Supplemental Material Table of Contents

Characteristic	pre-KAS (2000-2013) OR (95% CI)	post-KAS (2015-2018) OR (95% CI)	p-value
Race/Ethnicity			
White	reference group	reference group	
Black	0.31 (0.29, 0.33)	0.24 (0.22, 0.26)	**< 0.001**
Hispanic	0.30 (0.27, 0.32)	0.26 (0.24, 0.30)	0.12
Other	0.38 (0.35, 0.42)	0.38 (0.33, 0.44)	0.94
Age at Transplant			
Years+	1.17 (1.15, 1.19)	1.26 (1.23, 1.30)	**< 0.001**
Sex			
Male	reference group	reference group	
Female	1.37 (1.32, 1.43)	1.43 (1.33, 1.53)	0.36
Education Level			
High School or Less	reference group	reference group	
Post-High School Education	1.62 (1.55, 1.70)	1.70 (1.58, 1.82)	0.30
Unknown	1.50 (1.41, 1.60)	2.66 (2.25, 3.13)	**< 0.001**
Primary Payer			
Private	reference group	reference group	
Medicare	0.22 (0.21, 0.23)	0.17 (0.16, 0.18)	**<0.001**
Medicaid	0.45 (0.41, 0.49)	0.37 (0.32, 0.43)	**0.03**
Other/Unknown	0.70 (0.62, 0.80)	0.59 (0.52, 0.68)	0.08
ESKD Etiology			
Glomerulonephritis	reference group	reference group	
Diabetes	0.68 (0.62, 0.75)	0.69 (0.56, 0.85)	0.91
Hypertension	0.67 (0.60, 0.74)	0.59 (0.47, 0.73)	0.29
PCKD	2.01 (1.82, 2.22)	2.19 (1.76, 2.72)	0.47
Other/Unknown	1.35 (1.24, 1.48)	1.75 (1.43, 2.14)	**0.02**
EPTS Score at Transplant			
> 20% or Unknown	reference group	reference group	
≤ 20% (Top 20)	1.51 (1.45, 1.58)	1.44 (1.33, 1.55)	0.22
KDPI Score			
≤ 85%/Unknown	reference group	reference group	
> 85% (High KDPI)	0.79 (0.73, 0.84)	0.68 (0.60, 0.79)	0.07
HLA Mismatch			
Non-Zero MM/Unknown	reference group	reference group	
Zero Mismatch	1.86 (1.76, 1.97)	2.44 (2.12, 2.79)	**<0.001**
PRA Sensitization			
PRA <80%	reference group	reference group	
PRA 80-97%	0.95 (0.87, 1.05)	1.29 (0.73, 2.28)	0.30
PRA 98-100%	0.77 (0.67, 0.90)	0.64 (0.30, 1.39)	0.65
Unknown	3.06 (2.76, 3.40)	1.63 (1.39, 1.91)	**<0.001**
ABO Blood Type			
O	reference group	reference group	
A	1.43 (1.37, 1.50)	1.52 (1.40, 1.64)	0.20
B	1.00 (0.93, 1.07)	1.13 (1.02, 1.27)	0.06
AB	1.79 (1.65, 1.95)	1.93 (1.68, 2.22)	0.36
Diabetes			
No/Unknown	reference group	reference group	
Yes	0.69 (0.66, 0.73)	0.71 (0.66, 0.77)	0.53
Transplant Year			
Additional Year	1.02 (1.01, 1.03)	1.12 (1.08, 1.16)	**<0.001**

Supplemental Table 1: Unadjusted associations with preemptive deceased donor transplantation before and after KAS

p-value is for the interaction term between policy era and the characteristic

+ OR is for a 10-year increase in age

KAS, Kidney Allocation System; OR, odds ratio; CI, confidence interval; HS, high school; ESKD, End Stage Kidney Disease; PCKD, Polycystic Kidney Disease; EPTS, Estimated Post-Transplant Survival; KDPI, Kidney Donor Profile Index; HLA, Human Leukocyte Antigens; MM, mismatch; PRA, Panel Reactive Antibody

