

# Supplemental Table 1: Characteristics and Demographics of Included Studies

First Author	Year	Study Type	Multi-center vs Single-center	Name of Country or Registry	Inclusion Criteria	Recruitment Time Frame (Years)	Follow-up	Stratified Model	n	n events	Definition of graft loss	Female	Female	Recipient	Recipient	Recipient	Recipient BMI	Donor BMI	Ischemic Time	Acute Rejection	Dialysis pre-transplant	Duration of Dialysis (years) (mean/median)	Deceased donor	Diabetes mellitus	Hypertension	Tacrolimus	Sirolimus	Cyclosporin	Prednisone	Myfortic							
												Recipient	Donor	Race: Black	Race: Caucasian	Race: Other																					
Adekoya	2016	Retrospective	SC	UK	Deceased donor transplants from donors > 60 years old	1969-2009	NR	NA	112	41	RRT, Death Censored	38	59	50.39 (13.72)*	64.71 (4)*	NR	NR	NR	NR	NR	NR	NR	112	45	NR	36	NR	NR	NR	NR	NR						
An	2016	Retrospective	MC	Korea	Recipients <18 years old	1997-2012	6.4 [0 - 17.8]**	NA	2902	286	RRT, nephrectomy, re-transplantation, Death Censored	1190	1239	42 [33 - 51]**	40 [30 - 48]**	NR	NR	NR	22.1 (20.1 - 24.4)**	23.4 (21.2 - 25.6)**	NR	NR	NR	642	NR	481	2441	NR	NR	NR	NR	NR					
Anderson	2015	Retrospective	MC	OPTN/UNOS	Recipients <18 years old with ECD kidneys	1987-2011	NR	NA	25640	11691	NR	NR	NR	57 (48 - 65)**	61 (55 - 65)**	736	13213	1904	26.7 (23.6 - 30.4)**	26.9 (23.8 - 30.8)**	19 (14 - 26)**	NR	20985	NR	25640	25640	8421	NR	16910	NR	NR	NR	NR				
Andreoni	2013	Retrospective	MC	OPTN/UNOS	Recipients <65 years with no transplant history, primary graft from living or standard d-criteria deceased donor	1987-2010	6**	NA	168809	46854	NR, Death Censored	68705	78159	37.7 (12.6)*	34.4 (14)*	40363	95433	33013	NR	NR	NR	NR	0	0	NR	2104	8784	NR	NR	NR	NR	NR					
Andresdottir	2005	Retrospective	MC	Euro-transplant International foundation	Recipients <18 years of age with IgA nephropathy, who received a primary cadaveric renal graft	1990-2002	NR	Immunoglobulin A nephropathy	1207	93	NR, Death Censored	229	506	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Andresdottir	2005	Retrospective	MC	Euro-transplant International foundation	Recipients <18 years of age with IgA nephropathy, who received a primary cadaveric renal graft	1990-2002	NR	Controls	7935	881	NR, Death Censored	4317	3142	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Aderakis	2001	Retrospective	SC	UK	First deceased donor kidney transplants	1990-1997	NR	NA	788	NR	NR, Death Included	254	NR	42.1 (15.5)*	NR	NR	NR	NR	NR	NR	NR	NR	NR	184	NR	NR	NR	NR	NR	NR	NR	NR					
Bay	2013	Retrospective	MC	Denmark	All adult renal transplants	1998-2009	NR	NA	676	97	NR, Death Censored	255	360	42.7 (14.7)*	47.3 (14.8)*	NR	NR	NR	NR	NR	NR	NR	NR	456	NR	86	62	NR	NR	NR	NR	NR					
Boffa	2017	Retrospective	MC	UK	First adult kidney-only transplants	2003 - 2013	NR	NA	11,655	NR	NR, Death Included	NR	NR	NR	NR	807	9087	1761	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR					
Brar	2013	Retrospective	MC	USRDS	First kidney transplant	2004 - 2009	5.04*	NA	80,880	6,855	RRT	31637	NR	48.2**	38.8 (15)*	10127	67188	2777	27.1 (5.7)*	NR	NR	NR	NR	50261	13266	24013	62909	NR	NR	NR	NR	NR					
Cardinal	2005	Retrospective	MC	Canada	Recipients <60 years with first deceased donor kidney transplant	1985 - 2000	6**	NA	256	124	RRT, re-transplant, Death Included	81	NR	63 (61 - 65)**	42 (23 - 51)**	NR	NR	NR	25 (4)*	NR	NR	NR	NR	256	NR	37	NR	NR	40	3	214	252	76				
Carrier	2012	Retrospective	MC	Canada	NR	2003 - 2009	3.5 [2]*	NA	1375	133	RRT, re-transplant, Death Included	715	359	51.3 (12.7)*	48.2 (11.5)*	NR	NR	NR	NR	NR	NR	NR	NR	282	792	NR	NR	NR	NR	NR	NR	NR					
Courtney	2007	Prospective	SC	Ireland	First deceased donor renal transplants	1986 - 2005	8.2**	NA	707	198	RRT, Death Censored	331	352	42 (16.7)**	37 (16.8)*	0	707	0	NR	NR	NR	NR	NR	707	NR	NR	NR	NR	NR	NR	NR	NR					
Diaz	2009	Retrospective	SC	Spain	NR	1980 - 2004	8 (4.6)*	NA	250	65	NR, Death Included	87	NR	47.7 (14.2)**	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	17	NR	58	0	192	250	127					
Dinis	2015	Prospective	SC	Portugal	Non-hyperimmunized recipients (PRA < 80%) submitted to first and single deceased renal transplantations	2006 - 2009	5.2*	NA	236	NR	NR	84	92	49.35 (14)*	46.65 (16.5)*	NR	NR	NR	NR	NR	NR	NR	NR	236	57	NR	NR	NR	NR	NR	NR	NR					
Faravadeh	2013	Retrospective	SC	USA	First adult kidney transplant recipients	1963 - 2012	8.4*	Recipient age > 65	364	NR	NR, Death Censored	136	NR	69.5 (3.5)*	NR	12	328	24	NR	NR	NR	NR	NR	56	NR	2.22	51	NR	NR	101	NR	94	22	273	160	6	
Faravadeh	2013	Retrospective	SC	USA	First adult kidney transplant recipients	1963 - 2012	8.4*	Recipient age 50 - 64	1218	NR	NR, Death Censored	505	NR	57 (4.2)*	NR	49	1095	73	NR	NR	NR	NR	NR	201	NR	2.08	70	NR	NR	369	NR	224	69	810	580	10	
