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OPTN/SRTR 2013 Annual Data Report:

kidney

ABSTRACT A new kidney allocation system, expected to be implemented in late 2014, will characterize donors on a percent scale (0%-100%) using the kidney donor profile index (KDPI). The 20% of deceased donor kidneys with the greatest expected posttransplant longevity will be allocated first to the 20% of candidates with the best expected posttransplant survival; kidneys that are not accepted will then be offered to remaining 80% of candidates. Waiting time will start at the time of maintenance dialysis initiation (even if before listing) or at the time of listing with an estimated glomerular filtration rate of 20 mL/min/1.73 m² or less. Under the current system, the number of candidates on the waiting list continues to increase, as each year more candidates are added than are removed. Median waiting times for adults increased from 3 years in 2003 to more than 4.5 years in 2009. Donation rates have not increased. Short-term outcomes continue to improve; death-censored graft survival at 90 days posttransplant was 97% or higher for deceased donor transplants and over 99% for living donor transplants. In 2013, 883 pediatric candidates were added to the waiting list; 65.8% of pediatric candidates on the list in 2013 underwent deceased donor transplant. Five-year graft survival was highest for living donor recipients aged younger than 11 years (89%) and lowest for deceased donor recipients aged 11 to 17 years (68%).

KEY WORDS End-stage renal disease, kidney transplant, organ allocation, waiting list.

It is with the utmost respect and gratitude that I reach out to you to say how thankful I am for your selfless and compassionate gift that saved my life. Words cannot express how grateful I am that even as you were experiencing such grief, you thought to save someone else's life. I want you to know that I think of you often. Your gift has changed my life.

JV, kidney recipient

Introduction

This report and the 2014 report will be the last to depict the deceased donor waiting list and waiting times under the current allocation system, which is based on the following three categories of deceased donors: standard criteria (SCD), expanded criteria (ECD), and donation after circulatory death (DCD). Allocation is prioritized using a point system, with points given for waiting time, donor-recipient HLA matching, prior organ donation, and high sensitization (calculated panel-reactive antibodies [CPRA] $\geq 80\%$). Within this system, "trumping" priority is given to patients who are listed for multiple organs or have zero HLA antigen mismatches; in addition, for donors aged younger than 35 years, priority is given to children. Waiting time points begin when a candidate is listed and has a glomerular filtration rate (GFR) or creatinine clearance of 20 mL/min/1.73 m² or less, or has started dialysis. For candidates listed after starting dialysis, waiting time is backdated to the date of dialysis initiation.

When the new system is implemented in December 2014, deceased donors will be characterized on a cumulative percentage scale (0%-100%) using the kidney donor profile index (KDPI) formula. The KDPI includes 10 donor factors (age, height, weight, race/ethnicity, history of hypertension and diabetes, cause of death, serum creatinine level, hepatitis C status, and DCD); lower scores are associated with increased graft longevity. The KDPI will be converted from a raw score to a percentile by mapping the score to the population of all donors with at least one kidney recovered for transplant during the previous calendar year. Thus, a kidney from a donor with a KDPI of 35 (equivalently noted as 0.35) that was recovered in 2014 can be considered to be in the 35th percentile of estimated donor quality relative to all kidneys recovered in 2013. Most current ECDs will be ranked in the 85th percentile or above. An important component of the new system is classification of candidates based on potential life-years gained. The best 20% of deceased donor kidneys (as estimated by KDPI) will be preferentially allocated to the best 20% of candidates (by estimated posttransplant survival). However, "trumping" priority will still be given to candidates awaiting multiple organs, such as liver-kidney and heart-kidney patients (currently, approximately 8% of kidneys are allocated to these candidates; Figure KI 4.3). Also, zero HLA mismatches will still receive high priority in the new system, as will prior living organ donors. More priority will be assigned to the most highly sensitized candidates, those with a CPRA of 98%, 99%, and 100%, who will receive local, regional, and national priority for organ offers, respectively.

In other important changes, under the new system children will receive priority for kidneys with a KDPI of less than 35, points will be given (on a sliding scale) for a CPRA greater

than 19%, and blood type A2 and A2B kidneys will be offered to medically eligible and consented type B candidates. Allocation priority will differ with KDPI ($\leq 20, 21-34, 35-85, > 85$). For KDPI ≤ 20 donors, priority will be, in order, to candidates with a CPRA of 98% or higher, candidates in the top 20% of expected posttransplant survival with zero HLA mismatches, prior living donors, local pediatric candidates, local candidates in the top 20% of expected posttransplant survival, candidates in the bottom 80% of expected posttransplant survival with zero HLA mismatches, and finally remaining candidates in the bottom 80% of expected posttransplant survival. This ordering is similar for the allocation of organs from higher KDPI donors, with the important exception that patients' estimated posttransplant survival is not used for prioritization for the 80% of allocations where the KDPI exceeds 20. Kidneys will also be more widely shared outside the local donor service area (DSA) for highly sensitized candidates. Kidneys with a KDPI greater than 85 will also be more broadly shared, being offered to a combined local/regional list with the intent of more quickly finding a willing acceptor for these often hard-to-place kidneys.

Importantly, waiting time will start at the time of dialysis initiation (even if prior to listing) or time of listing with an estimated GFR (eGFR) of 20 mL/min/1.73 m² or less, whichever occurred earlier. When the system is implemented, patients already listed who had been on dialysis for a long time before listing will immediately receive increased priority. It will be interesting to see the effect of these allocation changes on a) the demographics of deceased donor transplant recipients in the first year of the new system, b) deceased donor graft outcomes, and c) the demographics of living donor transplant recipients.

An important but not widely discussed consideration in calculating KDPI is that it is a relative measure of donor quality based on a regularly updated reference pool of donors, namely, all deceased donors with at least one kidney recovered for transplant during the previous calendar year. If the quality of the donor pool worsens over time, the same kidney donor will have a lower KDPI when the reference population is updated. The OPTN Kidney Transplantation Committee has been tracking the donor distribution since KDPI started being displayed in DonorNet® in March 2012. Although no discernible shifts in the recovered kidney donor population have been observed since that time, this will continue to be monitored closely.

Adult Kidney Transplant

Waiting List

The number of candidates on the waiting list continues to increase, as each year more candidates are added than are re-

moved (Figure KI 1.1). Since 2002, the number of candidates on the waiting list has nearly doubled, from just over 50,000 to more than 96,000 by 2013. Of importance, since 2007, approximately 30% of newly listed patients were listed as inactive. Early listing is to a candidate's advantage under the current system, as waiting time (active or inactive) was awarded points for allocation as long as other criteria (GFR ≤ 20 mL/min/1.73 m² or on dialysis) were met. Of candidates listed as inactive, the workup was incomplete for 73.9%, 8.3% were too sick to undergo transplant at time of listing, and 7.4% had insurance issues (Figure KI 1.2). When the new system is implemented, some of these candidates (i.e., all those already on dialysis) may not be listed until they can be listed as active, as being added to the list is no longer needed to accumulate waiting time points.

In the past 10 years, the percentage of the waiting list made up of candidates aged 50 years or older has steadily increased (Figure KI 1.3), as has the percentage of candidates whose primary disease is diabetes. In 2013, nearly 30% of wait-listed patients had been on dialysis for 6 years or more (Figure KI 1.3), including total time on dialysis both before and after being listed. Given that the total number of listed patients was close to 100,000, this represented 30,000 candidates. Of these, approximately 10,000 had been on dialysis for 11 years or more (Figure KI 1.3). Of candidates on the list in 2013, only 16% had a CPRA of 80% or higher (Figure KI 1.3). Therefore, high sensitization alone does not explain the long waiting times. Due to their increase in waiting time points, candidates with years of prelisting dialysis time may be disproportionately more likely to receive a deceased donor kidney in the short term after the new system is implemented. Interestingly, from 2002 to 2013, an increased percentage of candidates had a PRA/CPRA of 0%; this shift is, at least in part, attributable to the switch from PRA to CPRA from 2007 through 2009. At the same time, the percentages of candidates with CPRAs of 1% to less than 20% and 80% to less than 98% have decreased (Figure KI 1.4). Finally, almost 50% of waitlisted candidates were willing to accept an ECD kidney in 2013 (Figure KI 1.3).