Supplemental Table 2: Sensitivity analysis incorporating additional socioeconomic variables: Unadjusted associations with preemptive transplantation - overall*, pre-KAS (2000-2013), and post-KAS (2015-2018)

	Number of DDK Transplants			n (%) preemptive			Unadjusted Odds Ratio (95% CI)			interaction term p-value
	overall	pre-KAS	post-KAS	overall	pre-KAS	post-KAS	overall	pre-KAS	post-KAS	
Medicaid Recipient										
No	112,780	76,742	29,247	12,720 (11%)	8,695 (11%)	3,181 (11%)	reference group			
Yes	44,293	34,411	7337	1,900 (4%)	1,350 (4%)	422 (6%)	0.35 (0.34-0.37)	0.32 (0.30-0.34)	0.50 (0.45-0.56)	< 0.001
Working Status										
Working for Income	31,902	18,829	10,296	4,806 (15%)	3,003 (16%)	1,422 (14%)	reference group			
Not Working - Disability	30,734	19,816	7775	1,458 (5%)	1,104 (6%)	199 (3%)	0.28 (0.26-0.30)	0.31 (0.29-0.33)	0.16 (0.14-0.19)	< 0.001
Not Working - Other	42,706	22,434	17,276	4,478 (10%)	2,267 (10%)	1,816 (11%)	0.66 (0.63-0.69)	0.59 (0.56-0.63)	0.73 (0.68-0.79)	< 0.001
Unknown/Missing	51,731	50,074	1237	3,878 (7%)	3,671 (7%)	166 (13%)	0.46 (0.44-0.48)	0.42 (0.40-0.44)	0.97 (0.81-1.15)	< 0.001

The percentages reported in the table are row percentages - the percent of all DDK transplants in that era that were preemptive.

Abbreviations: DDK, deceased donor kidney; KAS, Kidney Allocation System

* overall includes 2014, pre-KAS and post-KAS exclude 2014

Supplemental Table 3: Sensitivity analysis incorporating additional socioeconomic variables: Adjusted associations with preemptive transplantation pre-KAS (2000-2013) and post-KAS (2015-2018)

