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Secondary Healthcare Utilisation in Children and Young People Following Kidney Transplant: A 10-year Retrospective Analysis

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Abstract

Background: Hospital admissions are common following paediatric kidney transplantation (PKT), yet national data describing patterns of healthcare utilisation and associated factors are limited.

Methods: We conducted a retrospective cohort study using UK Renal Registry data linked to hospital episode statistics for patients aged ≤25 years receiving a first kidney transplant in England and Wales between 2012 and 2022. Secondary healthcare utilisation within the first post-transplant year was assessed, including elective and emergency admissions and inpatient days. Multivariable logistic regression identified factors associated with emergency admission.

Results: Among 2,004 transplant recipients, 92% experienced at least one hospital admission in the first year, including 64% with ≥1 emergency admission. Emergency admissions (n=3,868) exceeded elective admissions (n=1,596) and were associated with longer length of stay. Younger age (OR per year increase 0.94, 95% CI 0.93–0.96) and female sex (OR 1.30, 95% CI 1.07–1.60) were independently associated with emergency admission. Compared with congenital anomalies of the kidney and urinary tract (CAKUT), glomerular disease (OR 0.59, 95% CI 0.45–0.78) and hereditary nephropathies (OR 0.67, 95% CI 0.49–0.92) were associated with lower odds of emergency admission. Infection was the leading cause of admission (592 patients; median 4 months post-transplant). No independent associations were observed for ethnicity, socioeconomic deprivation, donor type, or pre-emptive transplantation.

Conclusions: Hospital utilisation in the first year after PKT remains substantial and is largely driven by emergency presentations, particularly among younger children and those with CAKUT. No independent ethnic or socioeconomic disparities were observed, supporting structured post-transplant care within a universal healthcare system.

Introduction

Paediatric kidney transplantation is considered the optimal treatment for children and young people with kidney failure. While long-term graft and patient survival are well-documented through national registries, there are limited data on healthcare utilisation, particularly within the immediate post-transplant period. Better understanding of healthcare utilisation in this phase may improve counselling of children and families regarding the expected post-transplant journey, identify groups at risk of increased morbidity, and inform service planning and healthcare resource allocation, given the substantial costs associated with early post-transplant care.

Hospital admissions during this period may reflect the complexity of post-operative care, the burden of immunosuppression, and potential complications such as infection or rejection. Several studies have highlighted that infections, especially urinary tract infections (UTIs), are the leading cause of hospitalisation within the first six months post-transplant [1–4]. Younger age [2,3] and higher number of Human Leucocyte Antigen (HLA) mismatches [3] have been associated with increased hospital

admissions. Evidence regarding the impact of the type of primary kidney disease, such as congenital conditions of the kidney and urinary tract, remains inconsistent [2,3,5].

Beyond clinical risk factors, social determinants of health—including ethnicity, socioeconomic status, and language barriers—are recognised as influencing post-transplant outcomes [6–8].

Social determinants of health are recognised to influence healthcare use in the general paediatric population. In high-income countries, studies have identified that children living in more deprived areas are more likely to use emergency services and have longer lengths of hospital stay compared with children from less socioeconomically deprived backgrounds. [9-11]. For Australian children with chronic conditions, those living in more disadvantaged areas were more likely to access public healthcare services and less likely to access services which attract an out-of-pocket fee [12]. A recent systematic review reported over 50% of studies examining ethnic variation in healthcare-use in childhood demonstrated differences in use by ethnicity [13].

For children with kidney disease, there is some evidence that such factors can influence access to kidney failure care and outcomes [6-8], although evidence is currently limited with regards to healthcare utilisation. Based on previous inequalities noted in access to care and outcomes for children with kidney disease, this study aimed to describe the burden of hospital admissions for children in the first year post-transplant period and to understand whether this was associated with demographic or clinical factors, on a national level. Our hypothesis was that, in the National Health Service (NHS), a universal healthcare system with access to specialist post-transplant care, we would observe no differences in rates of elective or emergency hospitalisation by age, sex, ethnicity, or area-level socioeconomic status.

Aims:

This study explored patterns of secondary healthcare utilisation in children and young people during the first year following paediatric kidney transplantation. Specifically, we sought to:

1. **Examine associations** between demographic and socioeconomic factors—including age, sex, ethnicity, and socioeconomic status—and the occurrence of elective and emergency hospital admissions.

