

Supplementary appendix

Early requirement for renal replacement therapy in children at presentation in the United Kingdom: association with transplantation and survival

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Table S1: Patient characteristics at baseline of all children and their distribution by late-referral and early referral.

	Late Referrals			Early Referrals	p-value
	<7days	7-<30days	30-<90days	>=90	
Total, N (%)	217 (13.5%)	84 (5.2%)	107 (6.7%)	1,195 (74.5%)	-
Age at presentation, median (IQR)	11.8 (6.7 - 13.9)	10.9 (5.9 - 13.8)	9.2 (2.3 - 13.1)	2.1 (0.1 - 7.6)	<0.001
Age at presentation				N (%)	<0.001
0 - <1 year	13 (6.0)	8 (9.5)	16 (15.0)	485 (40.6)	
1 - 1.9 years	14 (6.5)	4 (4.8)	9 (8.4)	103 (8.6)	
2 - 3.9 years	9 (4.1)	4 (4.8)	11 (10.3)	116 (9.7)	
4 - 7.9 years	25 (11.5)	13 (15.5)	12 (11.2)	215 (18.0)	
8 - 11.9 years	51 (23.5)	22 (26.2)	22 (20.6)	186 (15.6)	
12 - 16 years	105 (48.4)	33 (39.3)	37 (34.6)	90 (7.5)	
Age at Start of RRT, median (IQR)	11.8 (6.7 - 13.9)	10.9 (5.9 - 13.9)	9.3 (2.5 - 13.2)	9.6 (5.0 - 13.2)	0.002
Age at Start of RRT				N (%)	<0.001
3 months - 1.9 years	26 (12.0)	12 (14.3)	24 (22.4)	126 (10.5)	
2 - 3.9 years	10 (4.6)	4 (4.8)	11 (10.3)	127 (10.6)	
4 - 7.9 years	25 (11.5)	13 (15.5)	13 (12.2)	221 (18.5)	
8 - 11.9 years	51 (23.5)	21 (25.0)	22 (20.6)	294 (24.6)	
12 - 16 years	105 (48.4)	34 (40.5)	37 (34.6)	427 (35.7)	
Gender					<0.001
Female	127 (58.5)	49 (58.3)	55 (51.4)	447 (37.4)	
Male	90 (41.5)	35 (41.7)	52 (48.6)	748 (62.6)	
Ethnicity*					0.30
Black	10 (4.6)	5 (6.0)	4 (3.7)	30 (2.5)	
Other	12 (5.5)	4 (4.8)	9 (8.4)	47 (3.9)	
South Asian	34 (15.7)	13 (15.7)	17 (15.9)	203 (17.1)	
White	161 (74.2)	61 (73.5)	77 (72.0)	910 (76.5)	
Time Period at Start of RRT					0.70
1996-2001 (%)	67 (30.9)	31 (36.9)	38 (35.5)	393 (32.9)	
2002-2007 (%)	83 (38.2)	24 (28.6)	32 (29.9)	419 (35.1)	
2008-2012 (%)	67 (30.9)	29 (34.5)	37 (34.6)	383 (32.1)	

Primary Renal Diagnosis**					N/A
Congenital nephrotic syndrome	3 (1.4)	3 (3.6)	8 (7.5)	80 (6.7)	
Drug nephrotoxicity	4 (1.9)	1 (1.2)	4 (3.8)	11 (0.9)	
Glomerular Disease	55 (25.7)	27 (32.5)	37 (34.9)	221 (18.6)	
Malignancy & associated disease	5 (2.3)	0 (0)	4 (3.8)	13 (1.1)	
Metabolic	8 (3.7)	1 (1.2)	1 (0.9)	67 (5.6)	
Obstructive Uropathy	7 (3.3)	2 (2.4)	7 (6.6)	225 (18.9)	
Polycystic kidney disease	2 (0.9)	1 (1.2)	3 (2.8)	39 (3.3)	
Reflux Nephropathy	10 (4.7)	6 (7.2)	5 (4.7)	72 (6.1)	
Renal Dysplasia	37 (17.3)	21 (25.3)	14 (13.2)	332 (27.9)	
Renovascular Disease	7 (3.3)	3 (3.6)	4 (3.8)	33 (2.8)	
Tubulo-interstitial Diseases	38 (17.8)	11 (13.3)	11 (10.4)	74 (6.2)	
Uncertain aetiology	38 (17.8)	7 (8.4)	8 (7.5)	22 (1.9)	
Centre size					0.09
Small	40 (18.4)	9 (10.7)	13 (12.2)	228 (19.1)	
Large	177 (81.6)	75 (89.3)	94 (87.8)	967 (80.9)	

* n=6 missing ethnicity, **n=11 missing PRD

N/A not applicable as test not valid as many cells have expected value <5

Table S2: Adjusted odds ratios of being referred late to a paediatric renal centre by patient specific variables including centre-size as an additional variable.