Faravadeh	2013	Retrospective	SC	USA	First adult kidney transplant recipients	1963 - 2012	8.4*	Recipient age < 50	2900	NR	NR, Death Censored	1101	NR	35.4 (8.7)*	NR	119	2630	146	NR	NR	NR	NR	NR	161 (5.97)*	490	NR	1.4	57	NR	NR	691	NR	269	91	1402	1285	12
Ferrer	2009	Retrospective	SC	Portugal	Deceased donor kidney transplant	2005 - 2009	NR	NA	409	46	NR	140	NR	46.4 (10.3)*	44.3 (13.8)*	NR	NR	NR	NR	NR	NR	NR	NR	183 (5.59)*	86	NR	4.4	100	NR	90	NR	NR	NR	NR			
Fuggle	2010	Retrospective	MC	UK	Adult recipients of first live donor kidney transplants	2000 - 2007	3.5**	NA	3144	309	RRT, nephrectomy, Death Censored	1253	1737	39.8 (29.2 - 49.2)**	47.3 (38.6 - 55.3)**	110	2762	278	NR	NR	NR	NR	NR	0	NR	NR	NR	NR	NR	NR	NR	NR	NR				
Grosso	2012	Retrospective	SC	Italy	Adult first kidney alone transplants	2000 - 2010	13.6 (5.2)*	NA	376	52	NR	133	176	48.1 (12.25)*	51.2 (18.1)*	NR	NR	NR	NR	NR	NR	NR	NR	161 (5.97)*	NR	NR	4.2	NR	376	90	NR	NR	NR	NR			
Heldal	2013	Retrospective	MC	Norway	All patients > 70 years of age who received their first single kidney transplant	2000 - 2005	5.1 (0.1 - 9.7)**	NA	160	21	RRT, Death Censored	NR	NR	73.6 (70 - 81.1)**	55.2 (4 - 82)**	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	48	22	NR	NR	NR	NR	148	160	137			
Heldal	2009	Retrospective	SC	Denmark	First kidney transplant	1990 - 2005	NR	Senior (60 - 69)	577	85	RRT, Death Censored	179	260	64.8 (62.4 - 67.4)**	51.7 (1 - 83)**	1 - 83	NR	NR	NR	NR	NR	NR	NR	321	51	NR	NR	NR	NR	NR	NR	NR	NR				
Heldal	2009	Retrospective	SC	Denmark	First kidney transplant	1990 - 2005	NR	Control (45 - 54)	563	98	RRT, Death Censored	197	282	50.2 (47.6 - 52.3)**	47.1 (0 - 80)**	0 - 80	NR	NR	NR	NR	NR	NR	NR	142	538	1.2	NR	304	85	NR	NR	NR	NR	NR			
Heldal	2009	Retrospective	SC	Denmark	First kidney transplant	1990 - 2005	NR	Elderly (70 - 81.5)	354	45	RRT, Death Censored	110	152	73.5 (71.3 - 75.8)**	51.3 (2 - 82)**	2 - 82	NR	NR	NR	NR	NR	NR	NR	404	86	NR	NR	NR	NR	NR	NR	NR	NR				
Huaman	2016	Retrospective	MC	OPTN/UNOS	All adults who underwent first, single organ deceased donor kidney transplantation	2008 - 2013	NR	NA	51048	NR	RRT, re-transplant, Death Included	20239	20585	53.8 (12.9)*	37.4 (16.6)*	7186	NR	NR	28.4 (5.4)*	27.4 (6.8)*	17.7 (17.1)*	2982	NR	3.72	NR	51048	13006	19321	NR	NR	NR	NR	NR				
Ilori	2015	Retrospective	MC	OPTN/UNOS	kidney transplant recipients aged < 60 years	1996 - 2010	4.3 (5.2)****	NA	44,013	6206	NR, Death Censored	16501	NR	65 (7)*	43.2 (16)*	8903	27481	7629	NR	NR	NR	NR	NR	15 (18)****	4486	37848	2.47	9412	30799	NR	NR	NR	NR	NR			
Kayler	2009	Retrospective	MC	USA	All kidney transplant recipients of adult donors	1995-2007	NR	NA	99240	NR	NR	NR	18889	NR	38**	112%	NR	NR	NR	NR	NR	NR	NR	256	NR	NR	NR	NR	NR	NR	NR	NR	NR				
Koo	2015	Retrospective	SC	South Korea	NR	2000 - 2009	NR	NA	709	65	RRT, nephrectomy, re-transplantation, Death Censored	321	317	41.4 (33.2 - 49.4)**	40.5 (31.3 - 47.8)**	NR	NR	NR	22.2 (20 - 25)**	NR	NR	NR	NR	1.1 (0.8 - 2.3)**	198	NR	1.2	NR	153	35	99	NR	367	NR	334	NR	
Kruger	2007	Retrospective	SC	Germany	First renal transplant	1995 - 2006	3.65 (2.61)*	NA	352	NR	NR, Death Censored	112	NR	50.5 (13.8)*	50.3 (15.8)*	NR	NR	NR	NR	NR	NR	NR	NR	124	329	4	NR	272	60	60	336	NR	NR	NR	NR		
Lee	2014	Retrospective	SC	South Korea	First living donor kidney transplantations	2000 - 2011	NR	NA	201	15	NR, Death Censored	75	96	40.02 (10)*	38.5 (10.5)*	NR	NR	NR	22.5 (2.8)*	23.1 (2.9)*	0.9 (0.35)*	NR	121	14.7	NR	0	NR	NR	NR	NR	88	0	113	NR	NR		
Lin	2004	Retrospective	SC	Taiwan	First deceased donor transplants	1981-2000	5.61 (3.98)*	NA	299	162	RRT, Death Included	128	54	35 (10)*	29.5 (11.01)*	NR	NR	NR	NR	NR	NR	NR	NR	78	NR	NR	NR	NR	299	NR	8	118	NR	NR	NR		
Lynch	2009	Retrospective	SC	USA	All adult first kidney only transplants	2003-2008	NR	NR	869	NR	NR	316	NR	50.01**	NR	149	NR	NR	NR	NR	NR	NR	NR	446	NR	299	NR	NR	NR	NR	NR	NR	NR				
Molnar	2012	Retrospective	MC	SRTIR	All kidney transplant recipients	1998 - 2006	3.9 (1.9 - 6.8)**	NA	145470	22876	RRT, re-transplant, Death Censored	57821	NR	47.1 (4.6)*	38.5 (14.4)*	33276	85827	26367	26.7 (5.4)*	NR	NR	NR	NR	12.3 (1.7 - 20.6)**	7306	NR	NR	22516	80084	NR	28853	119869	NR	NR	NR	NR	
Molnar	2013	Retrospective	MC	USA	All kidney transplant recipients who underwent dialysis pre-transplant	2001-2006	6**	NR	8961	785	RRT, re-transplant, Death Censored	3316	NR	48 (13)**	39 (15)*	2420	NR	NR	26.6 (5.7)*	NR	NR	NR	NR	144 (10.6)*	NR	NR	NR	1703	NR	1951	2420	NR	NR	NR	NR		
Moore	2010	Retrospective	SC	UK	All consecutive kidney transplant	1996 - 2006	5.75**	NA	697	301	RRT, re-transplant, Death Censored	262	285	41.6 (16.7)*	36.5 (16.8)*	0	697	0	NR	NR	NR	NR	NR	697	NR	NR	NR	NR	NR	NR	NR	NR	NR				
Namoku	2012	Prospective	SC	Japan	NR	2000 - 2009	NR	NA	564	NR	NR	210	346	40.3 (12.35)*	53.47 (10.85)*	NR	NR	NR	NR	NR	NR	NR	NR	468	5.4	NR	51	NR	NR	NR	NR	NR	NR				
Papalia	2010	Retrospective	SC	Italy	First time, adult, kidney-only transplant recipients	1998-2008	5 (3.88)*	NA	206	NR																											