2. **Describe and compare** hospital utilisation across groups defined by primary kidney diagnosis, donor type, and pre-emptive versus dialysis-dependent transplantation.

Methods

Study Design and Population

This retrospective observational cohort study utilised data from the UK Renal Registry (UKRR). The cohort included all children and young people aged ≤25 years who received their first kidney transplant

between 1 January 2012 and 31 December 2022, which enabled follow-up over a 1-year period. The study population included patients from England and Wales.

Age was grouped into clinically relevant categories (<5, 5–10, 11–15, and 16–25 years). The wider 16–25-year category reflected the inclusion of young adults within paediatric transplant follow-up and allowed sufficient sample size for analysis.

Data Collection

Demographic variables (including age at transplant, sex, and patient- or family-reported ethnicity (Black, Asian, Mixed, White, Other ethnicity)), transplant-related factors (donor type: living or deceased; and transplant status: pre-emptive or not), primary kidney disease and socioeconomic status (measured using the Index of Multiple Deprivation [IMD] score) were extracted from UKRR data. The IMD is an area-level composite measure of deprivation derived from residential postcode and combines indicators across seven domains [14]. It provides a neighbourhood-level proxy for individual socioeconomic status.

Hospital utilisation was defined as inpatient admissions exceeding 24 hours in duration, categorised as either elective or emergency, occurring within the first year following transplantation. Outcomes included the number of admissions within the first-year post-transplant date and total inpatient days (length of hospital stay, LOS) per patient.

Statistical Analysis

Continuous variables were reported as medians and interquartile ranges (IQR), and categorical variables as frequencies and percentages.

Comparisons across groups were performed using the Kruskal–Wallis test for continuous data and the Chi-square test for categorical data. Multivariable logistic regression was used to identify independent predictors of emergency admission within the first-year post-transplant, adjusting for demographic, clinical, and socioeconomic covariates.

Model assumptions were checked, and statistical significance was defined as $p < 0.05$. Analyses were performed using SASsoftware, version 9.4.

Results

In total, 2,004 children and young people who received a kidney transplant in England and Wales during the study period were included in the analysis. The characteristics of these patients are presented in *Table 1*. Over half of the cohort were aged 16–25 years (55%), reflecting the wider age range represented within this category. The majority were male (63%) and of White ethnicity (71%), and 26% were in the most deprived socioeconomic quintile. A quarter of children and young people had congenital conditions of kidneys and urinary tract (n=514, 26%). Just over half received a living donor transplant (54%), and pre-emptive transplantation accounted for 28% of cases.

The majority of cohort members had an admission to hospital in the first-year post-transplant (n=1,836, 92%). There were 1,282 people who had at least one emergency admission in this period (totalling 3,868 admissions) and 865 who had at least one planned admission (totalling 1,596 admissions).

Hospital Admissions by Demographic Factors

Table 2 highlights LOS and frequency of hospital admission by demographic characteristics for the study cohort. Children aged under 5 years exhibited the highest hospital utilisation in the first year following transplantation. 62% experienced at least one elective admission, compared with 29% among those aged 16–25 years. Emergency admissions showed a similar pattern, with 86% of children under 5 years requiring at least one emergency admission, compared with 56% of those aged 16–25 years. There was an age-related trend, with the proportion of patients experiencing both elective and emergency admissions decreasing with older age.

Females had a higher proportion of emergency admissions in the first-year post-transplant compared with males (67% vs 62%), while elective admission rates were broadly comparable.

Hospital admissions by clinical characteristics

Table 3 and *Table 4* highlight the number of elective and emergency hospital admissions by clinical characteristics for the study cohort, respectively. Overall, there were more emergency than elective admissions in the first-year post-transplantation, with a higher median length of stay for emergency hospitalisations (3 days [IQR 2–6] for emergency admissions vs 2 days [IQR 1–4] for elective admissions).

In both categories, children and young people with congenital urinary tract conditions experienced the highest number of admissions. Similar proportions of children and young people required elective or emergency admission by transplant type and pre-emptive status.

