Supplemental Information to

Association of dialysis vintage on outcomes after kidney transplant

Maria C. Haller, MD, Alexander Kainz, PhD, Heather Bear, ScD and

Rainer Oberbauer MD, MSc

Contents

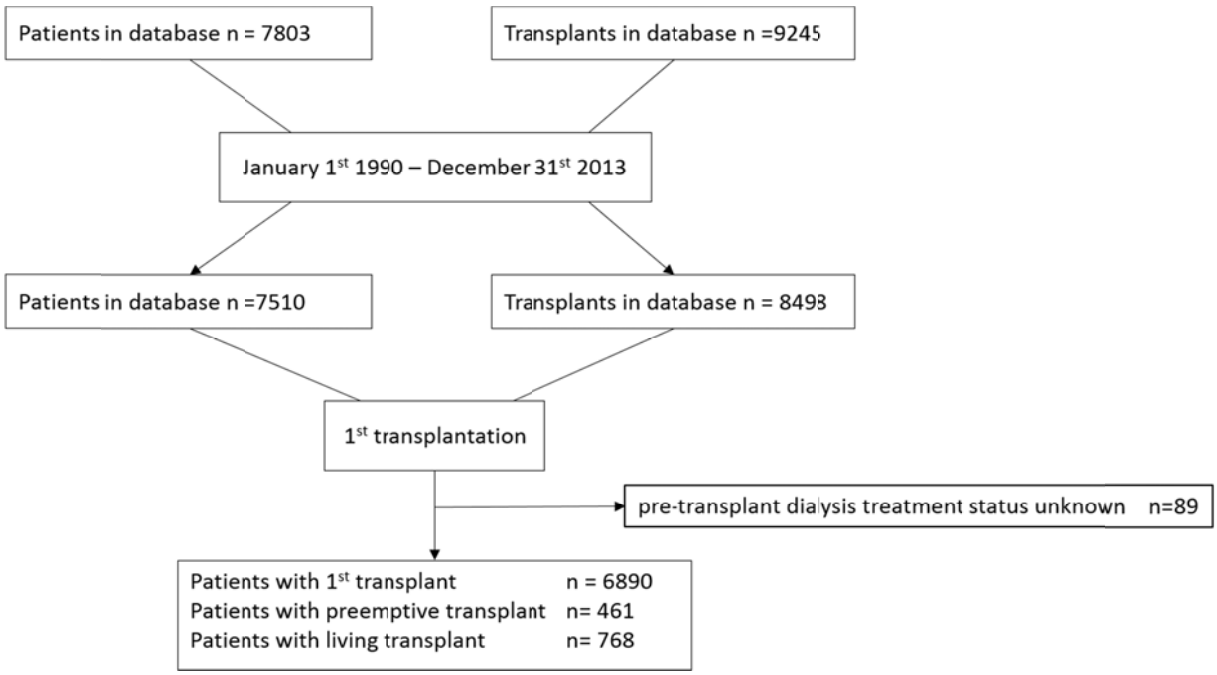
1. Details on the database

The OEDTR registry was established by the Austrian Society of Nephrology in 1970 and has almost complete follow-up; only 0.6% of all Austrian residents on renal replacement therapy have been lost since 1990 [1]. Data provided by the OEDTR included information on recipient demographics, primary renal diagnosis, the presence of comorbidities (coronary heart disease and heart failure, diabetes, cerebro- or peripheral artery vascular disease, arterial hypertension, malignancy, chronic obstructive lung disease, liver disease), immunosuppressive regimen, course of renal replacement therapy, patient and graft survival. Each year mandatory follow-up data for each patient in the registry is collected to update the database. The OEDTR, which mainly provides data on transplant recipients, was merged with data from EUROTRANSPLANT to obtain donor information, such as donor type (deceased or living), donor age, and the number of human leukocyte antigen (HLA) mismatches. The EUROTRANSPLANT database was established in 1968 and collects organ donor characteristics from transplants that have been performed in the EUROTRANSPLANT region, to which Austria belongs [2].

