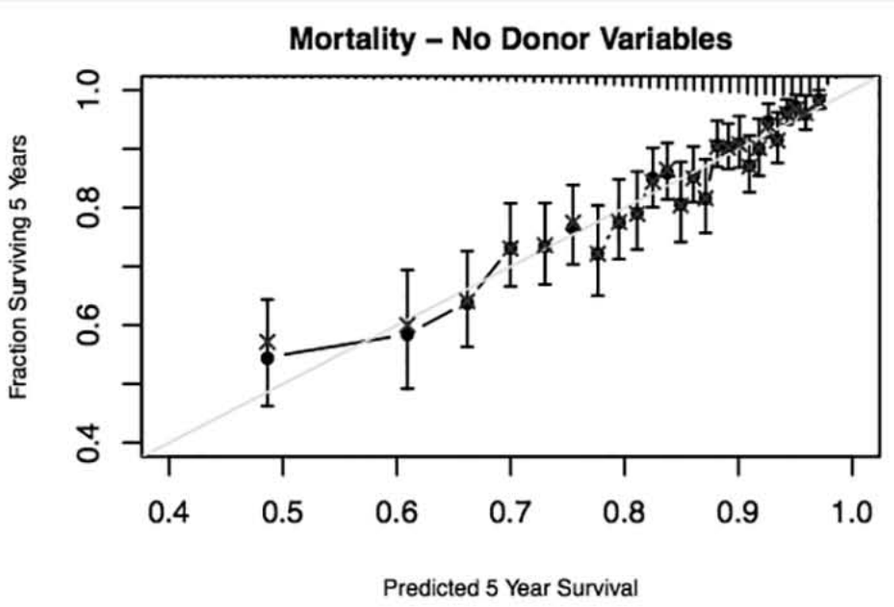
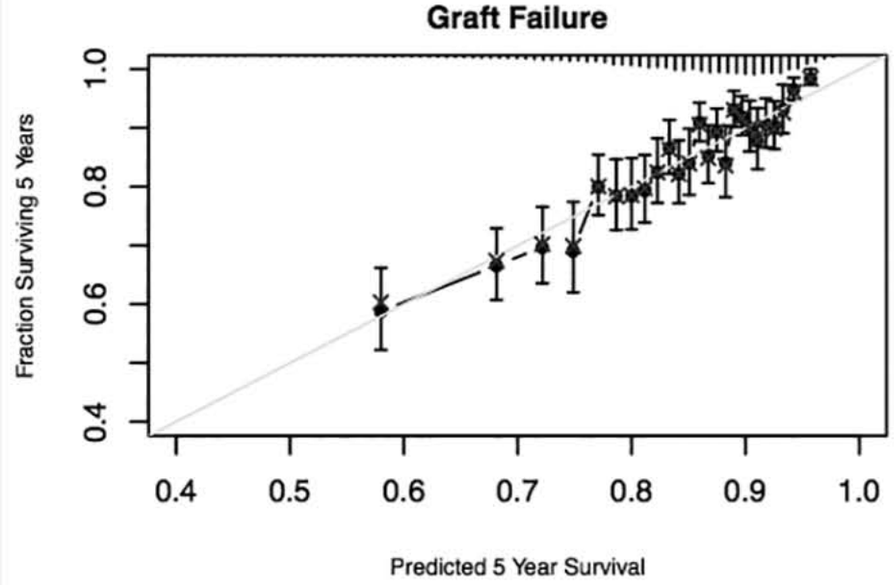