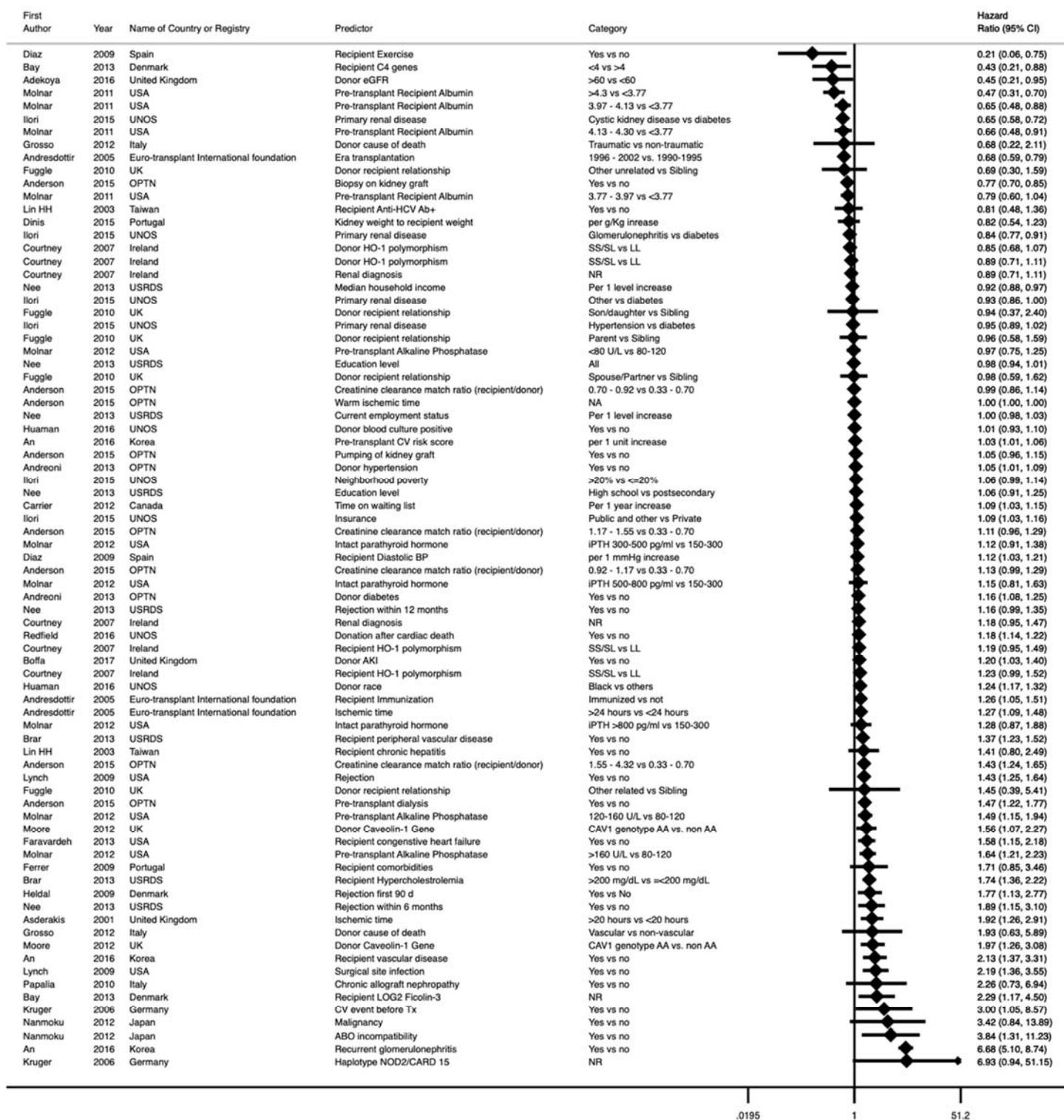
Supplemental Table 2: Risk of Bias of Included Studies