2. Flow chart on study cohort assembly

Supplement Figure 1

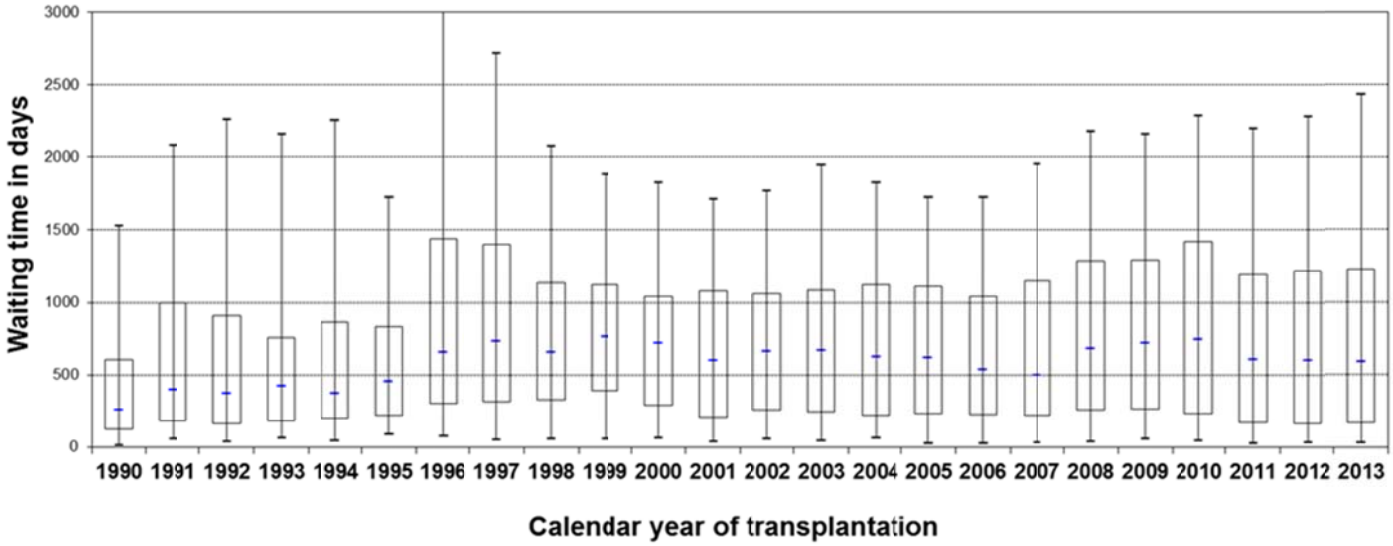
Flow chart on assembly of study cohort



Waiting time

Supplement Figure 2

The plot shows waiting time for a kidney transplant in Austria in days from 1990 until 2013.



3. Detailed results of all models

Death-censored graft loss

Supplement Table 1

Table 1a

Multivariable Fine and Gray model, variables selection based on clinical judgment using the complete study cohort for death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.76	0.59	0.98	0.04
tertile 2 vs tertile 1	1.00	0.88	1.14	0.94
tertile 3 vs tertile 1	0.89	0.78	1.02	0.10
year of transplantation (continuous, per year)	0.97	0.96	0.98	<.001
age at first renal replacement therapy (years, continuous)	0.98	0.98	0.99	<.001
chronic heart disease vs none	1.17	1.02	1.36	0.03
hypertension vs none	1.02	0.90	1.15	0.80
diabetes mellitus vs none	1.00	0.79	1.28	1.00
diabetic nephropathy vs glomerulonephritis	0.87	0.70	1.09	0.3
other primary renal diagnosis vs glomerulonephritis	0.89	0.79	1.00	0.04
vascular nephropathy vs glomerulonephritis	1.22	1.01	1.47	0.04
living donor vs deceased donor	0.77	0.63	0.95	0.01