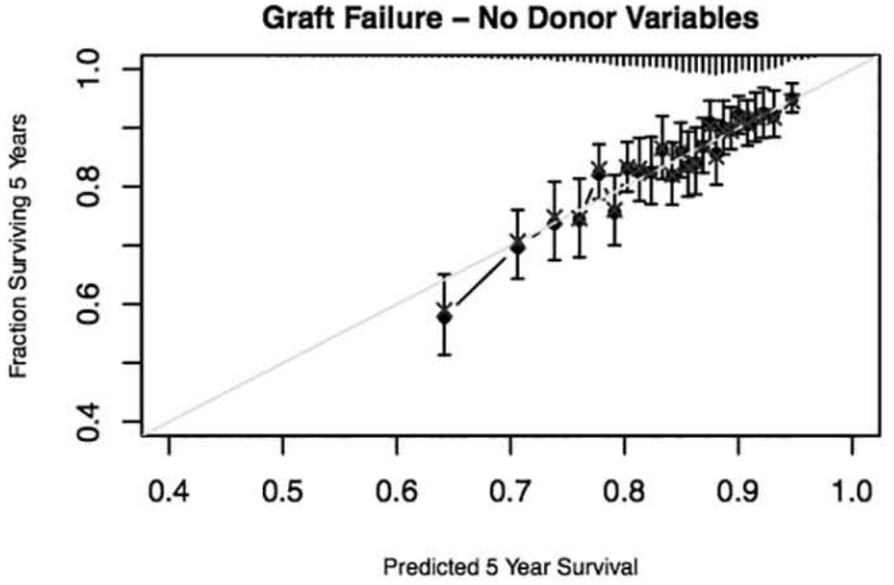
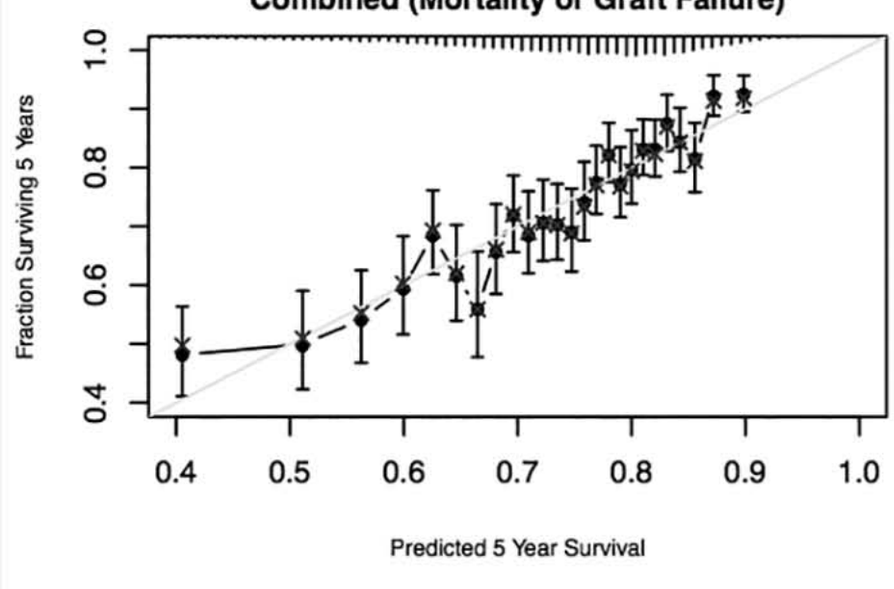