Reason for admission

Supplementary Table 1 summarises the primary diagnoses for emergency and elective admissions by ICD-10 chapter, with disorders of the genitourinary system representing the most frequent category overall, largely driven by infection-related diagnoses, particularly urinary tract infections. More detailed analysis of the three most frequent diagnostic categories for emergency admissions (*Supplementary Table 2*) shows that urinary tract infection was the single most common diagnosis, followed by acute kidney injury and chronic kidney disease-related complications. In addition, a substantial proportion of emergency admissions were coded under symptoms, signs, and abnormal clinical and laboratory findings (R00–R99), including abnormal blood chemistry, abnormal kidney function tests, and fever. These non-specific codes may reflect presentations related to graft dysfunction, infection, or complications of immunosuppression, although the underlying clinical drivers cannot be determined from coding data alone.

Infections accounted for 1,195 admissions overall, comprising 14% of emergency and 2% of elective admissions (Table 5), affecting 592 patients, with a mean of 2 hospital admissions per patient. The median time to first infection-related admission was 4 months (IQR 2–7) following transplantation, with a median length of stay of 4 days (IQR 2–6).

Regression analyses

In univariable logistic regression analyses, younger age (compared to reference 16-25 years), female sex (compared with male), and primary kidney diagnosis were associated with a higher likelihood of emergency hospital admission in the first year following transplantation, with congenital anomalies of the kidney and urinary tract (CAKUT; reference group) demonstrating higher admission rates compared with other diagnostic groups. No associations were observed for ethnicity, socioeconomic deprivation quintile, donor type, or pre-emptive transplantation status. These variables were included in a mutually adjusted multivariable model.

After adjustment, younger age at transplantation, compared with 16–25 year olds, remained associated with a higher likelihood of emergency admission (adjusted odds ratio [aOR] per year increase 0.94, 95% CI 0.93–0.96; p<0.001), and female sex was associated with higher odds compared with males (aOR 1.30, 95% CI 1.07–1.60; p=0.01). Figure 1 illustrates the adjusted odds ratios from the multivariable logistic regression model.

Primary kidney diagnosis also remained associated with odds of emergency admission. Compared with congenital conditions of the kidney and urinary tract, patients with familial/hereditary nephropathies (aOR 0.67, 95% CI 0.49–0.92) and glomerular disease (aOR 0.59, 95% CI 0.45–0.78) had lower odds of emergency admission. Associations observed in univariable analyses for other diagnostic categories did not persist after adjustment.

Transplant-related factors were not associated with emergency admission risk; neither donor type nor dialysis use prior to transplantation showed evidence of association, with confidence intervals consistent with chance.

Discussion

This study provides a large, national analysis of secondary healthcare utilisation among children and young people in the first year following paediatric kidney transplantation in England and Wales. Hospital admission during this period was common, with over 90% of patients experiencing at least one admission in the first year following transplantation. Emergency admissions occurred more frequently than elective admissions. Younger age at transplantation, female sex (compared to male), and congenital conditions of the kidney and urinary tract (CAKUT) (compared to other kidney disease) were associated with a higher likelihood of emergency admission. In contrast, no difference was noted by ethnicity, socioeconomic deprivation, donor type, and pre-emptive transplantation status.

Frequent hospitalisation in the early post-transplant period has been reported across paediatric kidney transplant cohorts internationally. Studies from North America and Europe consistently describe high rehospitalisation rates during the first year after transplantation, with infection and complications related to immunosuppression representing common causes for admission [2, 15–16]. However, the overall burden of hospital utilisation observed in this cohort appears higher than that reported in many international studies, with more than 90% of patients experiencing at least one admission in the first year. This likely reflects differences in healthcare delivery and post-transplant care pathways. Elective admissions for planned procedures, such as ureteric stent removal, may contribute to higher admission rates. In addition, variation in thresholds for hospital admission, access to outpatient review, and models of follow-up care may influence the frequency and duration of emergency admissions across healthcare systems. Registry analyses from North America have reported that more than two-thirds of paediatric kidney transplant recipients are hospitalised within the first year, with early hospitalisation associated with poorer kidney function and an increased risk of graft failure [15]. Similar patterns have been observed in European and Canadian cohorts, suggesting that early hospital utilisation reflects the complexity of post-transplant management and the need for intensive monitoring during this period [2, 16]. Our findings therefore align with existing literature in demonstrating a high burden of early post-transplant hospitalisation, while also highlighting potential variation in admission practices between healthcare systems.