Table 1b

Multivariable Fine and Gray model, variables selection based on clinical judgment excluding living kidney transplants for death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.71	0.50	1.01	0.06
tertile 2 vs tertile 1	1.01	0.89	1.15	0.86
tertile 3 vs tertile 1	0.88	0.77	1.01	0.08
year of transplantation (continuous, per year)	0.98	0.96	0.99	<.001
age at first renal replacement therapy (years, continuous)	0.98	0.98	0.99	<.001
chronic heart disease vs none	1.19	1.03	1.38	0.02
hypertension vs none	0.97	0.85	1.11	0.65
diabetes mellitus vs none	0.98	0.77	1.26	
diabetic nephropathy vs glomerulonephritis	0.89	0.70	1.11	0.30
other primary renal diagnosis vs glomerulonephritis	0.90	0.80	1.02	0.11
vascular nephropathy vs glomerulonephritis	1.25	1.03	1.51	0.02

Table 1c

Multivariable Fine and Gray model, variables selection based on clinical judgment excluding transplants before 1.1.2000 for death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.91	0.63	1.31	0.61
tertile 2 vs tertile 1	1.25	1.00	1.55	0.05
tertile 3 vs tertile 1	1.14	0.91	1.42	0.26
year of transplantation (continuous, per year)	0.96	0.93	0.98	<.001
age at first renal replacement therapy (years, continuous)	0.99	0.98	0.99	<.001
diabetes mellitus vs none	1.08	0.76	1.51	0.70
hypertension vs none	0.98	0.82	1.18	0.87
chronic heart disease vs none	1.16	0.97	1.39	0.11
diabetic nephropathy vs glomerulonephritis	0.75	0.52	1.07	0.12
other primary renal diagnosis vs glomerulonephritis	0.82	0.68	1.00	0.05
vascular nephropathy vs glomerulonephritis	1.21	0.94	1.55	0.14
living donor vs deceased donor	0.77	0.57	1.04	0.08

Table 1d

Multivariable Fine and Gray model, variables selection using purposeful selection and the complete study cohort for death censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.71	0.56	0.90	0.005
tertile 2 vs tertile 1	1.04	0.93	1.16	0.513
tertile 3 vs tertile 1	0.94	0.84	1.07	0.353
year of transplantation (continuous, per year)	0.96	0.95	0.97	<.001
age at first renal replacement therapy (years, continuous)	0.98	0.98	0.99	<.001
diabetes mellitus vs none	1.02	0.83	1.26	0.848
hypertension vs none	1.00	0.89	1.11	0.948
chronic heart disease vs none	1.20	1.06	1.36	0.004
diabetic nephropathy vs glomerulonephritis	0.87	0.72	1.06	0.160
other primary renal diagnosis vs glomerulonephritis	0.87	0.79	0.97	0.010
vascular nephropathy vs glomerulonephritis	1.14	0.96	1.35	0.128
living donor vs deceased donor	0.78	0.64	0.94	0.008