	adjusted model*				
	pre-KAS		post-KAS		
Characteristic	OR	95% CI	OR	95% CI	p-value
Medicaid Recipient					
No	reference group		reference group		
Yes	0.66	(0.61, 0.71)	0.92	(0.77, 1.09)	0.86
Working Status					
Working for Income	reference group		reference group		
Not Working - Disability	0.62	(0.57, 0.67)	0.40	(0.34, 0.47)	**< 0.001**
Not Working - Other	0.76	(0.72, 0.82)	0.97	(0.89, 1.06)	**< 0.001**
Unknown/Missing	0.56	(0.52, 0.61)	1.37	(1.10, 1.71)	**< 0.001**
Race/Ethnicity					
White	reference group		reference group		
Black	0.50	(0.47, 0.53)	0.42	(0.38, 0.47)	**< 0.001**
Hispanic	0.47	(0.43, 0.51)	0.41	(0.37, 0.47)	**0.01**
Other	0.44	(0.40, 0.49)	0.45	(0.39, 0.52)	0.94
Age at Transplant					
10-year increase in age	1.64	(1.60, 1.69)	2.03	(1.93, 2.14)	**< 0.001**
Sex					
Male	reference group		reference group		
Female	1.44	(1.38, 1.51)	1.37	(1.27, 1.48)	0.42
Education Level					
High School or Less	reference group		reference group		
Post-High School Education	1.12	(1.07, 1.18)	1.11	(1.02, 1.20)	0.47
Unknown	1.47	(1.37, 1.57)	1.40	(1.14, 1.73)	**< 0.001**
Primary Payer					
Private	reference group		reference group		
Medicare	0.31	(0.29, 0.33)	0.22	(0.20, 0.23)	**< 0.001**
Medicaid	1.12	(0.99, 1.27)	0.79	(0.63, 0.98)	0.19
Other/Unknown	0.88	(0.76, 1.00)	0.65	(0.56, 0.76)	0.07
ESKD Etiology					
Glomerulonephritis	reference group		reference group		
Diabetes	0.63	(0.56, 0.72)	0.54	(0.42, 0.69)	0.97
Hypertension	0.84	(0.75, 0.93)	0.75	(0.59, 0.94)	0.35
PCKD	1.27	(1.14, 1.41)	1.33	(1.05, 1.68)	0.63
Other/Unknown	1.24	(1.12, 1.36)	1.55	(1.25, 1.92)	0.07
EPTS Score at Transplant					
> 20% or Unknown	reference group		reference group		
≤ 20% (Top 20)	3.58	(3.32, 3.85)	4.39	(3.81, 5.05)	**0.005**
KDPI Score					
≤ 85%/Unknown	reference group		reference group		
> 85% (High KDPI)	0.81	(0.75, 0.87)	0.66	(0.57, 0.77)	0.22
HLA Mismatch					
Non-Zero MM/Unknown	reference group		reference group		
Zero Mismatch	1.44	(1.35, 1.53)	1.53	(1.31, 1.78)	0.43
PRA Sensitization					
PRA <80%	reference group		reference group		
PRA 80-97%	0.85	(0.77, 0.94)	1.06	(0.56, 2.01)	0.56
PRA 98-100%	0.75	(0.64, 0.87)	0.51	(0.23, 1.16)	0.39
Unknown	2.22	(1.98, 2.49)	1.17	(0.98, 1.39)	**< 0.001**
ABO Blood Type					
O	reference group		reference group		
A	1.20	(1.14, 1.26)	1.16	(1.07, 1.27)	0.91
B	1.11	(1.03, 1.20)	1.20	(1.06, 1.35)	0.35
AB	1.60	(1.46, 1.74)	1.48	(1.27, 1.73)	0.52
Diabetes					
No/Unknown	reference group		reference group		
Yes	1.43	(1.32, 1.56)	1.65	(1.45, 1.89)	0.78
Year of Transplant					
Additional Year	1.00	(1.00, 1.01)	1.01	(0.97, 1.05)	0.57

* adjusted model includes all predictors in this table   p-value is for the interaction term between policy era and the characteristic

KAS, Kidney Allocation System; OR, odds ratio; CI, confidence interval; HS, high school; ESKD, End Stage Kidney Disease; PCKD, Polycystic Kidney Disease; KDPI, Kidney Donor Profile Index; HLA, Human Leukocyte Antigens; MM, mismatch; PRA, Panel Reactive Antibody

Supplemental Table 4: Unadjusted and adjusted associations with preemptive transplantation among living donor kidney transplant recipients, before and after KAS