First Author	Year	Study Participation	Study Attrition	Prognostic Factor Measurement	Outcome Measurement	Study Confounding	Statistical Analysis and Reporting	Overall
Adekoya	2016	Low	NR	Moderate	Low	Low	Low	Low
An	2016	Low	NR	Low	Low	Low	Low	Low
Anderson	2015	Low	Low	Moderate	Moderate	Low	Low	High
Andreoni	2013	Low	Low	Low	Moderate	Low	Low	Low
Andresdottir	2005	Low	Low	Moderate	Moderate	High	High	High
Andresdottir	2005	Low	Low	Moderate	Moderate	High	High	High
Asderakis	2001	Low	Moderate	Low	Low	Low	Low	Low
Bay	2013	Low	Low	Low	Moderate	Low	Low	Low
Boffa	2017	Low	Low	Low	Low	Low	High	High
Brar	2013	Moderate	NR	Low	Low	Low	Low	Low
Cardinal	2005	Low	Low	Low	Low	Low	Low	Low
Carrier	2012	High	NR	Low	Low	Low	High	High
Courtney	2007	Low	NR	Low	Low	High	High	High
Diaz	2009	Low	NR	High	Low	Moderate	Low	High
Dinis	2015	Low	NR	Moderate	Moderate	Moderate	Low	High
Faravardeh	2013	Low	NR	Low	Moderate	Low	Low	Low
Faravardeh	2013	Low	NR	Low	Moderate	Low	Low	Low
Faravardeh	2013	Low	NR	Low	Moderate	Low	Low	Low
Ferrer	2009	Moderate	NR	Low	Moderate	Low	High	High
Fuggle	2010	Moderate	NR	Moderate	Low	Low	High	High
Grosso	2012	Low	NR	Low	Moderate	Low	High	High
Heldal	2011	Low	NR	Low	Low	Moderate	High	High
Heldal	2009	Low	NR	Low	Low	Moderate	High	High
Heldal	2009	Low	NR	Low	Low	Moderate	High	High
Heldal	2009	Low	NR	Low	Low	Moderate	High	High
Huaman	2016	Low	NR	Moderate	Low	Moderate	Low	High
Ilori	2015	Low	NR	Low	Moderate	Low	Low	Low
Kayler	2009	Moderate	NR	Moderate	Moderate	Low	Low	High
Koo	2015	Moderate	NR	Moderate	Low	Low	Low	Low
Kruger	2007	Low	NR	Low	High	Moderate	Moderate	High
Lee	2014	Low	NR	Moderate	Low	Low	High	High
Lin	2004	Low	NR	Low	Low	Low	Low	Low