In contrast to the 30% of candidates with long dialysis time, only about 14% had been on the waiting list for 5 years or more (Figure KI 1.4). Most candidates on the waiting list were aged 50 years or older (Figure KI 1.3), and waitlisting rates among prevalent dialysis candidates have increased most among those candidates (Figure KI 1.5). Given that dialysis duration will play a prominent role in kidney allocation under the new system, it will be interesting to see if older candidates with long dialysis times become more or less likely to accept kidneys from the highest quantile of KDPI.

Since 2008, the increasing numbers of candidates listed, combined with unchanged transplant rates, have resulted in increased median waiting times from listing to transplant

(from about 3 years in 2003 to more than 4.5 years in 2009). When the calculation was limited to deceased-donor transplants, the estimates increased to 5.5 years in 2003; the median wait-time has not yet been observed for 2009 listings. Of candidates listed in 2010, 50% or more had not yet undergone transplant by the end of 2013. Simultaneously in 2013, more than 7000 candidates were removed from the list because of death or becoming too sick to undergo transplant (Figure KI 1.9). This is despite decreasing mortality rates for candidates of all ages, races, and primary causes of disease (Figure KI 1.13).

Donation

In contrast to the growth of the waiting list, deceased donation rates have not increased in recent years (Figure KI 2.1). Donation rates (Figure KI 2.2) and kidney transplant rates (per 100 waitlist years) (Figure KI 1.7) varied by state and donation service area. New to this year's report is a description of the percentage of kidneys recovered for transplant and not transplanted, by donor type (current system) and by KPDI (new system). Under the current system, about 10% of SCD kidneys were not transplanted. Re-scoring under the incoming system shows fewer of the best 35% of kidneys not being transplanted (fewer than 9% of all kidneys not transplanted), as compared with high KPDI kidneys, of which more than 50% are not transplanted (Figure KI 2.4). However, for all but kidneys with KPDI of 20 or less, rates of kidneys not transplanted have increased over the past 12 years.

Living donation rates have also not increased and in fact have decreased since 2002. This is mainly due to a decrease in living related donation of about 40% since 2002 (Figure KI 3.1). Paired and other unrelated donations have increased since 2007, but not enough to compensate for the decline in living related donation. Rates decreased for all ages (except 65-70 years), both sexes, and all races (Figure KI 3.2). Almost all living donations are performed laparoscopically and, with increasing experience with the laparoscopic procedure, few are converted to open procedures (Figure KI 3.3). Given the importance of understanding the effect of donation on the donor, more complete data on hospitalization and complication rates after donation would be ideal. However, although data are reasonably good at 6 weeks, too much information is missing at 6 and 12 months to allow for meaningful conclusions (Figures KI 3.4 and KI 3.5).

Transplant

The total number of transplants by recipient age is shown in Figure KI 4.2. Over the past decade, the numbers of recipients aged 50 years or older have increased. DCD kidneys accounted for about 15% of kidney transplants for all ages in 2013 (Figure KI 4.5). Figure KI 4.4, which shows the per-

centages of kidney transplants by KDPI, demonstrates that (as noted earlier) one cannot, with precision, compare one year to another.

Other than age and years of renal replacement therapy (RRT), the characteristics of recipients who underwent transplant in 2003 vs. 2013 differed little (Figure KI 4.6). Both preemptive transplants and transplants in recipients with 5 or more years of RRT increased, while all other levels of RRT decreased. As noted above, a larger percentage of transplants was performed in highly sensitized patients in 2013. Medicare was the primary insurer for almost 58% of recipients (Figure KI 4.6).

The major components of immunosuppressive protocols have not changed markedly since 2008 (Figure KI 4.7). Belatacept, recently approved by the US Food and Drug Administration, was not accounted for in this report. Over the years, there has been a steady trend toward use of T-cell depleting antibody, tacrolimus as the calcineurin inhibitor, and mycophenolate rather than a mammalian target of rapamycin inhibitor. Less than 40% of recipients used a steroid-free protocol in 2013.

Short-term transplant outcomes continue to improve. Death-censored graft survival at 90 days posttransplant was 97% or higher for deceased donor transplants and over 99% for living donor transplants (Figure KI 6.1). For both deceased donor and living donor recipients, death-censored graft failure has steadily decreased at 6 months and at 1, 3, 5, and 10 years (Figures KI 6.2 and KI 6.3). For deceased donor recipients, death with function rates at 5 years have changed little since 1991 (Figure KI 6.2) but have increased at 10 years, perhaps due to older patients undergoing transplant. For living donor recipients, death with function rates through 5 years posttransplant have decreased since approximately 2000; however, the 10-year rate has been generally increasing since that time (Figure KI 6.3).

An important consideration for waitlisted candidates will be determining which quantile(s) of deceased donor kidneys to accept. Using the classifications of the current system, 3-year graft survival for ECD kidneys is 75%, and 5-year survival is about 64%. Using the KDPI cuts of the new system, 3-year graft survival for KDPI >0.85 kidneys is 72% and 5-year survival about 58%.

SRTR tracks only a few posttransplant morbidities. However, the data permit interesting observations. First, the risk of a first acute rejection episode is never eliminated. Rates increase most steeply in the first year, and are comparable for living and deceased donor recipients (Figure KI 6.7). The number of later rejections due to low drug levels (physician-reduced doses or recipient nonadherence) is unknown. Second, the prevalence of posttransplant diabetes has decreased since 2004, likely due to adjustments in immunosuppression protocols (Figure KI 6.8). Third, by

years posttransplant, 0.6% of adult recipients have developed posttransplant lymphoproliferative disorder (PTLD). As noted in previous reports, the risk is higher (1.5%) in recipients who are negative for Epstein-Barr virus (EBV). The rate of other posttransplant cancers (per 100,000 patient-years), as reported to 14 state cancer registries, is shown in Figure KI 6.10. Finally, 1-year renal function (eGFR using the Chronic Kidney Disease Epidemiology Collaboration equation) continues to improve. Currently, almost 50% of recipients with functioning grafts at 6 months have an eGFR of 60 mL/min/1.73 m² or higher.

Pediatric Kidney Transplant

Waiting List

In 2013, 883 pediatric candidates were added to the kidney transplant waiting list; almost equal numbers were added as inactive and active status (Figure KI 7.1). The number of prevalent pediatric candidates on the waiting list has been slowly increasing, reaching 1360 as of December 31, 2013; 60% were listed as inactive. The most common reason for inactive status in newly listed candidates was incomplete work-up (59.2%). In contrast, the most common reasons among prevalent listed candidates were: too sick to undergo transplant (24.3%), too well to require transplant (23.8%), and incomplete work-up (19.3%) (Figure KI 7.2). The largest proportion of waitlisted candidates were aged 11 to 17 years (67.6%), followed by those aged 1 to 5 (16.5%) and 6 to 10 years (14.6%) (Figure KI 7.3). From 2003 to 2013, the age distribution has shifted toward a lower proportion of adolescent candidates (49.8% in 2003, 38.2% in 2013) (Figure KI 7.4). Race, sex, and cause of disease have changed little. Fewer candidates would accept an ECD kidney in 2013. The frequency of multi-organ transplant, which occurred in 1.6% of 2013 recipients, was almost unchanged. The leading cause of end-stage kidney disease changed with patient age; structural abnormalities were most common in younger children, while focal segmental glomerulosclerosis and glomerulonephritis were more common in older children (Figure KI 7.5).