Mortality
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Mortality – No Donor Variables
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Graft Failure
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Graft Failure – No Donor Variables
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0


Combined (Mortality or Graft Failure)
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0

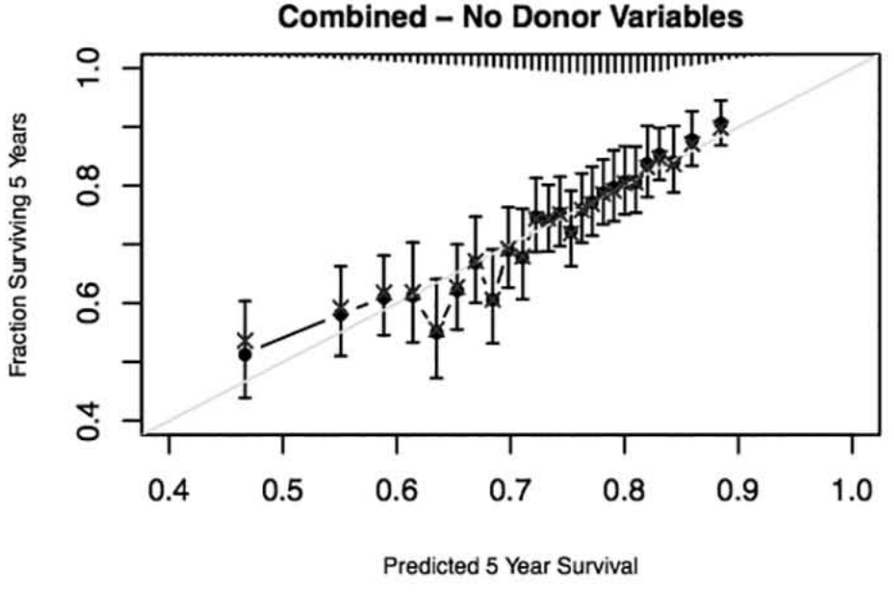

Combined – No Donor Variables
Fraction Surviving 5 Years
Predicted 5 Year Survival
0.4
0.5
0.6
0.7
0.8
0.9
1.0

Figure S1, SDC: Five-year survival calibration plots for for models (left column) using all information/predictors and (right column) models excluding donor information. Horizontal axis is the model predicted survival and the vertical axis is the observed survivial. Black marks (x) indicates optimism/bias corrected values which are close to uncorrected values (black solid).

Table S1, SDC: Cox regression model for predicting mortality without donor variables

Predictors	Parameter[a]	Adjusted Hazard Ratios (95% Confidence Interval)	p-value
Recipients' characteristics			
Age categories			
18-34 years	-0.9812	0.37 (0.28-0.49)	<0.001
35-49 years	-0.5508	0.58 (0.49-0.68)	<0.001
50-64 years		1.00 (Reference)	
>=65 years	0.5400	1.72 (1.47-2.00)	<0.001
Race categories			
Whites		1.00 (Reference)	
Hispanics	-0.1000	0.90 (0.78-1.05)	0.20
African-American	-0.3987	0.67 (0.54-0.83)	<0.001
Other/Unknown	-0.2918	0.75 (0.58-0.96)	0.02
Type of insurance			
Medicare		1.00 (Reference)	
Medicaid	0.3342	1.40 (0.96-2.04)	0.08
Other	-0.3196	0.73 (0.62-0.85)	<0.001
Unknown	-0.1764	0.84 (0.70-1.01)	0.06
Time on dialysis			
<1 year		1.00 (Reference)	
1-3 years	0.2246	1.25 (1.01-1.54)	0.04
3-5 years	0.3765	1.46 (1.17-1.82)	<0.001
>5 years	0.7091	2.03 (1.62-2.55)	<0.001
Type of dialysis			
Hemodialysis		1.00 (Reference)	
Not on dialysis	-0.2327	0.79 (0.64-0.98)	0.03
Peritoneal dialysis	-0.2862	0.75 (0.60-0.93)	0.001
Unknown	-0.2588	0.77 (0.58-1.02)	0.07
Comorbid conditions			
Diabetes mellitus (presence vs. absence (ref.))	0.4209	1.52 (1.34-1.74)	<0.001
Coronary artery disease (presence vs. absence (ref.))	0.2767	1.32 (1.10-1.58)	0.003
Peripheral vascular disease (presence vs. absence (ref.))	0.2642	1.30 (1.06-1.59)	0.01
Cerebrovascular disease (presence vs. absence (ref.))	0.3070	1.36 (1.06-1.74)	0.01
Laboratory results			
Serum albumin (+1 g/dL)	-0.5280	0.59 (0.49-0.71)	<0.001

[a]Model parameter estimate before application of shrinkage factor of 0.9414. Final coefficients are multiplied by this shrinkage parameter. Estimated 5-year event probabilities can be

obtained as: $1-0.8615768^{\exp(PS^*)}$, where $PS^* = \gamma LP$, γ is the shrinkage factor, and LP is the linear predictor using the given parameter estimates.