In contrast to the wider paediatric population, we did not observe independent associations between ethnicity or socioeconomic deprivation and emergency hospital admission following adjustment. In UK paediatric populations, children from minority ethnic backgrounds and those living in more deprived areas are often reported to have higher rates of emergency healthcare utilisation and longer hospital stays [9, 10]. At a national level, the Marmot Review has highlighted persistent socioeconomic gradients in child health outcomes and healthcare use across England, reflecting the broader influence of social determinants of health [17]. Similar disparities have been described in international cohorts, including studies from the United States, where socioeconomic disadvantage and ethnicity are associated with increased healthcare utilisation and poorer outcomes [18]. The absence of similar patterns in this post-kidney transplant cohort is reassuring and may reflect the highly structured nature of post-transplant follow-up. Children and young people who undergo kidney transplantation typically have close contact with specialist nephrology teams, with frequent outpatient review and direct access to clinical advice when concerns arise. Within a universal healthcare system such as the National Health Service, this continuity of care and harmonisation of post-transplant management on a national level may reduce variation in access to specialist kidney support during the immediate post-transplant period [19]. Ongoing monitoring of healthcare utilisation remains important to ensure that access to post-transplant services remains equitable across patient groups.

Age at transplantation was associated with emergency admission risk. Younger children were more likely to require emergency hospital care in the first year following transplantation, a finding consistent with previous studies in paediatric kidney transplant populations [2, 20] Several mechanisms may contribute to this association. Younger children may be more susceptible to infection due to immature

immune responses and the effects of immunosuppressive therapy [21, 22]. Clinicians may also have lower thresholds for hospital admission in younger children because of greater physiological vulnerability and the challenges of assessing clinical deterioration in early childhood. It is also possible that parental vigilance and the complexity of managing immunosuppression and infection risk in young children contribute to more cautious patterns of healthcare utilisation. These factors may help explain the higher emergency admission rates observed among younger transplant recipients, although further exploration of potential social and clinician factors influencing this observation is required.

Female sex was also associated with higher odds of emergency hospital admission following adjustment. Sex differences in post-transplant outcomes have been variably reported in the transplant literature [23–25], with effects differing by outcome and age group. One possible explanation relates to differences in infection risk, particularly urinary tract infections, which are more common in females and are a recognised cause of hospital admission following kidney transplantation [26, 27]. Alternatively, differences in healthcare-seeking behaviour or clinical thresholds for investigation may contribute to the observed association [28]. Further work is needed to understand whether sex-related differences in post-transplant complications, infection risk, or care pathways contribute to the increased emergency admission rates observed in female recipients.

Primary kidney disease was also associated with variation in healthcare utilisation. Compared with children transplanted for congenital anomalies of the kidney and urinary tract (CAKUT), those with glomerular disease or hereditary nephropathies had lower odds of emergency hospital admission after adjustment. Previous studies have similarly identified CAKUT and other urological causes of kidney failure as risk factors for increased post-transplant complications and healthcare utilisation compared with other primary kidney diseases [2, 29]. Children with CAKUT often have complex urological anatomy, bladder dysfunction, or a history of recurrent urinary tract infections, which may contribute to greater clinical complexity and the need for closer monitoring after transplantation [30, 31]. In this context, the higher admission rates observed in children with CAKUT may reflect ongoing urological management needs rather than transplant-related complications alone. These findings highlight the importance of close collaboration between paediatric nephrology and urology teams in the care of children with CAKUT following transplantation.

Infection was the most common cause of hospital admission in the first year following paediatric kidney transplantation, consistent with international literature identifying infection—particularly urinary tract and respiratory tract infections—as the leading driver of rehospitalisation [2, 16]. The predominance of urinary tract infection in this cohort aligns with the underlying burden of urological abnormalities and post-transplant vulnerability to infection. Admissions occurred a median of four months following transplantation, suggesting a period of vulnerability beyond the most intensive early monitoring phase. Contemporary immunosuppressive regimens have substantially reduced rates of acute rejection, but this benefit may be accompanied by increased susceptibility to infection, particularly in the early post-transplant period [20]. These findings highlight a pattern that may be helpful for both families and healthcare professionals to recognise, particularly as the frequency of intensive early post-transplant

monitoring reduces. This period may warrant continued vigilance with respect to infection prevention practices and, for patients with underlying urological conditions, careful attention to bladder management. Such awareness may support earlier recognition and management of infection and help reduce avoidable admissions.