Of pediatric candidates removed from the waiting list in 2013, 65.8% received a deceased donor kidney, 25.8% received a living donor kidney, 1.8% died, 1.1% were considered too sick to undergo transplant, and 0.5% were removed from the list because their condition improved (Figure KI 7.6). The rate of deceased donor transplant among pediatric waitlisted candidates was 101.4 per 100 active waitlist years; rates were similar for those aged 6 to 10 and 11 to 17 years (Figure KI 7.8). Transplant rates varied by CPRA, ranging from 175.5 per 100 active waitlist years for candidates with a CPRA of less than 1% to only 6.0 for those with a CPRA of 98% or higher. In contrast to mortality among

candidates waiting for other organs, pretransplant mortality among pediatric candidates waiting for kidney transplant was low: 1.4 per 100 waitlist years in 2012-2013 (Figure [KI 7.9](#)).

Transplant

The number of pediatric kidney transplants peaked in 2005 at 899 and has remained steady at approximately 750 over the past 3 years (Figure [KI 7.10](#)). The number of deceased donor transplants has exceeded the number of living donor transplants since 2006; in 2013 they were 474 and 279, respectively. Almost half of children aged younger than 6 years received a living donor kidney (49.2%), compared with 29.8% of recipients aged 11 to 17 years (Figure [KI 7.11](#)).

The age of deceased donors whose organs are allocated to pediatric transplant recipients has changed over time, guided by changes in clinical practice and in allocation policy. Figure [KI 7.12](#) illustrates the increase in deceased donor organs from donors aged younger than 35 years following implementation of Share 35, from 76.2% in 2001-2005 to 98.3% in 2006-2013.

Characteristics of pediatric kidney transplants have remained similar over the past decade (Figure [KI 7.13](#)). Preemptive transplant increased from 23.0% in 2001-2003 to 32.8% in 2011-2013, and Hispanic recipients increased from 19.8% to 26.2% over the same period.

The number of HLA mismatches was higher among deceased donor recipients than among living donor recipients; 85.1% of deceased donor recipients and 22.2% of living donor recipients had more than 3 HLA mismatches in 2009-2013 (Figure [KI 7.14](#)).

Immunosuppressive Medication Use

Trends in immunosuppressive medications used in children and adolescents were similar to trends for adults. In 2013, interleukin-2 receptor antagonist therapy for induction was used in 36.8% and T-cell depleting agents in 55.7%. The percentage of recipients receiving no induction therapy continued to decline, reaching a low of 10.4% in 2013 (Figure [KI 7.17](#)). In 2013, tacrolimus was used as part of the initial maintenance immunosuppressive medication regimen in 96.5% of pediatric transplant recipients and mycophenolate mofetil in 93.0%. Mammalian target of rapamycin inhibitors were used in 6.5% of 2012 pediatric recipients at 1 year posttransplant. Corticosteroids were used in 65.6% of 2013 pediatric recipients at the time of transplant and the same use was reported at 1 year posttransplant in 2012 pediatric recipients.

Outcomes

Graft survival (survival with a functioning graft) has continued to improve over the past decade. Graft failure estimates

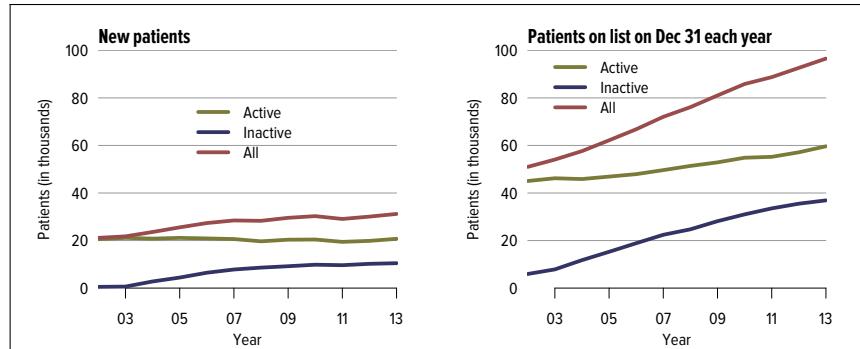
for deceased donor transplants were 2.7% at 6 months and 3.5% at 1 year for transplants in 2012-2013, 11.8% at 3 years for transplants in 2010-2011, 23.8% at 5 years for transplants in 2008-2009, and 49.4% at 10 years for transplants in 2002-2003 (Figure [KI 7.18](#)). Corresponding graft failure estimates for living donor transplants were 3.1% at 6 months and 3.1% at 1 year for transplants in 2012-2013, 6.0% at 3 years for transplants in 2010-2011, 14.6% at 5 years for transplants in 2008-2009, and 32.1% at 10 years for transplants in 2002-2003 (Figure [KI 7.19](#)). Regarding 5-year graft survival by age and donor source, graft survival was highest for living donor recipients aged younger than 11 years (88.7%) and lowest for deceased donor recipients aged 11 to 17 years (67.8%) (Figure [KI 7.20](#)). The rate of late graft failure is traditionally measured by the graft half-life conditional on 1-year survival, defined as the length of time until half of the allografts in the cohort have failed, limited to those that have survived at least 1 year with function. For deceased donor kidneys, the 1-year conditional graft half-life was 11.9 years for transplants in 2011; for living donor kidneys, the 1-year conditional half-life was 15.9 years for transplants in 2011 (Figure [KI 7.21](#)).

The incidence of acute rejection in pediatric patients undergoing kidney transplant in 2006-2011 increased over time posttransplant and varied by recipient age (Figure [KI 7.22](#)). At 1 year posttransplant, the incidence of acute rejection was relatively similar by age, between 10% and 13%. However, at 2 years posttransplant, differences became apparent; acute rejection occurred in 13.9% of recipients aged 0 to 5 years, 15.4% of recipients aged 6 to 10 years, and 21.1% of recipients aged 11 to 17 years.

Short-term renal function, measured by eGFR, improved substantially over the past decade. The proportion of patients with an eGFR of 90 mL/min/1.73 m² or higher at discharge increased from 21.8% in 2002 to 37.5% in 2013; at 6 months posttransplant, from 12.3% to 26.5%; and at 1 year posttransplant, from 10.1% to 25.9% (Figure [KI 7.23](#)). Almost 80% of recipients in the 2012 cohort had chronic kidney disease stage 1-2 at 1 year posttransplant, with an eGFR of 60 mL/min/1.73 m² or higher.

The combination of a donor who was positive for cytomegalovirus and a recipient who was negative occurred in 34.1% of deceased donor transplants and in 29.6% of living donor transplants (Figure [KI 7.15](#)). The highest risk for PTLD is in EBV-negative recipients of EBV-positive donor kidneys; this combination occurred in 36.3% of deceased donor transplants and in 39.5% of living donor transplants in 2009-2013 (Figure [KI 7.15](#)). The incidence of PTLD among EBV-negative recipients was 3.7% at 5 years posttransplant, compared with 0.6% among EBV-positive recipients (Figure [KI 7.16](#)).