Table S2, SDC: Cox regression model for predicting graft failure without donor variables

Predictors	Parameter[a]	Adjusted Hazard Ratios (95% Confidence Interval)	p-value
Recipients' characteristics			
Age categories			
18-34 years	0.3585	1.43 (1.20-1.70)	<0.001
35-49 years	0.1438	1.15 (0.99-1.34)	0.06
50-64 years		1.00 (Reference)	
>=65 years	-0.0862	0.92 (0.75-1.12)	0.40
Race categories			
Whites		1.00 (Reference)	
Hispanics	0.4245	1.53 (1.32-1.76)	<0.001
African-American	-0.1592	0.85 (0.70-1.04)	0.11
Other/Unknown	-0.5826	0.56 (0.41-0.76)	<0.001
Type of insurance			
Medicare		1.00 (Reference)	
Medicaid	-0.3244	0.72 (0.49-1.06)	0.10
Other	-0.5336	0.59 (0.51-0.68)	<0.001
Unknown	-0.6434	0.52 (0.43-0.64)	<0.001
Primary cause of ESRD			
Diabetes		1.00 (Reference)	
Hypertension	0.4306	1.54 (1.23-1.92)	<0.001
Glomerulonephritis	0.4638	1.59 (1.26-2.01)	<0.001
Cystic disease	0.2197	1.25 (0.90-1.72)	0.18
Other	0.5861	1.80 (1.44-2.24)	<0.001
Time on dialysis			
<1 year		1.00 (Reference)	
1-3 years	-0.4518	0.64 (0.54-0.75)	<0.001
3-5 years	-0.6480	0.52 (0.43-0.63)	<0.001
>5 years	-0.4319	0.65 (0.54-0.78)	<0.001
Comorbid conditions			
Diabetes mellitus (presence vs. absence (ref.))	0.3339	1.40 (1.17-1.66)	<0.001
Laboratory results			
Blood hemoglobin (+1 g/dL)	-0.0933	0.91 (0.86-0.96)	<0.001

[a]Model parameter estimate before application of shrinkage factor of 0.9224. Final coefficients are multiplied by this shrinkage parameter. Estimated 5-year event probabilities can be obtained as: $1-0.8426697^{\exp(PS^*)}$, where $PS^* = \gamma LP$, γ is the shrinkage factor, and LP is the linear predictor using the given parameter estimates.

Table S3, SDC: Cox regression model for predicting combined outcome (mortality or graft failure) without donor variables

Predictors	Parameter[a]	Adjusted Hazard Ratios (95% Confidence Interval)	p-value
Recipients' characteristics			
Age categories			
18-34 years	-0.0175	0.98 (0.87-1.14)	0.82
35-49 years	-0.1382	0.87 (0.77-0.98)	0.02
50-64 years		1.00 (Reference)	
>=65 years	0.2783	1.32 (1.16-1.51)	<0.001
Race categories			
Whites		1.00 (Reference)	
Hispanics	0.2208	1.25 (1.11-1.40)	<0.001
African-American	-0.2556	0.77 (0.66-0.90)	0.001
Other/Unknown	-0.4150	0.66 (0.54-0.81)	<0.001
Type of insurance			
Medicare		1.00 (Reference)	
Medicaid	-0.1535	0.86 (0.63-1.16)	0.32
Other	-0.4463	0.64 (0.57-0.72)	<0.001
Unknown	-0.4243	0.65 (0.56-0.76)	<0.001
Primary cause of ESRD			
Diabetes		1.00 (Reference)	
Hypertension	0.1642	1.18 (0.99-1.39)	0.05
Glomerulonephritis	0.1546	1.17 (0.97-1.40)	0.09
Cystic disease	-0.1259	0.88 (0.68-1.13)	0.33
Other	0.3449	1.41 (1.20-1.66)	<0.001
Time on dialysis			
<1 year		1.00 (Reference)	
1-3 years	-0.1781	0.84 (0.73-0.96)	0.01
3-5 years	-0.1956	0.82 (0.71-0.95)	0.01
>5 years	0.0562	1.06 (0.91-1.23)	0.47
Comorbid conditions			
Diabetes mellitus (presence vs. absence (ref.))	0.3213	1.38 (1.20-1.58)	<0.001
Coronary artery disease (presence vs. absence (ref.))	0.2474	1.28 (1.10-1.49)	0.002
Laboratory results			
Serum albumin (+1 g/dL)	-0.2828	0.75 (0.65-0.87)	<0.001
Blood hemoglobin (+1 g/dL)	-0.0487	0.95 (0.91-0.99)	0.03