Neither dialysis dependence prior to transplantation nor donor type was associated with emergency hospital admission. Although previous studies have reported higher hospitalisation rates among patients requiring dialysis prior to transplantation [4], improvements in peri-transplant care and follow-up protocols may have attenuated these associations over time. Differences in healthcare system organisation and outpatient management may also contribute to variation in hospitalisation patterns between countries [16].

The high frequency of hospital admissions observed in the first post-transplant year also has implications for healthcare resource utilisation. Early post-transplant care involves intensive monitoring, frequent outpatient visits, and management of complications such as infection. Economic analyses suggest that healthcare costs are highest during the first year following kidney transplantation, reflecting the intensity of follow-up and hospital care during this period [32]. However, transplantation becomes increasingly cost-effective over time compared with dialysis, with substantial long-term health and economic benefits [33].

In understanding those at highest risk of hospital admission post-transplantation, we can begin to identify whether certain children may benefit from more intensive monitoring and early outpatient-based intervention to potentially avoid admission. Such strategies are aligned with the ‘Fit for the Future’ NHS 10-year Health Plan for England [34]. These findings will also support clinicians to counsel families preparing for transplantation, enabling them to understand where potential disruptions to family life and employment may occur.

The study includes children and young people from across England and Wales, representing a substantial proportion of the paediatric kidney replacement therapy population. Linkage to national hospital episode datasets (Hospital Episode Statistics in England and Patient Episode Database for Wales) enabled near-complete capture of all inpatient activity, including both elective and emergency admissions, across the National Health Service. This comprehensive data linkage provides a detailed, population-level assessment of real-world healthcare utilisation.

As a retrospective registry-based analysis, this study was limited by the scope of routinely collected UK Renal Registry variables. Information on degree of mismatch, illness severity, outpatient management, adherence to immunosuppressive therapy, and individual centre follow-up practices was not available, limiting adjustment for these factors and introducing the potential for residual confounding. In addition, centre-level differences in admission thresholds or local care pathways could not be explicitly modelled. The prominence of non-specific diagnostic codes highlights the complexity of post-transplant presentations and potential limitations of administrative coding in accurately capturing underlying clinical causes. The study period also spans a decade during which changes in transplant practice and

healthcare delivery—including the COVID-19 pandemic—may have influenced hospital utilisation; however, the relatively small number of transplants performed annually limited the ability to robustly examine temporal variation. Increasing use of harmonised transplant protocols within the United Kingdom may support greater standardisation of post-transplant care in the future.

Hospital admissions in the first year following paediatric kidney transplantation remain common and are predominantly driven by emergency presentations. Younger age, female sex, and primary kidney disease—particularly congenital conditions of the kidney and urinary tract—were associated with higher likelihood of emergency admission, while no differences were observed according to ethnicity or socioeconomic deprivation. These findings will help to counsel families of the clinical burden of the early post-transplant period and may help to identify those at higher risk who may benefit from enhanced surveillance to avoid hospital admission.

Declarations

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Competing Interests

The authors declare that they have no competing interests.

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Tables

Table 1: Characteristics of patients who received kidney transplant between 2012 and 2022, (N= 2004).

Characteristic	n (%)
Age group	
Under 5 years	248 (12.4)
5–10 years	295 (14.7)
11–15 years	357 (17.8)
16–25 years	1,140 (55.1)
Sex	
Male	1,295 (68.8)
Female	744 (31.1)
Missing	1 (0.1)
Ethnicity	
Asian	343 (17.1)
Black	92 (4.6)
Mixed	52 (2.6)
Other	46 (2.3)
White	1,425 (71.1)
Missing	46 (2.3)
Deprivation quintile	
1 (most deprived)	516 (25.8)
2	442 (22.1)
3	395 (19.7)
4	342 (17.0)
5 (least deprived)	301 (15.1)
Missing	8 (0.4)
Primary kidney diagnosis	
CAKUT	514 (25.7)
Tubulointerstitial (non –CAKUT)	19 (1.0)
Glomerular disease	410 (20.1)
Familial or hereditary nephropathies	181 (9.0)

Miscellaneous kidney disorders	185 (9.2)
Systemic diseases affecting the kidney	45 (2.3)
Hypertension	22 (1.1)
Polycystic kidney disease	14 (0.7)
Pyelonephritis	94 (4.7)
Renal vascular disease	3 (0.2)
Diabetes	3 (0.2)
Other	303 (15.1)
Uncertain	111 (5.5)
Missing	100 (5.0)
Type of donor	
Deceased donor	915 (45.7)
Living donor	1,089 (54.3)
Pre-emptive transplant	
No	1,447 (72.2)
Yes	557 (27.8)

Table 2: Hospital utilisation and length of stay in days (LoS) in the first year following kidney transplantation, by demographic characteristics.