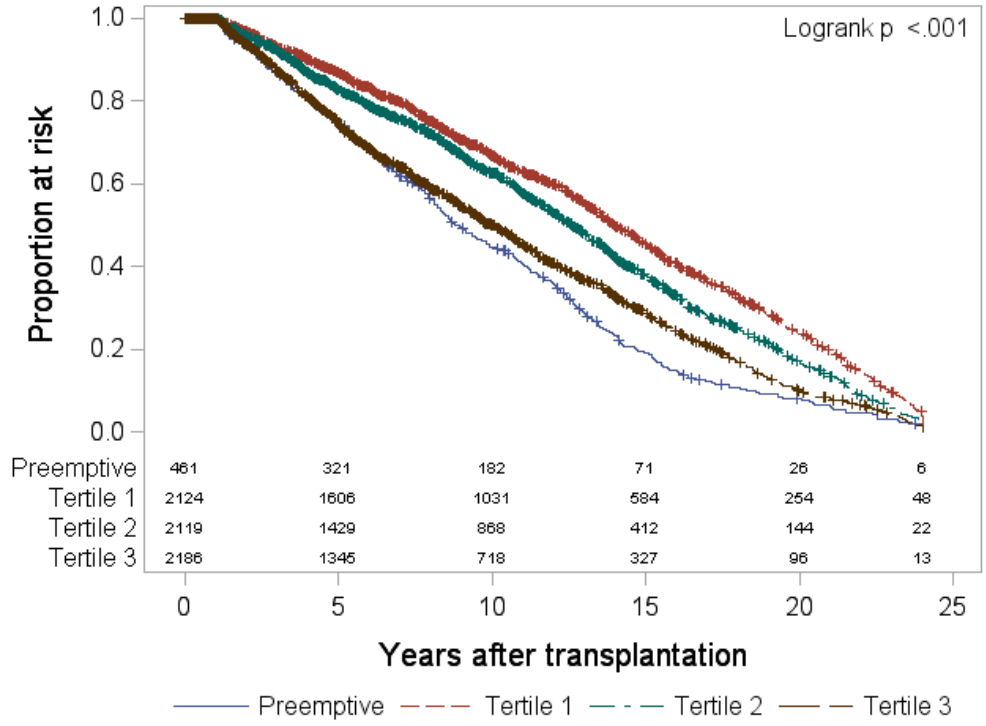
All- cause mortality

Supplement Table 2

Cause of death

	Preemptive transplantation	Tertile 1	Tertile 2	Tertile 3	Total
number of patients	461	2124	2119	2186	6890
follow up time (years, mean, SD)	9.9 (0.3)	13.8 (0.2)	12.6 (0.2)	10.7 (0.2)	-
number of deaths	63	751	850	743	2407
cardiovascular deaths	15	250	265	239	769
death due to infections	19	184	220	206	629
other causes of death	29	317	365	298	1009

Supplement Figure A



Kaplan-Meier curves for follow-up time for each group of pre-transplant dialysis duration. This plot was generated by reversing codes for death to compare follow-up between groups; end of follow-up is counted as event, and patients are censored for death in this analysis. The curves show the proportion of patients at risk who are followed-up at a given point in time after transplantation. Follow-up was shorter in tertile 3 explaining why this group had a higher risk of death compared to tertile 1 despite a lower absolute number of events in equally sized groups with proportional hazards.

Supplement Table 3

Table 3a

Multivariable Cox model, variables selection based on clinical judgment using the complete study cohort for all-cause mortality

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.84	0.62	1.14	0.26
tertile 2 vs tertile 1	1.24	1.11	1.39	<.001
tertile 3 vs tertile 1	1.62	1.43	1.83	<.001
year of transplantation (continuous, per year)	0.96	0.94	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.51	1.35	1.68	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
cyclosporine A vs TAC based immunosuppression	0.95	0.83	1.08	0.45
else vs TAC based immunosuppression	0.97	0.81	1.16	0.74
diabetic nephropathy vs glomerulonephritis	1.59	1.38	1.83	<.001
other primary renal diagnosis vs glomerulonephritis	1.02	0.91	1.14	0.77
vascular nephropathy vs glomerulonephritis	1.31	1.12	1.54	<.001
living donor vs deceased donor	0.61	0.47	0.79	<.001

Table 3b

Multivariable Cox model, variables selection based on clinical judgment excluding living kidney transplants for all-cause mortality

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.78	0.54	1.13	0.19
tertile 2 vs tertile 1	1.25	1.11	1.40	<.001
tertile 3 vs tertile 1	1.64	1.45	1.85	<.001
year of transplantation	0.95	0.94	0.96	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.52	1.36	1.70	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
cyclosporine A vs TAC based immunosuppression	0.93	0.81	1.06	0.27
else vs TAC based immunosuppression	0.94	0.78	1.13	0.50
diabetic nephropathy vs glomerulonephritis	1.59	1.37	1.84	<.001
other primary renal diagnosis vs glomerulonephritis	0.99	0.88	1.11	0.85
vascular nephropathy vs glomerulonephritis	1.32	1.12	1.56	<.001

Table 3c

Multivariable Cox model, variables selection based on clinical judgment excluding transplants before 1.1.2000 for all-cause mortality

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.80	0.52	1.24	0.186
tertile 2 vs tertile 1	1.42	1.18	1.72	<.001
tertile 3 vs tertile 1	1.93	1.58	2.35	<.001
year of transplantation	0.94	0.92	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.44	1.25	1.67	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	0.90	0.76	1.06	0.20
else vs TAC based immunosuppression	0.92	0.74	1.13	0.43
diabetic nephropathy vs glomerulonephritis	1.51	1.22	1.86	<.001
other primary renal diagnosis vs glomerulonephritis	1.06	0.88	1.27	0.56
vascular nephropathy vs glomerulonephritis	1.26	1.01	1.58	0.04
living donor vs deceased donor	0.78	0.57	1.08	0.13