[a]Model parameter estimate before application of shrinkage factor of 0.9225. Final coefficients are multiplied by this shrinkage parameter. Estimated 5-year event probabilities can be obtained as: $1-0.7299241^{(PS^*)}$, where $PS^* = \gamma LP$, γ is the shrinkage factor, and LP is the linear predictor using the given parameter estimates.

Table S4, SDC: Prediction model based on Estimated Post-Transplant Survival (EPTS) score model for (A) mortality, (B) graft failure and (C) combined outcome (death or graft failure)

	(A) Mortality				
	Parameter	**Adjusted Hazard Ratios (HR)**	**95% Confidence Interval of HRs**		**p-value**
Predictors			**Lower**	**Upper**	
max(Age - 25,0)	0.0450	1.05	1.04	1.05	<0.001
Diabetes x max(Age - 25,0)	-0.0022	1.00	0.99	1.01	0.71
log(Years on Dialysis + 1)	0.4359	1.55	1.34	1.79	<0.001
Diabetes x log(Years on Dialysis + 1)	0.0285	1.03	0.83	1.28	0.80
(Years on Dialysis = 0)	0.1392	1.15	0.60	2.12	0.67
Diabetes x (Years on Dialysis = 0)	-0.0895	0.91	0.40	2.08	0.83
Diabetes	0.5066	1.66	1.00	2.75	0.05
	(B) Graft Failure				
	Parameter	**Adjusted Hazard Ratios (HR)**	**95% Confidence Interval of HRs**		**p-value**
Predictors			**Lower**	**Upper**	
max(Age - 25,0)	-0.0109	0.99	0.98	0.99	<0.001
Diabetes x max(Age - 25,0)	0.0062	1.01	0.99	1.02	0.25
log(Years on Dialysis + 1)	0.3396	1.40	1.25	1.58	<0.001
Diabetes x log(Years on Dialysis + 1)	-0.2663	0.77	0.61	0.97	0.02
(Years on Dialysis = 0)	2.4089	11.12	8.38	14.76	<0.001
Diabetes x (Years on Dialysis = 0)	-0.8274	0.44	0.27	0.71	<0.001
Diabetes	0.2669	1.31	0.84	2.02	0.23
	(C) Combined Outcome				
	Parameter	**Adjusted Hazard Ratios (HR)**	**95% Confidence Interval of HRs**		**p-value**
Predictors			**Lower**	**Upper**	
max(Age - 25,0)	0.0084	1.01	1.00	1.01	<0.001
Diabetes x max(Age - 25,0)	0.0120	1.01	1.00	1.02	0.005
log(Years on Dialysis + 1)	0.3661	1.44	1.31	1.59	<0.001
Diabetes x log(Years on Dialysis + 1)	-0.0788	0.92	0.78	1.10	0.37

(Years on Dialysis = 0)	2.0778	7.99	6.16	10.35	<0.001
Diabetes x (Years on Dialysis = 0)	-0.8173	0.44	0.29	0.67	<0.001
Diabetes	0.0187	1.02	0.72	1.45	0.92

Table S5, SDC: Assessment of model calibration using group-based goodness-of-fit for models using all information/predictors and models excluding donor information.