waiting list



KI 1.1 Adults waiting for kidney transplant

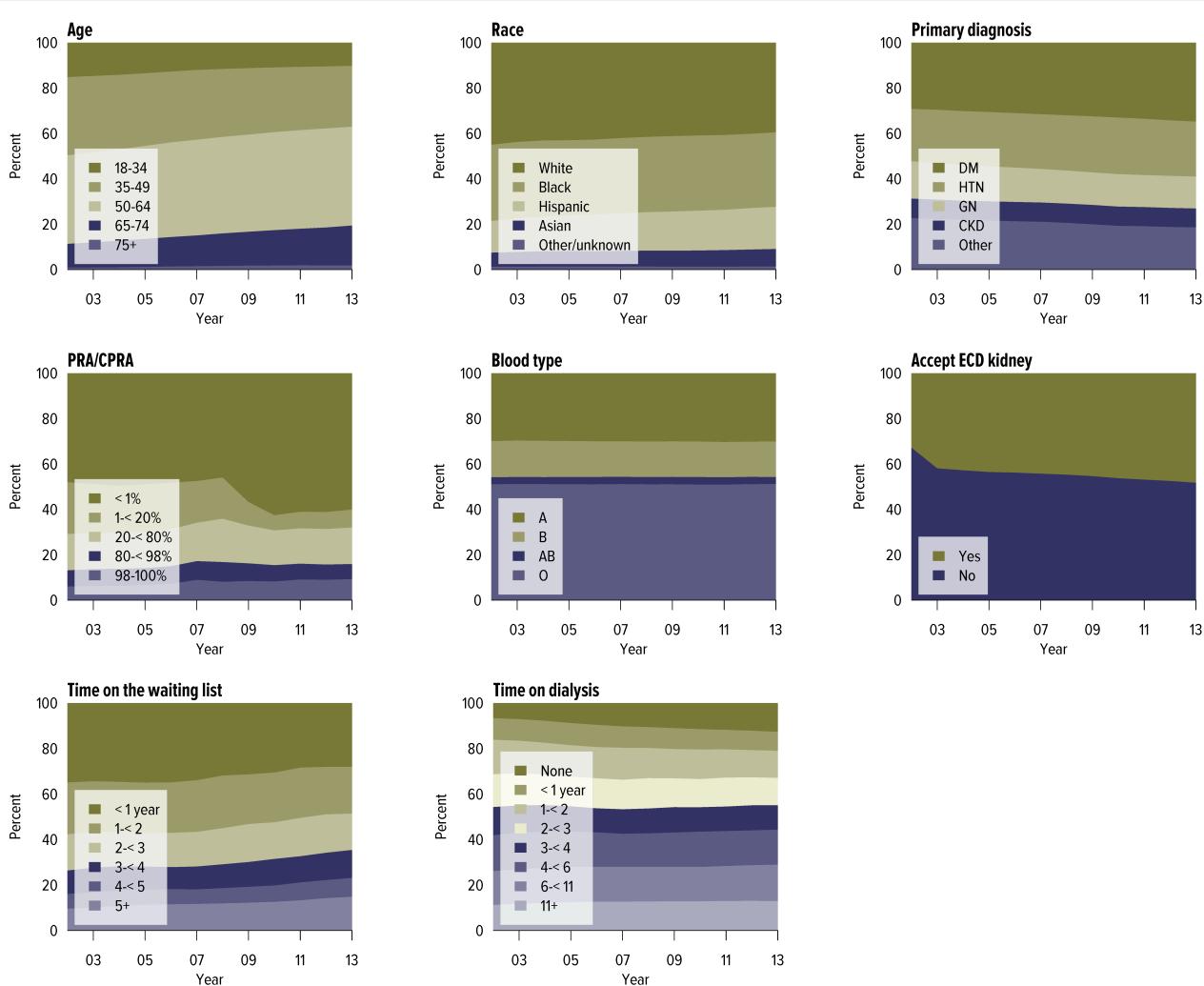
A new patient is one who first joined the list during the given year, without having been listed in a previous year. Previously listed candidates who underwent transplant and subsequently relisted are considered new. Candidates concurrently listed at multiple centers are counted once. Concurrently listed candidates who are active at any program are considered active; those who are inactive at all programs are considered inactive. Active status is determined on day 7 after first listing.

Reasons for inactive status	Inactive 7 days after listing		Active at listing, inactive on Dec 31	
	N	%	N	%
Candidate work-up incomplete	8,992	73.9	5,633	30.1
Too sick	1,015	8.3	6,828	36.4
Insurance issues	897	7.4	1,741	9.3
Weight inappropriate for tx	571	4.7	1,053	5.6
Too well	296	2.4	918	4.9
Candidate choice	182	1.5	1,046	5.6
Transplant pending	71	0.6	60	0.3
Medical non-compliance	67	0.6	621	3.3
Inappropriate substance abuse	47	0.4	233	1.2
Unknown	20	0.2	223	1.2
Candidate could not be contacted	6	0.0	356	1.9
Removal pending data correction	1	0.0	0	0.0
Physician/surgeon unavailable	1	0.0	25	0.1

KI 1.2 Reasons for inactive status among adult kidney transplant listings, 2013

As candidates can be concurrently listed at more than one center and reasons for inactive status may differ, each listing is counted separately.

waiting list



KI 1.3 Distribution of adults waiting for kidney transplant

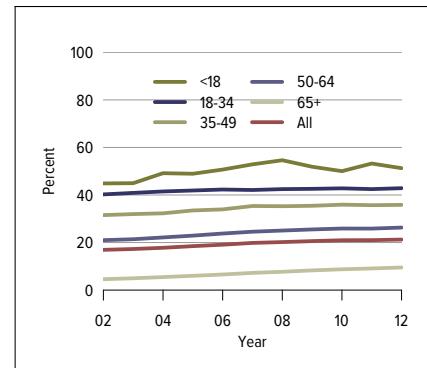
Candidates waiting for transplant any time in the given year. Candidates listed concurrently at multiple centers are counted once. Age is determined at the later of listing date or January 1 of the given year. Time on the waiting list and on dialysis are determined at the earlier of December 31 or removal from the waiting list. PRA is the highest value during the year. Active and inactive candidates are included. CKD, cystic kidney disease; DM, diabetes. HTN, hypertension. GN, glomerulonephritis.

waiting list

	2003		2013	
	N	%	N	%
Age				
18-34	7,325	13.5	9,029	9.3
35-49	17,954	33.2	25,399	26.3
50-64	21,836	40.4	42,064	43.5
65+	6,991	12.9	20,115	20.8
Sex				
Female	23,081	42.7	39,055	40.4
Male	31,025	57.3	57,552	59.6
Race				
White	21,845	40.4	35,833	37.1
Black	19,413	35.9	33,007	34.2
Hispanic	8,327	15.4	18,570	19.2
Asian	3,780	7.0	7,724	8.0
Other/unknown	741	1.4	1,473	1.5
Citizenship				
US citizen	51,285	94.8	88,727	91.8
Non-citizen resident	2,238	4.1	3,787	3.9
Non-citizen non-resident	473	0.9	513	0.5
Other/unknown	110	0.2	3,580	3.7
Primary diagnosis				
Diabetes	15,680	29.0	33,590	34.8
Hypertension	13,294	24.6	23,938	24.8
GN	8,692	16.1	13,576	14.1
CKD	4,502	8.3	7,759	8.0
Other	11,938	22.1	17,744	18.4
Diabetes (any source)	19,496	36.0	43,151	44.7
Kidney tx history				
First transplant	44,664	82.5	82,832	85.7
Retransplant	9,442	17.5	13,775	14.3
Blood type				
A	15,088	27.9	27,874	28.9
B	9,131	16.9	15,549	16.1
AB	1,468	2.7	2,703	2.8
O	28,419	52.5	50,481	52.3
PRA/CPRA				
<1%	26,859	49.6	56,334	58.3
1-20%	11,597	21.4	9,186	9.5
20-80%	7,943	14.7	15,505	16.0
80-98%	4,045	7.5	6,139	6.4
98-100%	3,662	6.8	9,443	9.8
Waiting time				
<1 year	18,313	33.8	27,614	28.6
1-2 years	12,444	23.0	20,782	21.5
2-3 years	8,422	15.6	15,441	16.0
3-4 years	5,774	10.7	11,456	11.9
4-5 years	3,523	6.5	7,677	7.9
5+ years	5,630	10.4	13,637	14.1
Will accept ECD kidney	22,864	42.3	46,477	48.1
Multi-organ				
Kidney alone	51,212	94.7	93,612	96.9
Kidney-pancreas	2,590	4.8	2,030	2.1
Kidney-liver	243	0.4	811	0.8
Kidney-heart	58	0.1	143	0.1
Other	3	0.0	11	0.0
All candidates	54,106	100.0	96,607	100.0

KI 1.4 Characteristics of adults on the kidney transplant waiting list on December 31, 2003, and December 31, 2013