Table 3d

Multivariable Cox model, variables selection using purposeful selection using the complete study cohort for all-cause mortality

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.84	0.62	1.13	0.26
tertile 2 vs tertile 1	1.24	1.11	1.39	<.001
tertile 3 vs tertile 1	1.62	1.43	1.83	<.001
year of transplantation	0.96	0.94	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.51	1.34	1.69	<.001
diabetic nephropathy vs glomerulonephritis	1.59	1.37	1.83	<.001
other primary renal diagnosis vs glomerulonephritis	1.02	0.91	1.14	0.77
vascular nephropathy vs glomerulonephritis	1.31	1.12	1.54	<.001
living donor vs deceased donor	0.61	0.47	0.79	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	0.95	0.83	1.09	0.47
else vs TAC based immunosuppression	0.97	0.81	1.16	0.74

Composite outcome

Supplement Table 4

Table 4a

Multivariable Cox model, variables selection based on clinical judgment using the complete study cohort for the composite outcome of death and death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.89	0.72	1.10	0.292
tertile 2 vs tertile 1	1.14	1.04	1.26	0.007
tertile 3 vs tertile 1	1.31	1.18	1.45	<.001
year of transplantation (continuous, per year)	1.03	1.02	1.04	<.001
age at first renal replacement therapy (years, continuous)	1.02	1.02	1.03	<.001
chronic heart disease vs none	1.42	1.28	1.56	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	1.06	0.95	1.19	0.30
else vs TAC based immunosuppression	1.00	0.86	1.17	1.0
diabetic nephropathy vs glomerulonephritis	1.42	1.25	1.61	<.001
other primary renal diagnosis vs glomerulonephritis	1.02	0.93	1.12	0.68
vascular nephropathy vs glomerulonephritis	1.29	1.12	1.48	<.001
living donor vs deceased donor	0.74	0.62	0.88	<.001

Table 4b

Multivariable Cox model, variables selection based on clinical judgment excluding living kidney transplants for the composite outcome of death and death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.79	0.60	1.05	0.111
tertile 2 vs tertile 1	1.15	1.04	1.27	0.007
tertile 3 vs tertile 1	1.32	1.19	1.47	<.001
year of transplantation	1.03	1.01	1.04	<.001
age at first renal replacement therapy (years, continuous)	1.02	1.02	1.03	<.001
chronic heart disease vs none	1.43	1.30	1.58	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	1.04	0.93	1.17	0.511
else vs TAC based immunosuppression	0.97	0.83	1.14	0.723
diabetic nephropathy vs glomerulonephritis	1.43	1.26	1.62	<.001
other primary renal diagnosis vs glomerulonephritis	1.00	0.91	1.11	0.946
vascular nephropathy vs glomerulonephritis	1.31	1.14	1.51	<.001

Table 4c

Multivariable Cox model, variables selection based on clinical judgment excluding transplants before 1.1.2000 for the composite outcome of death and death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.96	0.72	1.29	0.79
tertile 2 vs tertile 1	1.28	1.09	1.50	0.002
tertile 3 vs tertile 1	1.51	1.28	1.77	<.001
year of transplantation	0.95	0.93	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.01	1.01	1.01	<.001
chronic heart disease vs none	1.32	1.17	1.50	<.001
diabetic nephropathy vs glomerulonephritis	1.25	1.05	1.50	0.01
other primary renal diagnosis vs glomerulonephritis	0.98	0.85	1.14	0.83
vascular nephropathy vs glomerulonephritis	1.26	1.04	1.52	0.02
living donor vs deceased donor	0.79	0.63	1.00	0.05
donor age (years, continous)	1.02	1.01	1.02	<.001
Cyclosporine A vs TAC based immunosuppression	1.01	0.88	1.16	0.90
else vs TAC based immunosuppression	1.02	0.85	1.22	0.86

Supplement 4d

Multivariable Cox model, variables selection using purposeful selection using the complete study cohort for the composite outcome of death and death-censored graft loss