Lynch	2009	Low	NR	Low	Moderate	Low	Moderate	High
Molnar	2012	Moderate	NR	Low	Low	Low	High	High
Molnar	2011	Low	NR	Low	Low	Low	Low	Low
Moore	2010	Low	Low	Low	Moderate	Low	Low	Low
Nanmoku	2012	Low	NR	High	Low	Moderate	Low	High
Papalia	2010	Low	NR	Low	Low	Low	Low	Low
Nee	2013	Low	Low	Low	Low	Low	Low	Low
Redfield	2016	Low	NR	Low	Low	Low	Moderate	Low

NR – not reported

Supplemental Figure 1: List of Predictors Identified by One Individual study



Individual studies reported a greater than 2-fold increase in risk of 1-year graft loss for the following predictors: recipient vascular disease (HR 2.13, 95% CI 1.37 to 3.31), surgical site infection (HR 2.19, 95% CI 1.36 to 3.55), recipient LOG2 Ficolin-3 gene (HR 2.29, 95% CI 1.17 to 4.50), cardiovascular events before transplant (HR 3.00, 95% CI 1.05 to 8.57), Australian aboriginal recipients (HR 3.10, 95% CI 2.24 to 4.28), ABO incompatibility (HR 3.84, 95% CI 1.31 to 11.23), and recurrent glomerulonephritis (HR 6.68, 95% CI 5.10 to 8.74). Similarly, the following prognostic factors were associated with a HR <0.5 for 1-year graft loss: pre-transplant recipient albumin levels (HR 0.47 for >4.3 mg/dL vs <3.77, 95% CI 0.30 to 0.67), donor eGFR (HR 0.45 for >60 mL/min/1.73 m<sup>2</sup> vs <60, 95% CI 0.21 to 0.94), recipient C4 genomic copy number (HR 0.43 for <4 vs ≥4, 95% CI 0.21 to 0.88), and recipient exercise pre-transplant (HR 0.21, 95% CI 0.06 to 0.76).

## Supplemental Material 1: Systematic Search Strategy

All searches executed on February 6, 2017:

Database: Ovid MEDLINE(R) <1946 to January Week 4 2017>  
Search Strategy:

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- 1 [kidney transplantation] (0)
- 2 Kidney Transplantation/ (85861)
- 3 exp kidney/tr (69)
- 4 (kidney? adj2 transplant\*).mp. (90052)
- 5 (kidney? adj2 graft\*).mp. (3806)
- 6 (kidney? adj2 allograft\*).mp. (3248)
- 7 (kidney? adj2 allotransplant\*).mp. (213)
- 8 (kidney? adj2 heterograft\*).mp. (2)
- 9 (kidney? adj2 heterotransplant\*).mp. (1)
- 10 (kidney? adj2 homotransplant\*).mp. (109)
- 11 (kidney? adj2 homograft\*).mp. (47)
- 12 (renal adj2 transplant\*).mp. (40446)
- 13 (renal adj2 graft\*).mp. (3147)
- 14 (renal adj2 allograft\*).mp. (11163)
- 15 (renal adj2 allotransplant\*).mp. (428)
- 16 (renal adj2 heterograft\*).mp. (3)
- 17 (renal adj2 heterotransplant\*).mp. (19)
- 18 (renal adj2 homotransplant\*).mp. (330)
- 19 (renal adj2 homograft\*).mp. (249)
- 20 or/2-19 (96397)
- 21 [graft loss] (0)
- 22 graft rejection/ (54629)
- 23 (graft? adj2 loss\*).mp. (5929)
- 24 (transplant adj2 loss\*).mp. (210)
- 25 or/22-24 (58046)
- 26 20 and 25 (23756)
- 27 [predictors/risk/prognostic factors] (0)
- 28 predict\*.mp. (1089664)
- 29 scor\*.tw. (611522)
- 30 observ\*.mp. (2588936)
- 31 validat\*.mp. (342123)
- 32 exp risk/ (985946)
- 33 risk\*.mp. (1848735)
- 34 exp Cohort Studies/ (1609759)
- 35 between group\*.tw. (83478)
- 36 exp prognosis/ (1318869)
- 37 (prognos\* adj2 factor\*).mp. (72868)
- 38 (prognos\* adj2 value\*).mp. (35580)
- 39 (associat\* adj2 factor\*).mp. (117849)
- 40 (independent adj2 factor\*).mp. (57112)
- 41 (multivariate adj2 factor\*).mp. (3082)
- 42 (multivariable\* adj2 factor\*).mp. (504)
- 43 exp Regression Analysis/ (351660)
- 44 regression\*.mp. (535453)
- 45 (hazard\* adj2 model\*).mp. (73870)
- 46 (cox adj2 model\*).mp. (14261)
- 47 (hazard\* adj2 ratio\*).mp. (65084)
- 48 exp survival analysis/ (229756)
- 49 or/28-48 (6848630)
- 50 26 and 49 (13920)