Panel A - Mortality

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-1.11	363	9	8.79	1.02	0.072	0.94
2	(-1.11,-0.731]	362	12	14.70	0.82	-0.704	0.48
3	(-0.731,-0.463]	363	15	19.94	0.75	-1.103	0.27
4	(-0.463,-0.206]	362	25	23.48	1.06	0.314	0.75
5	(-0.206,-0.00127]	363	20	28.80	0.69	-1.631	0.10
6	(-0.00127,0.216]	362	47	35.33	1.33	1.956	0.05
7	(0.216,0.44]	362	46	42.68	1.08	0.508	0.61
8	(0.44,0.724]	363	50	55.70	0.90	-0.764	0.44
9	(0.724,1.04]	362	58	63.82	0.91	-0.728	0.47
10	>1.04	363	85	96.76	0.88	-1.194	0.23
Total		3625	367	390.01	0.94		

Overall deviance=9.985, df=9,p=0.3517

Panel B - Graft Failure

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-0.804	368	16	13.62	1.17	0.643	0.52
2	(-0.804,-0.546]	367	16	18.98	0.84	-0.684	0.49
3	(-0.546,-0.346]	368	19	23.94	0.79	-1.008	0.31
4	(-0.346,-0.172]	367	22	27.97	0.79	-1.126	0.26
5	(-0.172,0.00467]	368	27	35.18	0.77	-1.375	0.17
6	(0.00467,0.157]	367	37	40.03	0.92	-0.479	0.63
7	(0.157,0.313]	367	28	47.55	0.59	-2.803	0.005
8	(0.313,0.489]	368	36	54.94	0.66	-2.536	0.01
9	(0.489,0.725]	367	57	62.63	0.91	-0.711	0.48
10	>0.725	368	54	99.90	0.54	-4.521	<0.001
Total		3675	312	424.75	0.73		

Overall deviance=15.44, df=9,p=0.0795

Panel C - Combined (Mortality or Graft Failure)

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-0.665	363	19	30.21	0.63	-2.021	0.04
2	(-0.665,-0.448]	362	44	40.09	1.10	0.617	0.54
3	(-0.448,-0.29]	362	39	47.39	0.82	-1.217	0.22
4	(-0.29,-0.161]	362	39	54.28	0.72	-2.065	0.04
5	(-0.161,-0.0238]	363	53	61.82	0.86	-1.121	0.26
6	(-0.0238,0.109]	362	57	66.80	0.85	-1.198	0.23

7	(0.109,0.247]	362	61	77.52	0.79	-1.872	0.06
8	(0.247,0.409]	362	89	82.39	1.08	0.728	0.47
9	(0.409,0.648]	362	73	100.46	0.73	-2.728	0.006
10	>0.648	363	99	137.15	0.72	0.1005	0.001
Total		3623	573	698.11	0.82		

Overall deviance=14.84, df=9,p=0.0954

Panel D - Mortality - Without Donor Variables

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-1.04	368	13	9.57	1.36	1.103	0.27
2	(-1.04,-0.723]	367	5	14.94	0.33	-2.449	0.01
3	(-0.723,-0.451]	367	11	19.01	0.58	-1.815	0.07
4	(-0.451,-0.217]	367	20	24.43	0.82	-0.895	0.37
5	(-0.217,-0.00199]	367	21	28.10	0.75	-1.334	0.18
6	(-0.00199,0.234]	367	38	36.33	1.05	0.278	0.78
7	(0.234,0.456]	367	55	43.28	1.27	1.777	0.08
8	(0.456,0.686]	367	61	51.05	1.19	1.391	0.16
9	(0.686,0.999]	367	58	67.40	0.86	-1.144	0.25
10	>0.999	368	92	99.80	0.92	-0.78	0.44
Total		3672	374	393.92	0.95		