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
pre-emptive transplant vs tertile 1	0.89	0.71	1.11	0.30
tertile 2 vs tertile 1	1.14	1.03	1.26	0.01
tertile 3 vs tertile 1	1.31	1.18	1.46	<.001
year of transplantation (continuous, per year)	1.03	1.02	1.05	<.001
age at first renal replacement therapy (years, continuous)	1.02	1.02	1.03	<.001
chronic heart disease vs none	1.42	1.28	1.57	<.001
diabetic nephropathy vs glomerulonephritis	1.42	1.25	1.61	<.001
other primary renal diagnosis vs glomerulonephritis	1.02	0.93	1.12	0.68
vascular nephropathy vs glomerulonephritis	1.29	1.12	1.48	<.001
living donor vs deceased donor	0.74	0.62	0.87	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	1.06	0.95	1.18	0.29
else vs TAC based immunosuppression	1.00	0.86	1.16	0.99

4. Analysis of pre-transplant dialysis duration in annual intervals

Multivariable Cox Model, variables selected based on clinical judgment, reference group was pre-transplant dialysis duration >1 year.

Death-censored graft loss

Supplement Table 5

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
preemptive transplantation	0.70	0.55	0.89	0.003
>1 - 2 year	0.97	0.85	1.11	0.68
>2 - 3 years	1.00	0.87	1.15	0.99
>3 - 4 years	1.07	0.91	1.24	0.43
>4 - 5 years	0.93	0.77	1.13	0.48
>5 - 6 years	0.80	0.61	1.05	0.11
> 6 years	0.73	0.58	0.93	0.01
year of transplantation (continuous, per year)	0.96	0.95	0.97	<.001
age at first renal replacement therapy (years, continuous)	0.98	0.98	0.99	<.001
diabetes mellitus vs none	1.02	0.83	1.26	0.82
hypertension vs none	0.99	0.88	1.11	0.84
chronic heart disease vs none	1.22	1.07	1.38	0.002
diabetic nephropathy vs glomerulonephritis	0.86	0.71	1.04	0.12
other renal diagnosis vs glomerulonephritis	0.87	0.78	0.96	0.008
vascular nephropathy vs glomerulonephritis	1.13	0.96	1.34	0.14
living donor vs deceased donor	0.77	0.63	0.92	0.006

All-cause mortality

Supplement Table 6

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
preemptive transplantation	0.90	0.66	1.22	0.50
>1 - 2 year	1.18	1.02	1.36	0.02
>2 - 3 years	1.44	1.24	1.68	<.001
>3 - 4 years	1.54	1.31	1.82	<.001
>4 - 5 years	1.90	1.58	2.29	<.001
>5 - 6 years	1.72	1.33	2.21	<.001
> 6 years	2.16	1.73	2.71	<.001
year of transplantation (continuous, per year)	0.95	0.94	0.96	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.49	1.34	1.66	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
cyclosporine A vs TAC based immunosuppression	0.94	0.83	1.08	0.38
else vs TAC based immunosuppression	0.97	0.81	1.16	0.74
diabetic nephropathy vs glomerulonephritis	1.62	1.40	1.87	<.001
other renal diagnosis vs glomerulonephritis	1.02	0.91	1.15	0.69
vascular nephropathy vs glomerulonephritis	1.34	1.14	1.57	<.001
living donor vs deceased donor	0.64	0.49	0.82	<.001

Composite outcome

Supplement Table 7

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
preemptive transplantation	0.89	0.71	1.11	0.31
>1 - 2 year	1.03	0.92	1.16	0.58
>2 - 3 years	1.13	1.00	1.28	0.06
>3 - 4 years	1.17	1.02	1.34	0.03
>4 - 5 years	1.25	1.07	1.47	0.005
>5 - 6 years	1.20	0.97	1.48	0.09
> 6 years	1.23	1.02	1.49	0.03
year of transplantation (continuous, per year)	0.96	0.95	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.01	1.01	1.01	<.001
chronic heart disease vs none	1.44	1.31	1.59	<.001
diabetic nephropathy vs glomerulonephritis	1.30	1.15	1.47	<.001
other renal diagnosis vs glomerulonephritis	0.99	0.90	1.09	0.84
vascular nephropathy vs glomerulonephritis	1.27	1.11	1.46	<.001
living donor vs deceased donor	0.70	0.59	0.84	<.001
donor age (years, continous)	1.01	1.01	1.02	<.001
Cyclosporine A vs TAC based immunosuppression	1.00	0.90	1.12	1.0
else vs TAC based immunosuppression	1.01	0.87	1.19	0.85