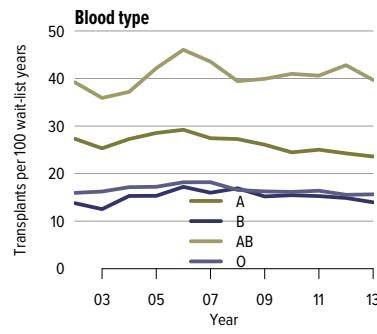
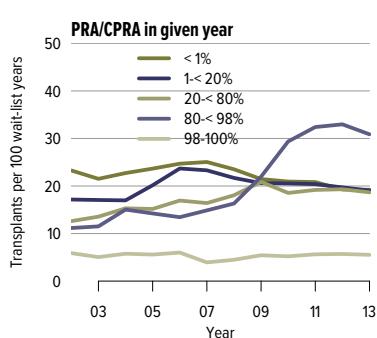
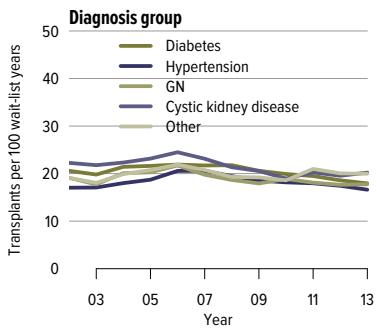
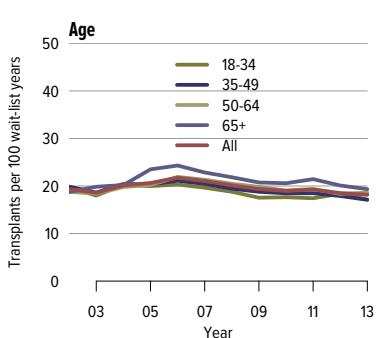
Patients waiting for transplant on December 31, 2003, and December 31, 2013, regardless of first listing date; active/inactive status is on this date, and multiple listings are not counted. CKD, cystic kidney disease; GN, glomerulonephritis.



KI 1.5 Prevalent dialysis patients wait-listed for kidney transplant, by age

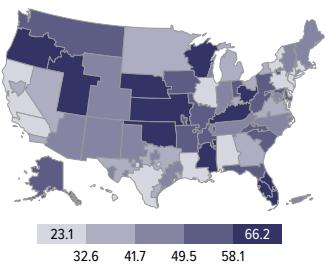
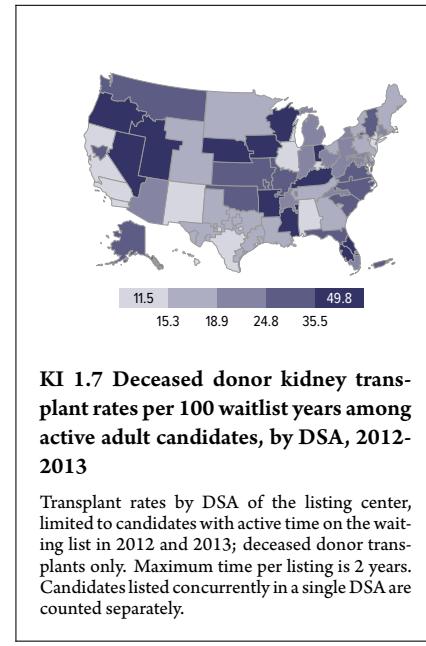
Prevalent dialysis patients, all ages, waitlisted for kidney-alone transplant. Percentage calculated as the sum of waitlist candidates divided by the sum of point prevalent dialysis patients on December 31 of each year (data from the United States Renal Data System).

Waiting list



KI 1.6 Deceased donor kidney transplant rates among active adult waitlist candidates

Transplant rates are computed as the number of deceased donor transplants per 100 patient-years of active waiting in a given year. GN, glomerulonephritis.



KI 1.8 Percentage of adult waitlisted candidates who underwent deceased donor kidney transplant within 5 years, by DSA, 2008

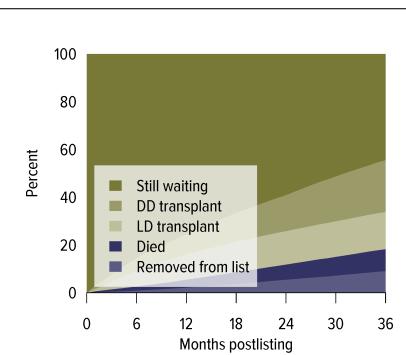
Candidates listed concurrently in a single DSA are counted once in that DSA; candidates listed in multiple DSAs are counted separately per DSA.

	2011	2012	2013
Patients at start of year	85,802	88,698	92,582
Patients added during year	29,372	30,349	31,532
Patients removed during year	26,441	26,425	27,581
Patients at end of year	88,733	92,622	96,533
Removal reason			
Deceased donor transplant	11,195	11,032	11,277
Living donor transplant	5,011	4,935	5,099
Transplant (type unspecified)	49	57	54
Patient died	4,837	4,735	4,722
Patient refused transplant	425	445	458
Improved, tx not needed	146	157	194
Too sick for transplant	2,320	2,525	2,922
Other	2,458	2,539	2,855

KI 1.9 Kidney transplant waitlist activity among adults

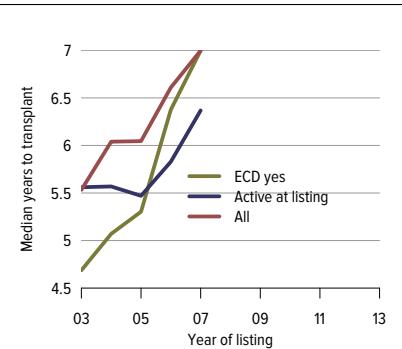
Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. Candidates who are listed, undergo transplant, and are relisted are counted more than once. Candidates are not considered to be on the list on the day they are removed; counts on January 1 may differ from counts on December 31 of the prior year. Candidates listed for multi-organ transplants are included.

waiting list



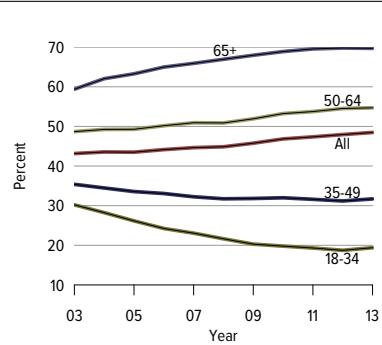
KI 1.10 Three-year outcomes for adults waiting for kidney transplant, new listings in 2010

Adults waiting for any kidney transplant and first listed in 2010. Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. DD, deceased donor; LD, living donor.



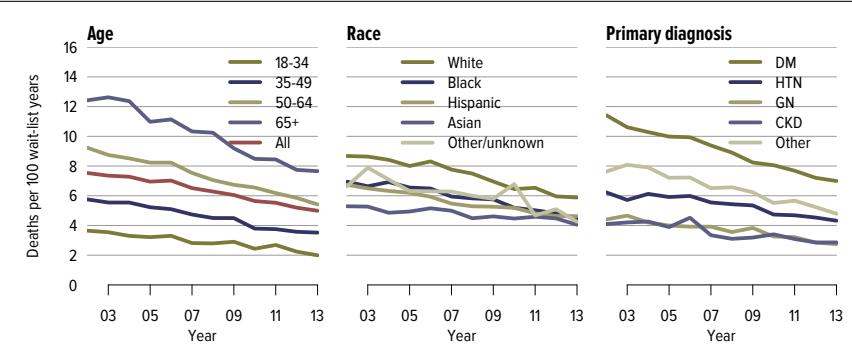
KI 1.11 Median years to deceased donor kidney transplant for waitlisted adults

Observations censored at earliest of December 31, 2013, transfer to another center, or removal from waiting list due to improved condition; otherwise, candidates contribute waiting time until deceased donor transplant. Kaplan-Meier competing risks methods used to estimate time to transplant. Analysis performed per candidate not per listing. If an estimate is not plotted, 50% of the cohort listed in that year had not undergone transplant by the censoring date. Only the first transplant is counted.