	Median LoS for elective admissions (IQR)	% of patients contributing to LoS in the year post transplant	Median LoS for emergency admissions (IQR)	% of patients contributing to LoS in the year post transplant
Age group				
Under 5 years	2 (1-4)	61.7	3 (2-5)	85.5
5-10 years	2 (1-3)	60.7	3 (2-6)	73.9
11-15 years	2 (1-4)	59.7	3 (2-6)	66.4
16+ years	2 (1-4)	29.0	3 (1-5)	55.7
Sex				
Male	2 (1-4)	42.3	3 (2-5)	62.0
Female	2 (1-4)	44.6	3 (2-6)	67.3
Ethnic group				
White	2 (1-4)	42.5	3 (2-5)	62.9
Asian	2 (1-4)	44.0	3 (2-6)	69.7
Black	2 (2-4)	44.6	3 (2-7)	66.3
Mixed	2 (2-3)	53.8	3 (2-7)	61.5
Other	2 (1-3.5)	56.5	3 (1-5)	73.9
Index of Multiple Deprivation				
1 (most deprived)	2 (1-5)	41.5	4 (2-7)	64.9
2	2 (1-3.5)	43.4	3 (2-5)	63.6
3	2 (1-3)	44.8	3 (1-4)	67.1
4	2 (1-4)	42.4	3 (2-5)	62.6
5 (least deprived)	2 (1-3)	44.2	3 (2-5)	61.

LoS, length of stay; IQR, interquartile range

Table 3: Elective admissions by clinical characteristics for the study cohort.

Clinical Characteristic	No. of elective admissions in the 1st year post transplant	Total number of inpatient days in the 1st year post transplant	Median LoS (IQR)	No. of patients contributing to LoS	Total no. of patients
Primary kidney disease					
CAKUT	620	2,325	2 (1-4)	295	514
Tubulointerstitial (non-CAKUT)	10	27	2 (1-3)	4	19
Glomerular disease	304	1,173	2 (2-3)	159	410
Familial/hereditary	215	859	2 (1-5)	110	181
Systemic	42	223	2 (1-4)	24	45
Miscellaneous	154	434	2 (1-3)	91	185
Adult groups (Age 16+)					
Diabetes	1	1	1 (1-1)	1	3
Hypertension	3	15	3 (2-10)	3	22
Polycystic kidney disease	3	49	4 (2-43)	3	14
Pyelonephritis	45	161	2 (1-4)	30	94
Renal vascular disease	2	10	5 (3-7)	2	3
Other	108	587	2 (1-5.5)	74	303
Uncertain	39	140	2 (1-4)	31	111
Missing	50	153	2 (1-3)	38	100
Transplant Type					
Living Donor	878	3,585	2 (1-4)	491	1,089
Deceased Donor	718	2,572	2 (1-4)	374	915
Age at time of transplant					
Under 5 yrs	351	1,382	2 (1-4)	153	248
5-10 yrs	365	1,329	2 (1-3)	179	295
11-15 yrs	395	1,521	2 (1-4)	213	357

16-25 yrs	485	1,925	2 (1-4)	320	1,104
Kidney Replacement Modality Pre-Transplant					
Dialysis	1,213	4,602	2 (1-4)	629	1,447
No Dialysis	383	1,555	2 (1-4)	236	557

LoS, length of stay; IQR, interquartile range. Primary kidney diagnosis categories are based on UK Renal Registry coding and grouped for analysis; tubulointerstitial disease (non-CAKUT) includes non-congenital tubulointerstitial conditions.

Table 4: Emergency admissions by clinical characteristics for the study cohort.