- 51 animals/ not (animals/ and humans/) (4277235)
- 52 50 not 51 (13507)
- 53 limit 52 to ("all infant (birth to 23 months)" or "all child (0 to 18 years)") (3110)
- 54 limit 52 to "all adult (19 plus years)" (8531)
- 55 52 not 53 (10397)
- 56 54 or 55 (12725)
- 57 limit 56 to yr="2000 -Current" (8622)
- 58 from 57 keep 1-4000 (4000)
- 59 from 57 keep 4001-8622 (4622)
- 60 remove duplicates from 58 (3862)
- 61 remove duplicates from 59 (4620)
- 62 60 or 61 (8482)

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations <February 03, 2017>  
 Search Strategy:

- 
- 1 (kidney? adj2 transplant\*).mp. (3048)
  - 2 (kidney? adj2 graft\*).mp. (199)
  - 3 (kidney? adj2 allograft\*).mp. (212)
  - 4 (kidney? adj2 allotransplant\*).mp. (3)
  - 5 (kidney? adj2 heterograft\*).mp. (0)
  - 6 (kidney? adj2 heterotransplant\*).mp. (2)
  - 7 (kidney? adj2 homotransplant\*).mp. (0)
  - 8 (kidney? adj2 homograft\*).mp. (0)
  - 9 (renal adj2 transplant\*).mp. (2523)
  - 10 (renal adj2 graft\*).mp. (185)
  - 11 (renal adj2 allograft\*).mp. (464)
  - 12 (renal adj2 allotransplant\*).mp. (6)
  - 13 (renal adj2 heterograft\*).mp. (0)
  - 14 (renal adj2 heterotransplant\*).mp. (0)
  - 15 (renal adj2 homotransplant\*).mp. (0)
  - 16 (renal adj2 homograft\*).mp. (1)
  - 17 (graft? adj2 loss\*).mp. (517)
  - 18 (transplant adj2 loss\*).mp. (20)
  - 19 or/1-16 (4867)
  - 20 17 or 18 (535)
  - 21 19 and 20 (337)
  - 22 limit 21 to yr="2000 -Current" (325)

Database: Embase <1974 to 2017 February 03>  
 Search Strategy:

- 
- 1 [kidney transplantation] (0)
  - 2 exp kidney transplantation/ (136804)
  - 3 (kidney? adj2 transplant\*).mp. (127620)
  - 4 (kidney? adj2 graft\*).mp. (52987)
  - 5 (kidney? adj2 allograft\*).mp. (16323)
  - 6 (kidney? adj2 allotransplant\*).mp. (277)
  - 7 (kidney? adj2 heterograft\*).mp. (3)
  - 8 (kidney? adj2 heterotransplant\*).mp. (2)
  - 9 (kidney? adj2 homotransplant\*).mp. (71)
  - 10 (kidney? adj2 homograft\*).mp. (33)
  - 11 (renal adj2 transplant\*).mp. (62067)
  - 12 (renal adj2 graft\*).mp. (6493)
  - 13 (renal adj2 allograft\*).mp. (15758)
  - 14 (renal adj2 allotransplant\*).mp. (503)
  - 15 (renal adj2 heterograft\*).mp. (3)

16 (renal adj2 heterotransplant\*).mp. (12)  
 17 (renal adj2 homotransplant\*).mp. (296)  
 18 (renal adj2 homograft\*).mp. (210)  
 19 or/2-18 (148461)  
 20 [graft loss] (0)  
 21 graft failure/ (30676)  
 22 kidney allograft rejection/ (3283)  
 23 kidney graft rejection/ (14325)  
 24 (graft? adj2 loss\*).mp. (12046)  
 25 (transplant adj2 loss\*).mp. (422)  
 26 or/21-25 (48978)  
 27 19 and 26 (27891)  
 28 [predictors/risk/prognostic factors] (0)  
 29 predict\*.tw. (1566846)  
 30 exp methodology/ (5010109)  
 31 validat\*.tw. (515387)  
 32 risk\*.mp. (3024807)  
 33 exp epidemiology/ (2902080)  
 34 prognosis/ (590179)  
 35 prognostic assessment/ (3012)  
 36 (prognos\* adj2 factor\*).mp. (123954)  
 37 (prognos\* adj2 value\*).mp. (60036)  
 38 (associat\* adj2 factor\*).mp. (185971)  
 39 (independent adj2 factor\*).mp. (96859)  
 40 (multivariate adj2 factor\*).mp. (5218)  
 41 (multivariable\* adj2 factor\*).mp. (937)  
 42 exp regression analysis/ (532262)  
 43 regression\*.mp. (841942)  
 44 (hazard\* adj2 model\*).mp. (123772)  
 45 (cox adj2 model\*).mp. (28915)  
 46 (hazard\* adj2 ratio\*).mp. (113253)  
 47 survival analysis/ (3038)  
 48 (survival adj2 analy\*).mp. (55752)  
 49 or/29-48 (9821988)  
 50 27 and 49 (17324)  
 51 (exp animals/ or exp animal experimentation/ or nonhuman/) not ((exp animals/ or exp animal experimentation/ or nonhuman/) and exp human/) (5926819)  
 52 50 not 51 (17120)  
 53 limit 52 to (embryo <first trimester> or infant <to one year> or child <unspecified age> or preschool child <1 to 6 years> or school child <7 to 12 years> or adolescent <13 to 17 years>) (2277)  
 54 limit 52 to (adult <18 to 64 years> or aged <65+ years>) (8833)  
 55 52 not 53 (14843)  
 56 54 or 55 (16327)  
 57 limit 56 to (book or book series or chapter or conference abstract or conference paper or conference proceeding or "conference review") (5242)  
 58 56 not 57 (11085)  
 59 limit 58 to yr="2000 -Current" (9957)  
 60 from 59 keep 1-5000 (5000)  
 61 from 59 keep 5001-9957 (4957)  
 62 remove duplicates from 60 (4582)  
 63 remove duplicates from 61 (4940)  
 64 62 or 63 (9522)