KI 1.12 Adults willing to accept an ECD kidney, by age

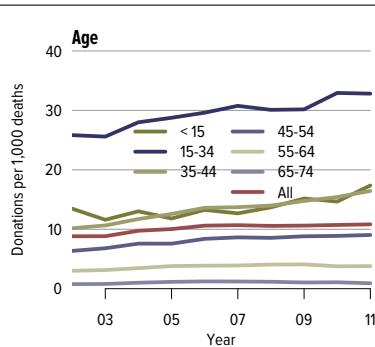
Adults waiting for kidney transplant on December 31, 2003 (start of ECD program), through December 31, 2013. Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. Candidates are considered willing to accept an ECD kidney if so identified in at least one listing.



KI 1.13 Pretransplant mortality rates among adults waitlisted for kidney transplant

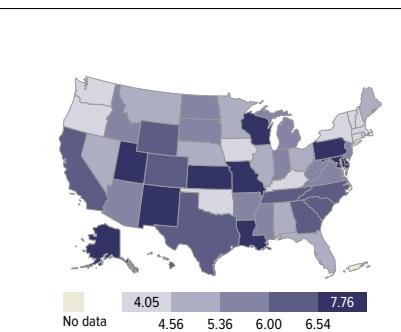
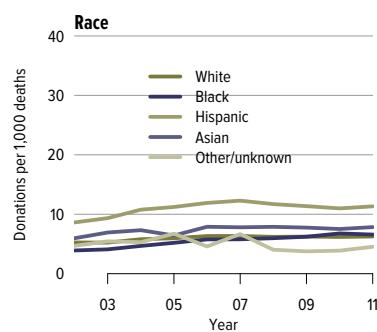
Mortality rates are computed as the number of deaths per 100 patient-years of waiting in the given year. Patients concurrently listed at multiple centers are counted once. Deaths after removal from the waiting list are not counted. Rates by status are calculated as the number of transplants for a given status divided by total waiting time in the year at that status. Age is determined at the later of listing date or January 1 of the given year. CKD, cystic kidney disease; DM, diabetes. HTN, hypertension. GN, glomerulonephritis.

deceased donation



KI 2.1 Deceased donor kidney donation rates

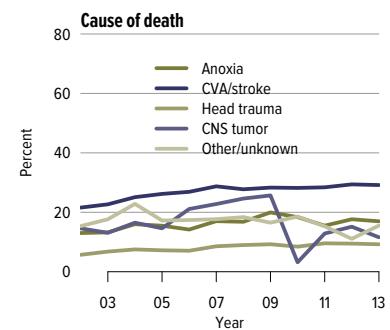
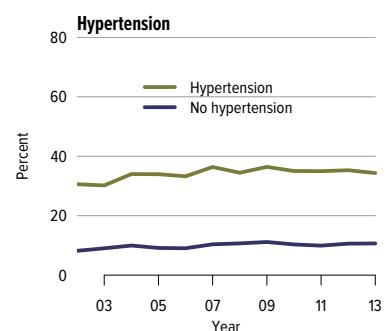
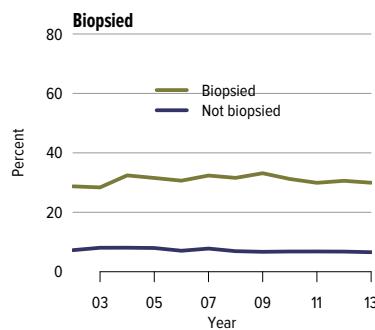
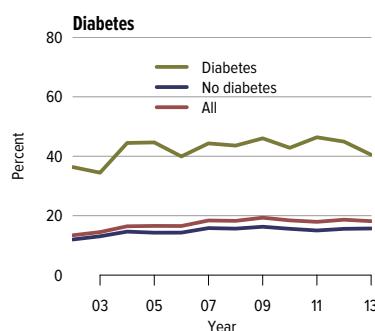
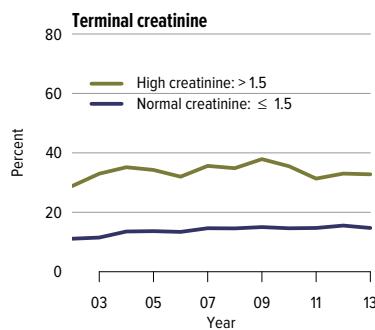
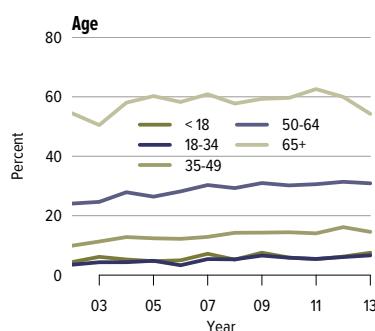
Numerator: Deceased donors aged younger than 75 years with at least one kidney recovered for transplant. Denominator: US deaths per year, age younger than 75 years. Death data available only through 2011. (Death data available at <http://www.cdc.gov/nchs/products/nvsr.htm>.) Donors whose kidneys were recovered en-bloc are counted once, and donors whose kidneys were recovered separately are counted twice.



KI 2.2 Deceased donor kidney donation rates (per 1000 deaths), by state, 2009-2011

Numerator: Deceased donors residing in the 50 states whose kidneys were recovered for transplant from 2009 through 2011. Denominator: US deaths, all ages, by state from 2009 through 2011 (death data available at <http://www.cdc.gov/nchs/products/nvsr.htm>).

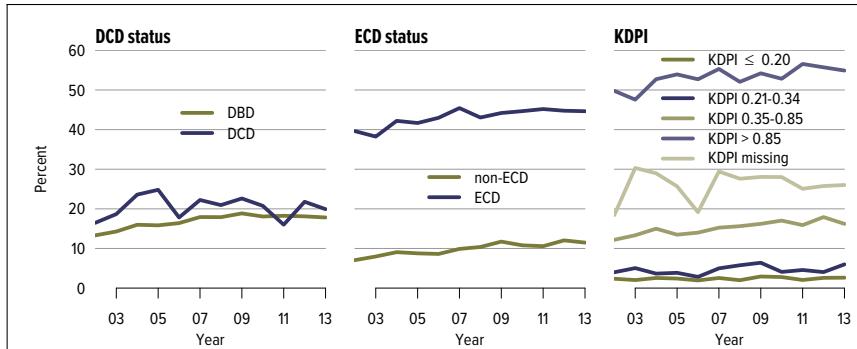
Donors whose kidneys were recovered en-bloc are counted once, and donors whose kidneys were recovered separately are counted twice.



KI 2.3 Rates of organs recovered for transplant and not transplanted

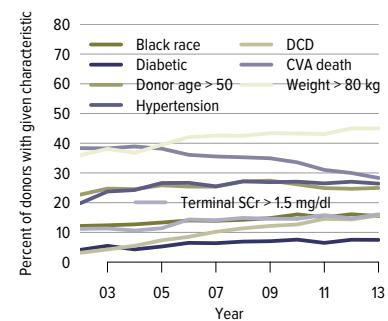
Percentages of kidneys not transplanted out of all kidneys recovered for transplant. Kidneys recovered en-bloc are counted once, and kidneys recovered separately are counted twice. CNS, central nervous system; CVA, cerebrovascular accident.

deceased donation



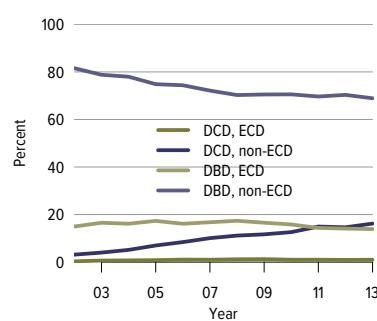
KI 2.4 Kidneys recovered for transplant and not transplanted, by donor type

Percentages of kidneys not transplanted out of all kidneys recovered for transplant, by SCD/ECD, DCD/DBD, and kidney donor profile index (KDPI) donor classification. The reference population for the kidney donor risk index (KDRI) to KDPI conversion is all deceased donor kidneys recovered for transplant in the US in 2013. Kidneys recovered en-bloc are counted once.