Characteristic	unadjusted			adjusted*		
	pre-KAS	post-KAS		pre-KAS	post-KAS	
	OR (95% CI)	OR (95% CI)	p-value	OR (95% CI)	OR (95% CI)	p-value
Race/Ethnicity						
White	reference group	reference group		reference group	reference group	
Black	0.37 (0.36, 0.40)	0.37 (0.33, 0.41)	0.75	0.49 (0.46, 0.52)	0.48 (0.43, 0.54)	0.44
Hispanic	0.38 (0.36, 0.40)	0.42 (0.38, 0.46)	0.076	0.50 (0.47, 0.53)	0.59 (0.53, 0.66)	0.34
Other	0.53 (0.49, 0.57)	0.57 (0.50, 0.64)	0.35	0.56 (0.52, 0.61)	0.63 (0.55, 0.72)	0.49
Age at Transplant						
Years+	1.08 (1.06, 1.09)	1.12 (1.09, 1.14)	**0.002**	1.14 (1.12, 1.15)	1.28 (1.24, 1.32)	**< 0.001**
Sex						
Male	reference group	reference group		reference group	reference group	
Female	1.12 (1.09, 1.16)	1.29 (1.21, 1.38)	**< 0.001**	1.20 (1.15, 1.24)	1.31 (1.22, 1.40)	**0.016**
Education Level						
High School or Less	reference group	reference group		reference group	reference group	
Post-High School Education	1.68 (1.62, 1.74)	1.73 (1.61, 1.86)	0.44	1.28 (1.23, 1.33)	1.40 (1.30, 1.52)	0.12
Unknown	1.32 (1.25, 1.39)	1.61 (1.30, 1.99)	0.072	1.27 (1.20, 1.34)	1.43 (1.14, 1.80)	0.11
Primary Payer						
Private	reference group	reference group		reference group	reference group	
Medicare	0.26 (0.25, 0.27)	0.28 (0.26, 0.30)	0.14	0.28 (0.27, 0.29)	0.26 (0.24, 0.28)	0.54
Medicaid	0.48 (0.44, 0.52)	0.54 (0.46, 0.64)	0.20	0.75 (0.69, 0.83)	0.87 (0.74, 1.03)	0.41
Other/Unknown	0.81 (0.72, 0.91)	0.81 (0.71, 0.94)	0.98	0.90 (0.80, 1.01)	0.81 (0.69, 0.94)	0.64
ESKD Etiology						
Glomerulonephritis	reference group	reference group		reference group	reference group	
Diabetes	0.80 (0.74, 0.86)	0.73 (0.61, 0.87)	0.34	0.92 (0.82, 1.02)	0.91 (0.72, 1.16)	0.67
Hypertension	0.75 (0.69, 0.81)	0.87 (0.73, 1.04)	0.13	0.89 (0.82, 0.97)	0.99 (0.82, 1.20)	0.33
PCKD	2.60 (2.40, 2.81)	3.02 (2.53, 3.61)	0.13	1.83 (1.68, 1.98)	2.24 (1.85, 2.71)	**0.049**
Other/Unknown	1.17 (1.09, 1.26)	1.20 (1.02, 1.42)	0.78	1.14 (1.06, 1.22)	1.20 (1.00, 1.43)	0.99
HLA Mismatch						
Non-Zero MM/Unknown	reference group	reference group		reference group	reference group	
Zero Mismatch	1.20 (1.13, 1.26)	1.21 (1.06, 1.38)	0.90	1.21 (1.14, 1.29)	1.20 (1.04, 1.39)	0.91
PRA Sensitization						
PRA <80%	reference group	reference group		reference group	reference group	
PRA 80-97%	0.65 (0.58, 0.74)	0.49 (0.14, 1.74)	0.65	0.63 (0.55, 0.72)	0.64 (0.17, 2.47)	0.96
PRA 98-100%	0.45 (0.36, 0.55)	0.32 (0.04, 2.70)	0.77	0.48 (0.38, 0.60)	0.27 (0.03, 2.51)	0.58
Unknown	1.37 (1.26, 1.49)	1.13 (0.97, 1.32)	**0.033**	1.17 (1.07, 1.28)	1.07 (0.90, 1.27)	0.12
ABO Blood Type						
O	reference group	reference group		reference group	reference group	
A	1.21 (1.17, 1.25)	1.17 (1.09, 1.26)	0.40	1.09 (1.05, 1.13)	1.09 (1.01, 1.18)	0.81
B	0.96 (0.91, 1.01)	0.93 (0.85, 1.03)	0.70	1.02 (0.97, 1.08)	1.00 (0.89, 1.11)	0.68
AB	1.29 (1.18, 1.40)	1.15 (0.97, 1.35)	0.21	1.25 (1.14, 1.37)	1.10 (0.92, 1.31)	0.18
Diabetes						
No	reference group	reference group		reference group	reference group	
Yes	0.67 (0.65, 0.70)	0.57 (0.53, 0.61)	**< 0.001**	0.84 (0.78, 0.91)	0.77 (0.66, 0.91)	**0.039**
Year of Transplant						
Additional Year	1.03 (1.03, 1.04)	1.04 (1.01, 1.08)	0.50	1.04 (1.03, 1.04)	1.02 (0.98, 1.05)	0.24

The Living Donor cohort used for this analysis included 70,082 transplants (21,969 preemptive) occurring pre-KAS (2000-2013) and 16,446 transplants (6,042 preemptive) occurring post-KAS (2015-2018). Inclusion/exclusion criteria were the same as presented in Figure 1, except replacing Deceased Donor with Living Donor.