Database: EBM Reviews - Cochrane Central Register of Controlled Trials <November 2016>  
 Search Strategy:

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1 [kidney transplantation] (0)  
 2 Kidney Transplantation/ (3195)



3 exp kidney/tr (0)  
 4 (kidney? adj2 transplant\*).mp. (6017)  
 5 (kidney? adj2 graft\*).mp. (1489)  
 6 (kidney? adj2 allograft\*).mp. (364)  
 7 (kidney? adj2 allotransplant\*).mp. (5)  
 8 (kidney? adj2 heterograft\*).mp. (0)  
 9 (kidney? adj2 heterotransplant\*).mp. (0)  
 10 (kidney? adj2 homotransplant\*).mp. (2)  
 11 (kidney? adj2 homograft\*).mp. (2)  
 12 (renal adj2 transplant\*).mp. (3780)  
 13 (renal adj2 graft\*).mp. (324)  
 14 (renal adj2 allograft\*).mp. (921)  
 15 (renal adj2 allotransplant\*).mp. (21)  
 16 (renal adj2 heterograft\*).mp. (0)  
 17 (renal adj2 heterotransplant\*).mp. (0)  
 18 (renal adj2 homotransplant\*).mp. (3)  
 19 (renal adj2 homograft\*).mp. (0)  
 20 or/2-19 (6860)  
 21 [graft loss] (0)  
 22 graft rejection/ (2010)  
 23 (graft? adj2 loss\*).mp. (753)  
 24 (transplant adj2 loss\*).mp. (35)  
 25 or/22-24 (2566)  
 26 20 and 25 (1799)  
 27 [predictors/risk/prognostic factors] (0)  
 28 predict\*.mp. (55289)  
 29 scor\*.tw. (117562)  
 30 observ\*.mp. (155803)  
 31 validat\*.mp. (15583)  
 32 exp risk/ (30591)  
 33 risk\*.mp. (116134)  
 34 exp Cohort Studies/ (123483)  
 35 between group\*.tw. (412183)  
 36 exp prognosis/ (118499)  
 37 (prognos\* adj2 factor\*).mp. (4223)  
 38 (prognos\* adj2 value\*).mp. (1824)  
 39 (associat\* adj2 factor\*).mp. (5529)  
 40 (independent adj2 factor\*).mp. (2939)  
 41 (multivariate adj2 factor\*).mp. (412)  
 42 (multivariable\* adj2 factor\*).mp. (62)  
 43 exp Regression Analysis/ (16965)  
 44 regression\*.mp. (33916)  
 45 (hazard\* adj2 model\*).mp. (7152)  
 46 (cox adj2 model\*).mp. (1654)  
 47 (hazard\* adj2 ratio\*).mp. (11573)  
 48 exp survival analysis/ (16426)  
 49 or/28-48 (596513)  
 50 26 and 49 (1578)  
 51 limit 50 to yr="2000 -Current" (1048)

Database: EBM Reviews - Cochrane Database of Systematic Reviews <2005 to February 02, 2017>  
 Search Strategy:

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1 (kidney? adj2 transplant\*).mp. (164)  
 2 (kidney? adj2 graft\*).mp. (20)  
 3 (kidney? adj2 allograft\*).mp. (15)  
 4 (kidney? adj2 allotransplant\*).mp. (0)  
 5 (kidney? adj2 heterograft\*).mp. (0)

- 6 (kidney? adj2 heterotransplant\*).mp. (0)
- 7 (kidney? adj2 homotransplant\*).mp. (0)
- 8 (kidney? adj2 homograft\*).mp. (0)
- 9 (renal adj2 transplant\*).mp. (78)
- 10 (renal adj2 graft\*).mp. (4)
- 11 (renal adj2 allograft\*).mp. (6)
- 12 (renal adj2 allotransplant\*).mp. (0)
- 13 (renal adj2 heterograft\*).mp. (0)
- 14 (renal adj2 heterotransplant\*).mp. (0)
- 15 (renal adj2 homotransplant\*).mp. (1)
- 16 (renal adj2 homograft\*).mp. (0)
- 17 (graft? adj2 loss\*).mp. (61)
- 18 (transplant adj2 loss\*).mp. (6)
- 19 or/1-16 (229)
- 20 17 or 18 (62)
- 21 19 and 20 (43)