Clinical Characteristic	No. of emergency admissions in the 1st year post transplant	Total number of inpatient days in the 1st year post transplant	Median LoS (IQR)	No. of patients contributing to LoS	Total no. of patients
Primary kidney disease					
CAKUT	1,339	6,609	3 (2-6)	391	514
Tubulointerstitial (non-CAKUT)	37	107	2 (1-3)	13	19
Glomerular disease	700	3,242	3 (2-5)	230	410
Familial/hereditary	397	2,078	3 (2-6)	123	181
Systemic	114	385	3 (1-4)	33	45
Miscellaneous	354	1,425	3 (2-5)	120	185
Adult groups (Age 16+)					
Diabetes	2	19	9.5 (2-17)	2	3
Hypertension	20	91	5 (2-6.5)	15	22
Polycystic kidney disease	14	56	2 (1-5)	5	14
Pyelonephritis	120	655	3 (1-7)	50	94
Renal vascular disease	6	30	3 (2-10)	2	3
Other	441	2,119	3 (1-5)	171	303
Uncertain	147	624	3 (1-5)	68	111
Missing	177	1,042	4 (2-8)	59	100
Transplant Type					
Living Donor	2,192	9,992	3 (2-5)	702	1,089
Deceased Donor	1,676	8,490	3 (2-6)	580	915
Age at time of transplant					
Under 5 yrs	888	4,345	3 (2-5)	212	248
5-10 yrs	758	3,652	3 (2-6)	218	295

11-15 yrs	678	3,454	3 (2-6)	237	357
16-25 yrs	1,544	7,031	3 (1-5)	615	1,104
Kidney Replacement Modality Pre-Transplant					
Dialysis	2,828	13,533	3 (2-5)	937	1,447
No Dialysis	1,040	4,949	3 (2-6)	345	557

LoS, length of stay; IQR, interquartile range. Primary kidney diagnosis categories are based on UK Renal Registry coding and grouped for analysis; tubulointerstitial disease (non-CAKUT) includes non-congenital tubulointerstitial conditions.

Table 5: Infection-related hospital admissions in the first year following paediatric kidney transplantation.

Infection related admissions	**ALL**	**ELECTIVE**	**EMERGENCY**
Number of hospital stays	1,195	78	1,086
Number of patients	592	39	547
Mean number of stays per patient	2	1	2
Median time between transplant and 1st admission (months)	4 (2-7)	4 (2-7)	4 (2-7)
Total days hospital stay	6,164	545	5,435
Median time of hospitalisation (days)	4 (2-6)	5 (3-8)	4 (2-6)

Table 6: Univariable and multivariable logistic regression analyses of factors associated with emergency hospital admission in the first year following kidney transplantation.

Effect	95% Confidence Interval			95% Confidence Interval		
	OR	95% CI		OR	95% CI	
Age at transplant (continuous)	0.93	0.92	0.95	0.94	0.93	0.96
Female versus Male	1.26	1.04	1.53	1.30	1.07	1.60
Asian vs White	1.36	1.05	1.75	1.25	0.96	1.64
Black vs White	1.16	0.74	1.81	1.08	0.68	1.72
Mixed vs White	0.95	0.54	1.67	0.75	0.42	1.36
Other vs White	1.67	0.86	3.26	1.40	0.70	2.82
1 (most deprived) vs 5 (least deprived)	1.14	0.85	1.54	1.09	0.79	1.50
2 vs 5 (least deprived)	1.08	0.80	1.46	1.12	0.81	1.55
3 vs 5 (least deprived)	1.26	0.92	1.72	1.28	0.92	1.78
4 vs 5 (least deprived)	1.03	0.75	1.42	1.01	0.72	1.42
Familial / hereditary nephropathies vs CAKUT	0.66	0.49	0.88	0.67	0.49	0.92
Glomerular disease vs CAKUT	0.48	0.37	0.61	0.59	0.45	0.78
Miscellaneous kidney disorders vs CAKUT	0.63	0.48	0.83	0.76	0.57	1.02
Systemic diseases affecting the kidney vs CAKUT	0.92	0.56	1.53	1.15	0.68	1.96
Tubulointerstitial (non-cakut) vs CAKUT	0.72	0.41	1.26	1.02	0.57	1.81
Missing vs CAKUT	0.50	0.31	0.82	0.65	0.35	1.20
Type of donor: DBD vs Living donor	0.95	0.79	1.15	0.90	0.73	1.11
Type of donor: DCD vs Living donor	0.96	0.64	1.45	1.09	0.71	1.68
Dialysis prior to transplant vs pre-emptive	1.13	0.92	1.38	1.19	0.95	1.49