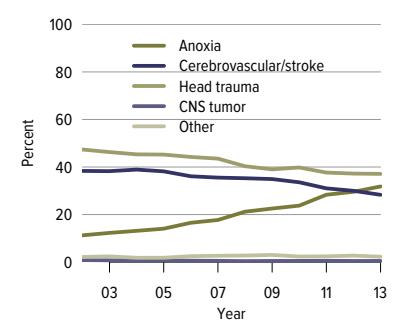
KI 2.5 Donor-specific components of the kidney donor risk index over time

Donors of at least one transplanted kidney. The donor-specific components of the kidney donor risk index (KDRI) are shown, except for donor height and hepatitis C virus positive status. CVA, cerebrovascular accident. SCr, serum creatinine.



KI 2.6 DCD with ECD or SCD kidney transplants

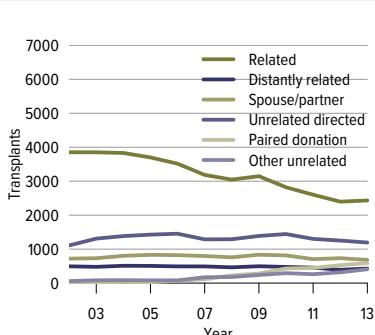
Percentages of each kidney transplant type among all deceased-donor kidney-alone transplants.



KI 2.7 Cause of death among deceased kidney donors

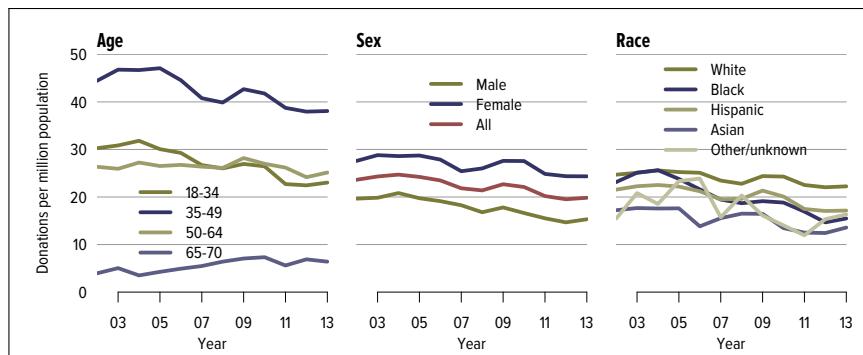
Deceased donors whose kidneys were transplanted. Donors who contributed more than one kidney are counted once. CNS, central nervous system.

living donation



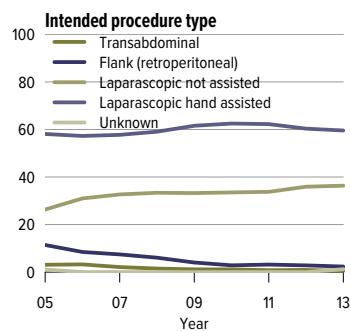
KI 3.1 Kidney transplants from living donors, by donor relation

Numbers of living donor donations; characteristics recorded on the OPTN Living Donor Registration Form.



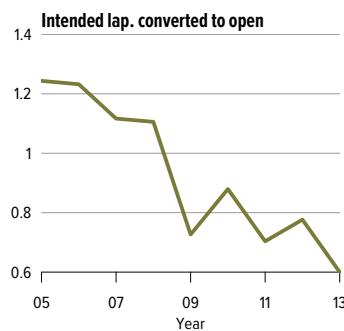
KI 3.2 Living donor kidney donation rates

Number of living donors whose kidneys were recovered for transplant each year. Denominator: US population aged 70 years or younger (population data downloaded from http://www.cdc.gov/nchs/nvss/bridged_race.htm)

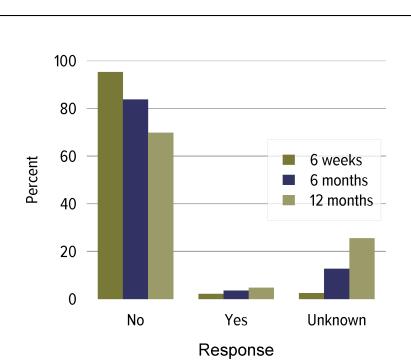


KI 3.3 Intended living kidney donor procedure type, and percentages of intended laparoscopic procedures converted to open

As reported on the OPTN Living Donor Registration Form.

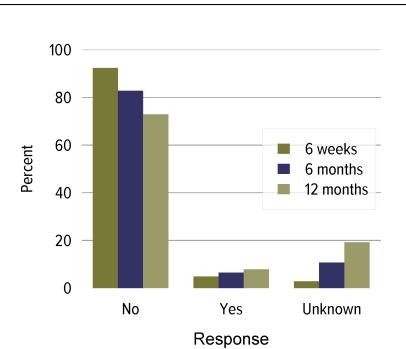


living donation



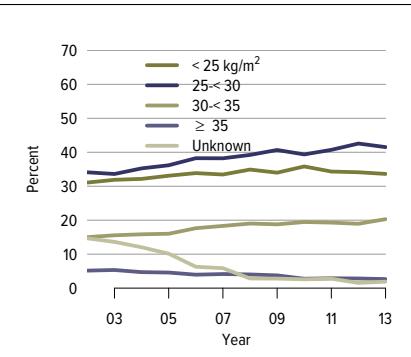
KI 3.4 Rehospitalization in the first 6 weeks, 6 months, and 1 year among living kidney donors, 2008-2012

Cumulative hospital readmission. The 6-week time point is recorded at the earliest of discharge or 6 weeks after donation.



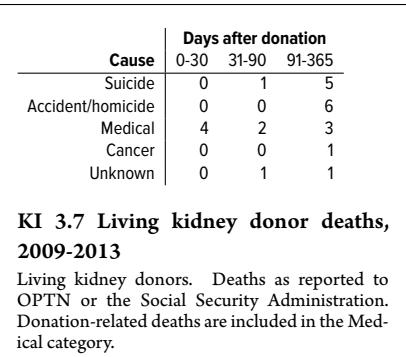
KI 3.5 Kidney complications among living kidney donors, 2008-2012

Complications reported on the OPTN Living Donor Registration and Living Donor Follow-up Forms at each time point. Complications include readmission, re-operation, vascular complications, and other complications requiring intervention. Multiple complications may be reported at any time point.



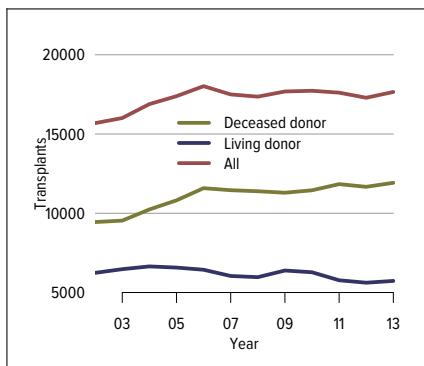
KI 3.6 BMI among living kidney donors

Donor height and weight reported on the OPTN Living Donor Registration Form.