5. Analysis of patients who underwent pre-transplant dialysis, adjusted for dialysis treatment modality

In this additional exploratory subgroup analysis, preemptive transplant recipients were excluded. All patients who underwent pre-transplant dialysis were included and hazard ratios were additionally adjusted for dialysis treatment modality. Dialysis modality was defined as either hemodialysis or peritoneal dialysis and patients were classified depending on whichever dialysis modality was first delivered. We decided to follow the concept of an intention-to-treat definition, because only 7% of patients in our cohort switched dialysis modality.

Death-censored graft loss

Supplement Table 8

Crude Fine and Gray model with dialysis treatment duration and dialysis modality in the model

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
tertile 2 vs tertile 1	0.95	0.85	1.06	0.38
tertile 3 vs tertile 1	0.87	0.77	0.97	0.01
peritoneal dialysis vs hemodialysis	0.80	0.68	0.93	0.003

Supplement Table 9

Multivariable Fine and Gray model, variables selection based on clinical judgment

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
tertile 2 vs tertile 1	0.99	0.87	1.13	0.89
tertile 3 vs tertile 1	0.87	0.76	1.00	0.05
peritoneal dialysis vs hemodialysis	0.83	0.69	0.98	0.03
year of transplantation (continuous, per year)	0.98	0.96	0.99	<.001
age at first renal replacement therapy (years, continuous)	0.98	0.98	0.99	<.001
diabetes vs none	1.00	0.78	1.29	1.00
hypertension vs none	0.98	0.86	1.12	0.78
chronic heart disease vs none	1.16	1.01	1.35	0.04
diabetic nephropathy vs glomerulonephritis	0.89	0.70	1.12	0.31
other primary renal diagnosis vs glomerulonephritis	0.88	0.78	1.00	0.04
vascular nephropathy vs glomerulonephritis	1.23	1.02	1.48	0.03
living donor vs deceased donor	0.74	0.59	0.94	0.01

All-cause mortality

Supplement Table 10

Crude Cox model with dialysis treatment duration and dialysis modality in the model

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
tertile 2 vs tertile 1	1.32	1.19	1.45	<.001
tertile 3 vs tertile 1	1.26	1.14	1.39	<.001
peritoneal dialysis vs hemodialysis	0.74	0.64	0.85	<.001

Supplement Table 11

Multivariable Cox model, variables selection based on clinical judgment

Variable	Hazard Ratio	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Pr > ChiSq
tertile 2 vs tertile 1	1.24	1.11	1.39	<.001
tertile 3 vs tertile 1	1.62	1.43	1.83	<.001
peritoneal dialysis vs hemodialysis	0.90	0.77	1.05	0.230
year of transplantation (continuous, per year)	0.95	0.94	0.97	<.001
age at first renal replacement therapy (years, continuous)	1.05	1.05	1.06	<.001
chronic heart disease vs none	1.49	1.33	1.66	<.001
donor age (years, continous)	1.01	1.01	1.01	<.001
Cyclosporine A vs TAC based immunosuppression	0.91	0.80	1.04	0.17
else vs TAC based immunosuppression	0.96	0.80	1.15	0.62
diabetic nephropathy vs glomerulonephritis	1.60	1.39	1.85	<.001
other primary renal diagnosis vs glomerulonephritis	1.00	0.89	1.12	0.95
vascular nephropathy vs glomerulonephritis	1.30	1.10	1.52	0.002
living donor vs deceased donor	0.58	0.44	0.77	<.001

References

1. Kramar, R, Oberbauer, R, Austrian Dialysis and Transplantation Registry (OEDTR), Nephrology, ASo: Annual Report of the Austrian Dialysis and Transplant Registry. 2013.
2. EUROTRANSPLANT: https://www.eurotransplant.org/cms/.