PubMed Query	Items found
<p><b>Search</b> (((((((("kidney"[All Fields] OR "kidneys"[All Fields] OR "renal"[All Fields])) AND ("transplant"[Text Word] OR "transplants"[Text Word] OR "transplantation"[Text Word] OR "transplanting"[Text Word] OR "transplanted"[Text Word] OR graft*[Text Word] OR allograft*[Text Word] OR allotransplant*[Text Word] OR heterograft*[Text Word] OR heterotransplant*[Text Word] OR homotransplant*[Text Word] OR homograft*[Text Word]))) AND (((("Graft"[Text Word] OR "grafts"[Text Word] OR "transplant"[Text Word]) AND loss*[Text Word]))) AND (((((((((((predict*[Title/Abstract] OR scor*[Title/Abstract] OR observ*[Title/Abstract] OR "validation"[Title/Abstract] OR "validate"[Title/Abstract] OR risk*[Title/Abstract] OR "cohort"[Title/Abstract]) OR group*[Text Word] OR regression*[Text Word] OR (hazard*[Text Word] AND model*[Text Word]) OR ("cox"[Text Word] AND model*[Text Word]) OR (hazard*[Text Word] AND ratio*[Text Word])) OR (((prognos*[Text Word] OR associat*[Text Word] OR "independent"[Text Word] OR "multivariate"[Text Word] OR multivariable*[Text Word]) AND factor*[Text Word]))) AND ((pubstatusaheadofprint OR publisher[sb] OR pubmednotmedline[sb]))) <b>Filters:</b> Publication date from 2000/01/01 to 2017/12/31</p>	259

## Supplemental Material 2: Details of the Methods

### **Study selection**

Among observational studies of adult ( $\geq 18$  years) kidney recipients receiving their first transplant, we included studies evaluating the association between any prognostic factors and 1-year graft-loss using multivariable analysis (i.e., Cox proportional hazards or logistic regression models). Reasoning that donor age is widely perceived as an important predictor of graft loss, we excluded studies that did not adjust for donor age in their final multivariable model. We also excluded studies with  $< 20$  events in the follow-up period, and those that assessed graft loss beyond the first year if they did not use a time to event analysis that followed the proportional hazard assumption. In order to capture more contemporary transplant cohorts, we excluded studies published before 2000. We did not restrict by language or publication status. If two studies drew their sample from the same population and reported on the same predictors, we included the study with larger sample size. For this reason, due to mandatory reporting from US centres to the United Network of Organ Sharing (UNOS) registry, we only considered US studies using this registry, and excluded US studies from individual centres if the risk factors of interest were reported in the UNOS registry.

Working in pairs, reviewers independently screened titles and abstracts of identified citations and evaluated the full text of articles deemed potentially eligible by either reviewer. We resolved disagreements through discussion or adjudication by a third reviewer.

### **Data abstraction**

Three pairs of independent reviewers, working in duplicate, extracted data from eligible studies. We extracted data related to center(s) at which data were collected, time frame of recruitment, and the definition and number of graft failures. Reviewers recorded the general characteristics of

cohorts from the individual studies: recipient age, sex, body mass index (BMI), race, diabetes, hypertension, duration of time on dialysis, immunosuppressive regiment, delayed graft function, acute rejection, donor age, sex, type (live vs deceased), quality (standard vs extended criteria), ischemic time, and sex mismatch between donor and recipient.

From each eligible study, reviewers abstracted key information about each predictor: the definition, estimate of effect, and confidence interval. We also recorded information about the outcome definitions; for example, whether graft loss was death-censored or not.

### **Data Synthesis**

When studies reported continuous prognostic variables as ordinal variables, if we observed a linear relation between the increasing order and risk of graft loss, we averaged the beta-coefficients across categories to obtain the estimate of effect associated with a unit change for the meta-analysis. If we observed no linear relation, we reported the effect estimate separately for each category. For studies that had stratified the overall cohort into two or more groups and conducted the same regression model separately in each group, we pooled the effect estimates for the predictors to obtain one for the entire cohort. We pooled HR estimates for each predictor through inverse variance analysis using random-effects meta-analysis. If only two studies assessed the same predictor with one much larger than the other, we pooled results using the fixed effect framework.

### **Subgroup hypotheses**

Risk of bias: We hypothesized greater strength of association between the prognostic factor and the outcome of interest for studies classified as high risk of bias compared to low risk of bias.

Definition of outcome: The primary analysis for each predictor in this review pooled those studies reporting on death-censored graft-loss at one year with those studies considering a non-

death-censored graft loss. We postulated that the power of predictor variables may differ depending on which of these two outcomes measures the studies used. Moreover, we postulated that the direction of this difference may vary for donor-related, transplant related or recipient-related risk factors. For donor-specific and transplant-specific factors, we postulated a stronger association with death-censored graft-failure compared to the composite of graft failure and all-cause mortality. For recipient-specific factors, we postulated the opposite: a stronger relation with graft failure combined with all-cause mortality.