	Odds Ratio	95% LCL	95% UCL	p-value
Age at presentation				
0 - <1 year	0.21	0.13	0.34	<0.001
1 - 1.9 years	0.60	0.36	1.03	0.60
2 - 3.9 years	0.41	0.24	0.71	0.02
4 - 7.9 years	0.45	0.29	0.68	0.01
8 - 11.9 years	1			
12 – 16 years	3.66	2.51	5.35	<0.001
Gender				
Female	1.71	1.30	2.25	<0.001
Male	1			
Ethnicity				
Black	1.17	0.57	2.37	0.90
Other	1.86	1.01	3.43	0.04
South Asian	0.73	0.50	1.08	0.02
White	1			
Time Period at Start of RRT				
1996-2001	0.96	0.69	1.34	0.97
2002-2007	0.94	0.67	1.30	0.70
2008-2012	1			
Primary Renal Diagnosis				
Congenital nephrotic syndrome	1.47	0.74	2.90	0.80
Drug nephrotoxicity	1.65	0.60	4.56	0.90
Glomerular Disease	1.58	1.10	2.26	0.90
Malignancy & associated disease	3.99	1.53	10.41	0.04
Metabolic	0.75	0.35	1.58	0.02
Obstructive Uropathy	0.53	0.29	0.96	<0.001
Polycystic kidney disease	1.09	0.42	2.87	0.40
Renovascular Disease	2.10	0.96	4.56	0.50
Tubulo-interstitial Diseases	2.38	1.50	3.79	0.06
Uncertain aetiology	5.66	3.05	10.48	<0.001
Renal Dysplasia± Reflux Nephropathy	1			
Centre Size				
Small	0.83	0.58	1.20	0.30
Large	1			

Table S3: Patient characteristics at baseline of all children and their distribution by late-referral and early referral in a smaller sub-group of limited PRDs**

	All Children	Late Referrals	Early Referrals	p-value
Total, N (%)	858	168 (19.6%)	690 (80.4%)	-
Age at presentation, median (IQR)	1.7 (0.1 - 9.1)	12.1 (7.4 - 14.1)	0.6 (0.03 - 5.9)	<0.001
Age at presentation	N (%)	N (%)	N (%)	<0.001
0 - <1 year	386 (45.0)	15 (8.9)	371 (53.8)	
1 - 1.9 years	57 (6.6)	6 (3.6)	51 (7.4)	
2 - 3.9 years	58 (6.8)	10 (6.0)	48 (7.0)	
4 - 7.9 years	112 (13.1)	13 (7.7)	99 (14.3)	
8 - 11.9 years	128 (14.9)	39 (23.2)	89 (12.9)	
12 - 16 years	117 (13.6)	85 (50.6)	32 (4.6)	
Age at Start of RRT, median (IQR)	9.8 (4.7 - 13.2)	12.1 (7.4 - 14.2)	8.9 (4.4 - 12.9)	<0.001
Age at Start of RRT	N (%)	N (%)	N (%)	<0.001
3 months - 1.9 years	110 (12.8)	21 (12.5)	89 (12.9)	
2 - 3.9 years	85 (9.9)	10 (6.0)	75 (10.9)	
4 - 7.9 years	147 (17.1)	13 (7.7)	134 (19.4)	
8 - 11.9 years	204 (23.8)	39 (23.2)	165 (23.9)	
12 - 16 years	312 (36.4)	85 (50.6)	227 (32.9)	
Gender				<0.001
Female	304 (35.4)	89 (53.0)	215 (31.2)	
Male	554 (65.6)	79 (47.0)	475 (68.8)	
Ethnicity*				0.04
Black	23 (2.7)	10 (6.0)	13 (1.9)	
Other	38 (4.4)	7 (4.2)	31 (4.5)	
South Asian	118 (13.8)	22 (13.1)	96 (13.9)	
White	678 (79.1)	129 (76.8)	549 (79.6)	
Time Period at Start of RRT				0.60
1996-2001 (%)	265 (30.9)	56 (33.3)	209 (30.3)	
2002-2007 (%)	303 (35.3)	54 (32.1)	249 (36.1)	
2008-2012 (%)	290 (33.8)	58 (34.5)	232 (33.6)	

Primary Renal Diagnosis				<0.001
Obstructive Uropathy	241 (28.1)	16 (9.5)	225 (32.6)	
Polycystic kidney disease	45 (5.2)	6 (3.6)	39 (5.7)	
Reflux Nephropathy	93 (10.8)	21 (12.5)	72 (10.4)	
Renal Dysplasia	404 (47.1)	72 (42.9)	332 (48.1)	
Uncertain aetiology	75 (8.7)	53 (31.6)	22 (2.3)	
Centre Size				0.20
Small	167 (19.5)	26 (15.5)	141 (20.4)	
Large	691 (80.5)	142 (84.5)	549 (79.6)	

* n=1 missing ethnicity

** Obstructive uropathy, polycystic kidney disease, Reflux nephropaty and Dysplasia, and Uncertain aetiology

Table S4: Adjusted odds ratios of being referred late to a paediatric renal centre by patient specific variables in a smaller sub-group of limited PRDs**

	Odds Ratio	95% LCL	95% UCL	p-value
Age at presentation				
0 - <1 years	0.13	0.06	0.25	<0.001
1 – 1.9 years	0.3	0.11	0.81	0.13
2 - 3.9 years	0.45	0.19	1.06	0.60
4 - 7.9 years	0.29	0.14	0.62	0.03
8 - 11.9 years	1			
12 - 16 years	5.43	2.99	9.89	<0.001
Gender				
Female	1.26	0.79	1.99	0.30
Male	1			
Ethnicity*				
Black	4.19	1.45	12.13	0.01
Other	1.63	0.56	4.70	0.70
South Asian	0.57	0.28	1.13	0.004
White	1			
Time Period at Start of RRT				
1996-2001	1.38	0.80	2.39	0.10
2002-2007	0.86	0.50	1.48	0.20
2008-2012	1			
Primary Renal Diagnosis				
Obstructive Uropathy	0.50	0.26	0.97	<0.001
Polycystic kidney disease	1.43	0.51	4.01	0.99
Uncertain aetiology	5.83	2.98	11.40	<0.001
Renal Dysplasia± Reflux Nephropathy	1			

* n=1 missing ethnicity

** Obstructive uropathy, polycystic kidney disease, Reflux nephropaty and Dysplasia, and Uncertain aetiology