* adjusted model includes all predictors in this table   + OR is for a 10-year increase in age

p-value is for the interaction term between policy era and the characteristic

KAS, Kidney Allocation System; OR, odds ratio; CI, confidence interval; HS, high school; ESKD, End Stage Kidney Disease; PCKD, Polycystic Kidney Disease; KDPI, Kidney Donor Profile Index; HLA, Human Leukocyte Antigens; MM, mismatch; PRA, Panel Reactive Antibody

Supplemental Figure 1: Median waiting time between addition to the waitlist or starting dialysis and receiving a deceased donor kidney transplant
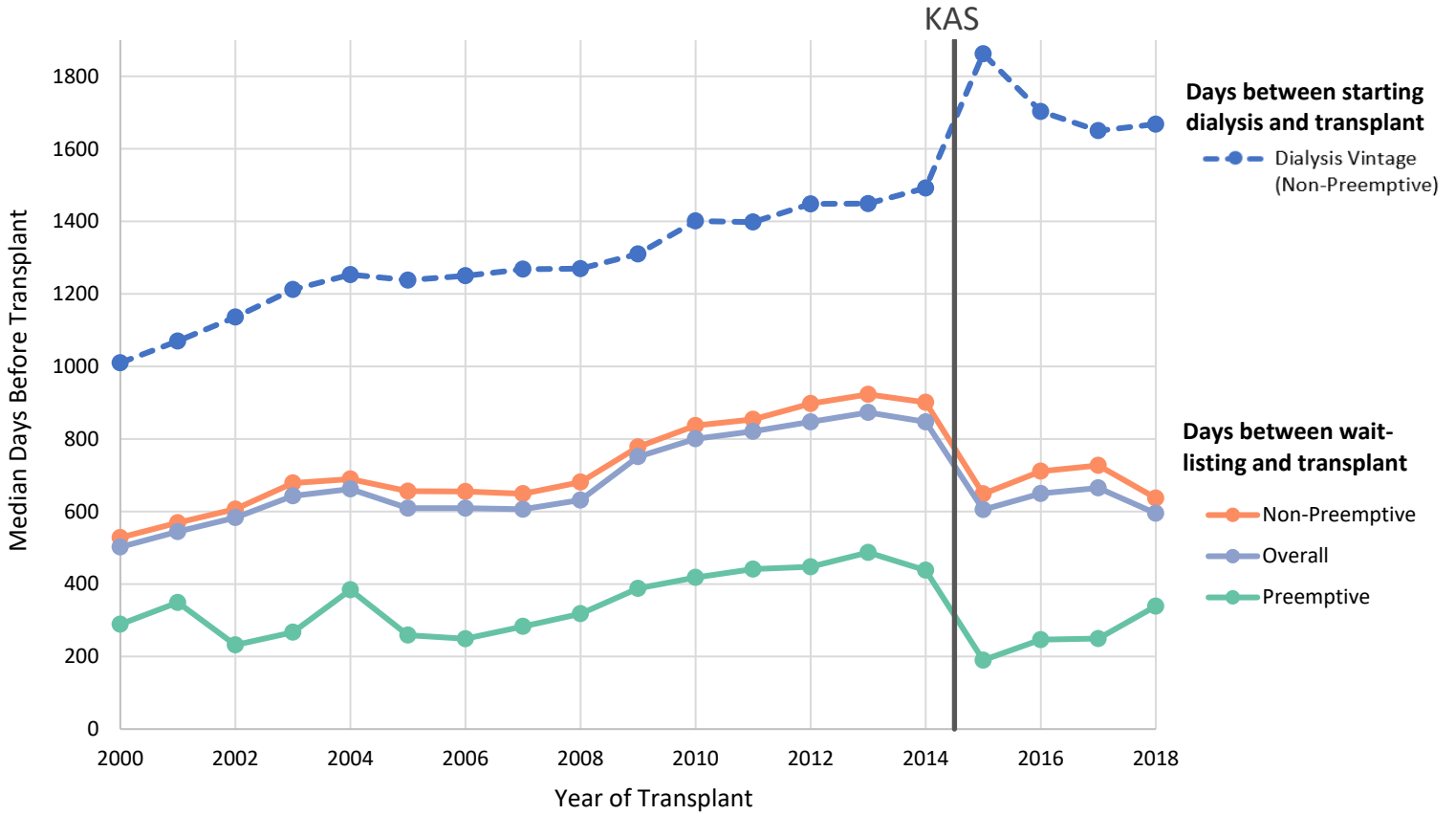
Supplemental Figure 2: Proportion of living and deceased donor kidney transplants occurring preemptively over time, by donor type
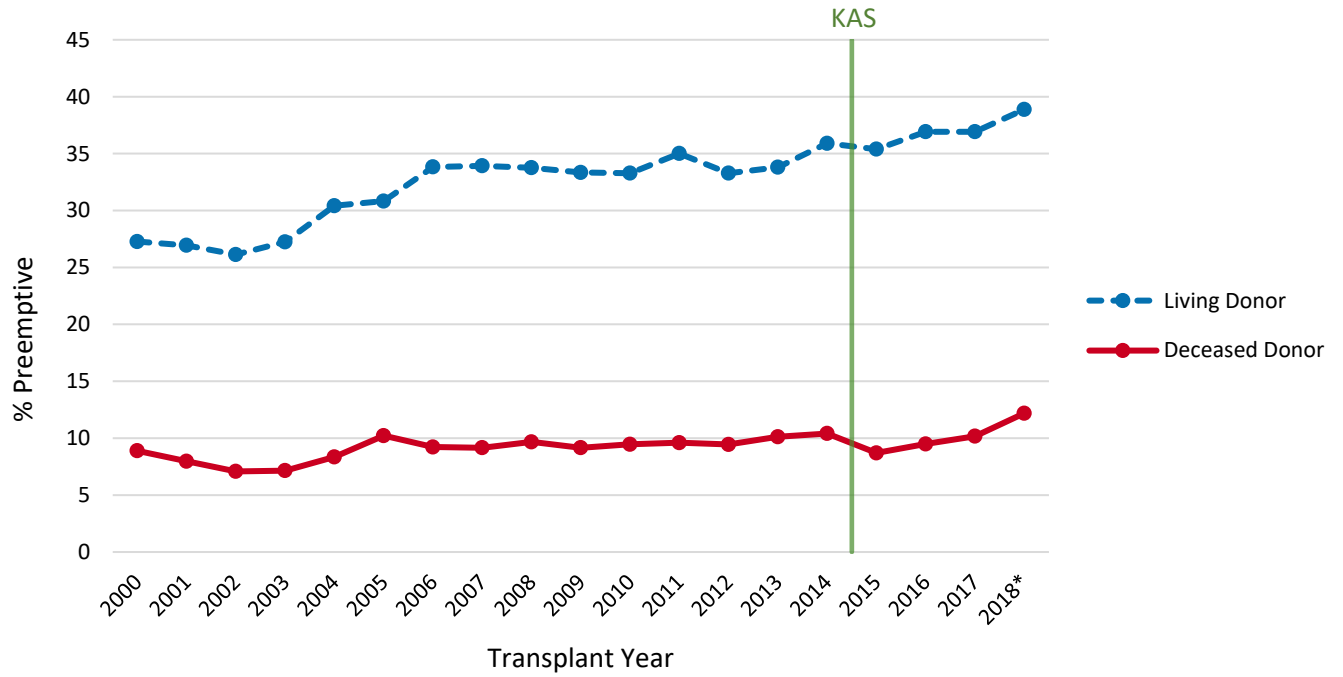
*2018 data only available through 05/31/2018