Overall deviance=22.65, df=9, p=0.007

Panel E - Graft Failure - Without Donor Variables

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-0.677	368	24	16.26	1.48	1.908	0.06
2	(-0.677,-0.459]	367	14	21.83	0.64	-1.662	0.10
3	(-0.459,-0.265]	368	23	25.32	0.91	-0.461	0.64
4	(-0.265,-0.128]	367	27	32.22	0.84	-0.919	0.36
5	(-0.128,-0.00304]	368	27	36.45	0.74	-1.559	0.12
6	(-0.00304,0.128]	367	39	41.78	0.93	-0.43	0.67
7	(0.128,0.281]	368	33	46.53	0.71	-1.973	0.05
8	(0.281,0.429]	367	34	55.31	0.61	-2.838	0.004
9	(0.429,0.648]	367	37	64.69	0.57	-3.399	<0.001
10	>0.648	368	54	90.72	0.60	-3.812	<0.001
Total		3675	312	431.10	0.72		

Overall deviation=19.35, df=9,p=0.0224

Panel F - Combined (Mortality or Graft Failure) - Without Donor Variables

Group	Risk Score - Deciles	N	Observed (O)	Expected (E)	O/E	z score	p-value
1	<-0.58	363	27	31.50	0.86	-1.203	0.23
2	(-0.58,-0.386]	362	44	36.70	1.20	0.344	0.73
3	(-0.386,-0.248]	362	43	43.70	0.98	-0.936	0.35
4	(-0.248,-0.131]	362	41	49.37	0.83	-1.959	0.05

5	(-0.131,-0.0156]	363	53	54.61	0.97	-1.367	0.17
6	(-0.0156,0.11]	362	56	60.81	0.92	-1.875	0.06
7	(0.11,0.245]	362	65	62.52	1.04	-1.283	0.20
8	(0.245,0.381]	362	78	70.41	1.11	-1.24	0.22
9	(0.381,0.564]	362	78	74.88	1.04	-1.782	0.07
10	>0.564	363	88	95.45	0.92	-3.366	<0.001
Total		3623	573	579.96	0.99		

Overall deviance=6.61, df=9, p=0.7333

Table S6, SDC: The list of variables included in our predictive scores and the currently avaliable predictive scores in kidney transplantation (highlighted with *italic font* which NOT avaliable at the time of transplantation)

Kasiske et al.(41) (2010)
-Donor age -Donor history of hypertension -Recipient age -Recipient race -Recipient insurance -Recipient cause of ESRD -Duration on dialysis -HCV antibody -Trauma as cause of death *-eGFR at 12 month post-transplantation* *-Hospitalization during the first post-transplant year*
Foucher et al.(40) (2010)
-Donor serum creatinine -Recipient age -Recipient gender -Number of previous transplantation *-Serum creatinine at 3 month and 12 month post-transplantation* *-Acute rejection in the first post-transplant year* *-24 hour Urine protein excretion measured in the first post-transplant year*
Moore et al.(38) (2011)
-Recipient age

-Recipient race -Recipient serum albumin *-Acute rejection* *-Change in eGFR* *-eGFR at 12 month post-transplantation* *-Recipient serum urea at 12 month post-transplantation*
Shabir et al.(39) (2014)
-Recipient age -Recipient race -Recipient gender -Recipient serum albumin *-Acute rejection* *-eGFR at 12 month post-transplantation* *-Urine albumin-creatinine ratio*
Patzer et al.(26) (2016)
-Recipient age -Recipient race -Recipient gender -Recipient Hispanic ethnicity -Recipient diabetes status -Recipient cardiovascular disease -Recipient hypertension -Recipient dialysis vintage -Recipient serum albumin<3.5g/dL
Our new main prediction score with all variables
-Recipient age

-Recipient race -Recipient insurance -Recipient serum albumin -Recipient blood hemoglobin -Recipient cause of ESRD -Recipient ESRD vintage -Recipient diabetes status -Recipient coronary artery diseae -Recipient peripheral vascular disease -Donor age -Donor diabetes status -Donor ECD status -Number of HLA mismatches
Our new prediction score without donor variables
-Recipient age -Recipient race -Recipient insurance -Recipient serum albumin -Recipient blood hemoglobin -Recipient cause of ESRD -Recipient ESRD vintage -Recipient type of dialysis -Recipient diabetes status -Recipient coronary artery diseae -Recipient peripheral vascular disease -Recipient cerebrovascular disease