OR, Odds ratio; CI, Confidence interval; DBD, donation after brain death; DCD, donation after circulatory death

Figures

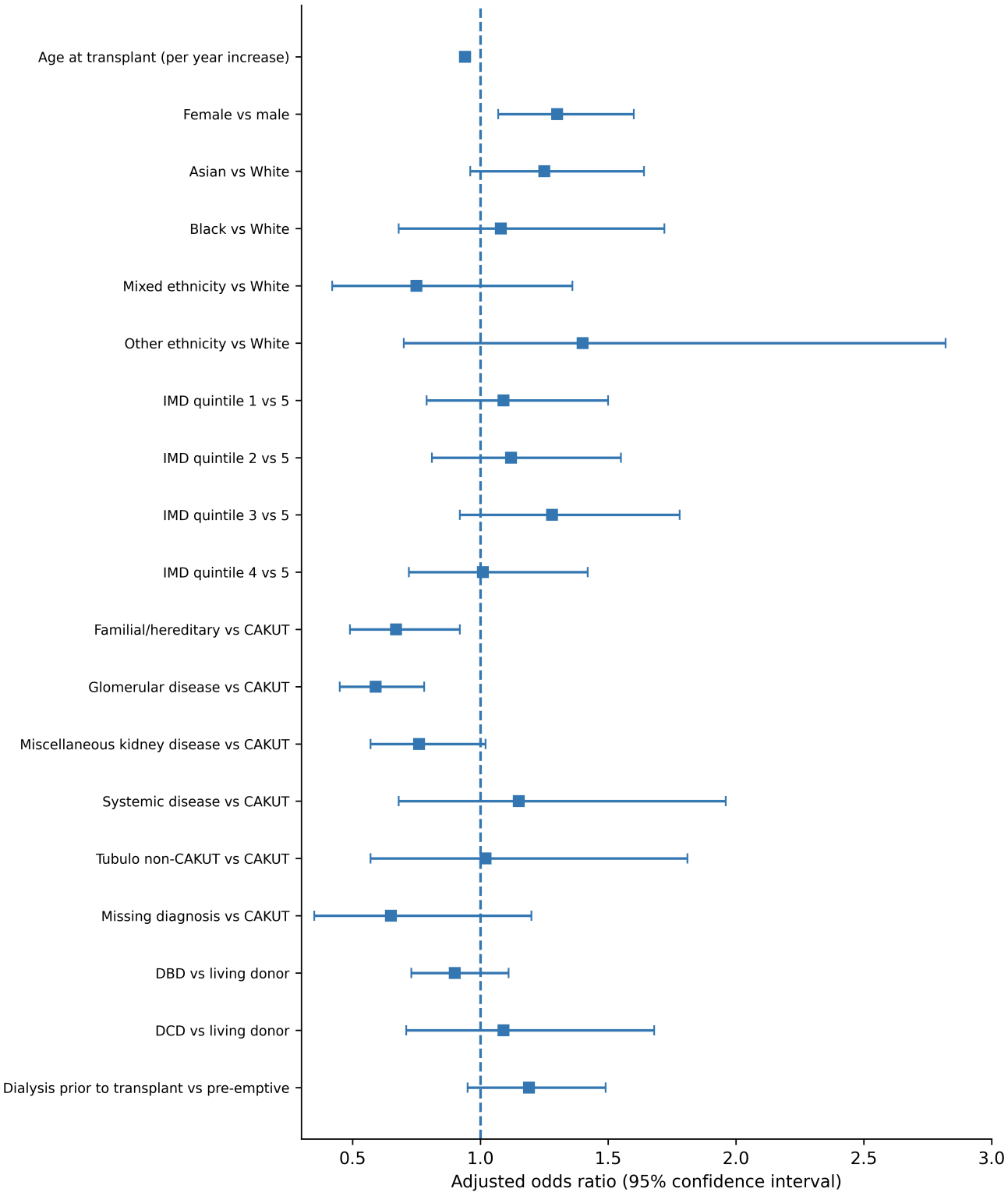


Figure 1

Adjusted odds ratios for emergency hospital admission in the first year following paediatric kidney transplantation.

Points represent odds ratios from the multivariable logistic regression model and horizontal bars indicate 95% confidence intervals. A vertical reference line at odds ratio = 1 represents no association.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementaryinformation.docx
- StrobeChecklist.pdf