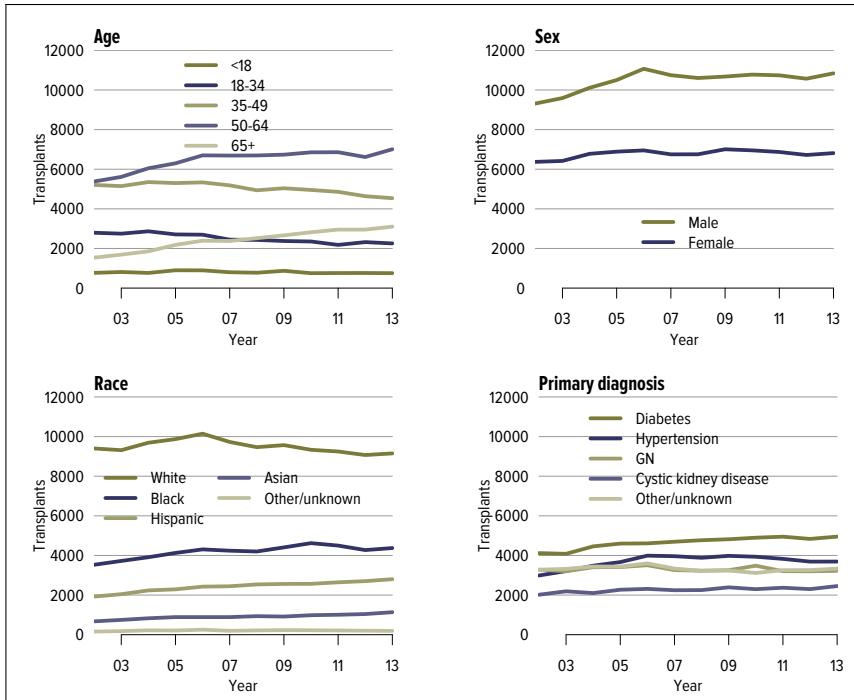
KI 3.7 Living kidney donor deaths, 2009-2013

Living kidney donors. Deaths as reported to OPTN or the Social Security Administration. Donation-related deaths are included in the Medical category.



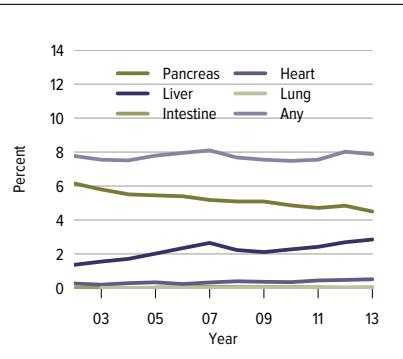
KI 4.1 Total kidney transplants

All kidney transplant recipients, including adult and pediatric, retransplant, and multi-organ recipients.



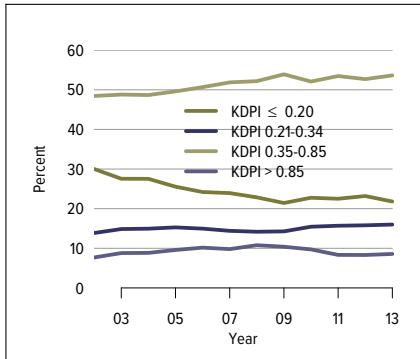
KI 4.2 Kidney transplants

All kidney transplant recipients, including adult and pediatric, retransplant, and multi-organ recipients. GN, glomerulonephritis.



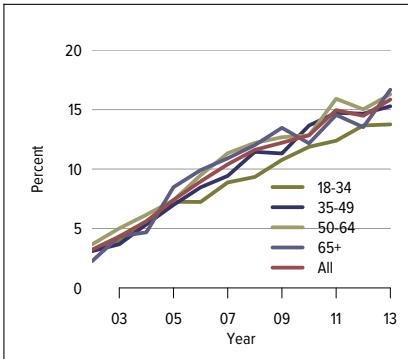
KI 4.3 Kidney transplants as part of a multi-organ transplants

All adult recipients of kidney transplants with at least one additional organ. Multi-organ transplants may include more than two organs; if so, each non-kidney organ is considered separately.



KI 4.4 Kidney transplants by kidney donor profile index

All adult recipients of deceased donor kidneys, including multi-organ transplants. The reference population for the kidney donor risk index (KDRI) to kidney donor profile index (KDPI) conversion is all deceased donor kidneys recovered for transplant in the US in 2013. Kidneys recovered en-bloc are counted once.



KI 4.5 Use of DCD kidneys among adult recipients, by recipient age

Percentages of deceased donor kidney transplants from DCD donors.

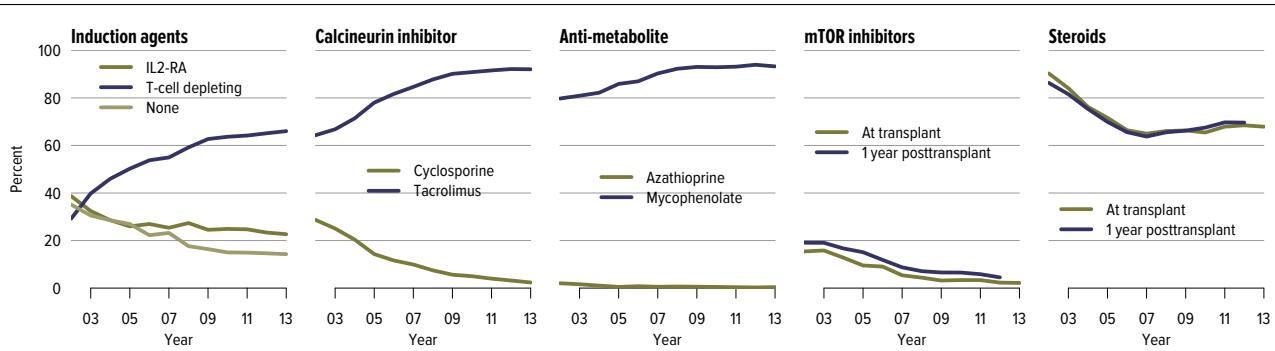


~~2003~~

	2003						2013						
	Deceased		Living		All		Deceased		Living		All		
	N	%	N	%	N	%	N	%	N	%	N	%	
Age													
18-34	1,335	14.6	1,412	23.4	2,747	18.1	1,185	10.4	1,069	19.6	2,254	13.3	
35-49	3,050	33.3	2,098	34.7	5,148	33.9	2,964	25.9	1,573	28.8	4,537	26.8	
50-64	3,593	39.3	2,020	33.4	5,613	36.9	4,972	43.4	2,036	37.3	7,008	41.5	
65+	1,175	12.8	514	8.5	1,689	11.1	2,327	20.3	775	14.2	3,102	18.4	
Sex	Female	3,539	38.7	2,543	42.1	6,082	40.0	4,401	38.4	2,102	38.5	6,503	38.5
	Male	5,614	61.3	3,501	57.9	9,115	60.0	7,047	61.6	3,351	61.5	10,398	61.5
Race	White	4,787	52.3	4,088	67.6	8,875	58.4	5,173	45.2	3,590	65.8	8,763	51.8
	Black	2,642	28.9	912	15.1	3,554	23.4	3,513	30.7	711	13.0	4,224	25.0
	Hispanic	1,146	12.5	742	12.3	1,888	12.4	1,823	15.9	802	14.7	2,625	15.5
	Asian	474	5.2	237	3.9	711	4.7	806	7.0	303	5.6	1,109	6.6
	Other/unknown	104	1.1	65	1.1	169	1.1	133	1.2	47	0.9	180	1.1
Primary diagnosis	Diabetes	2,734	29.9	1,347	22.3	4,081	26.9	3,709	32.4	1,242	22.8	4,951	29.3
	Hypertension	2,202	24.1	999	16.5	3,201	21.1	2,733	23.9	951	17.4	3,684	21.8
	GN	1,567	17.1	1,458	24.1	3,025	19.9	1,805	15.8	1,288	23.6	3,093	18.3
	CKD	968	10.6	898	14.9	1,866	12.3	1,222	10.7	897	16.4	2,119	12.5
	Other	1,682	18.4	1,342	22.2	3,024	19.9	1,979	17.3	1,075	19.7	3,054	18.1
Blood type	A	3,377	36.9	2,263	37.4	5,640	37.1	4,144	36.2	2,108	38.7	6,252	37.0
	B	1,068	11.7	810	13.4	1,878	12.4	1,457	12.7	738	13.5	2,195	13.0
	AB	457	5.0	220	3.6	677	4.5	603	5.3	223	4.1	826	4.9
	O	4,251	46.4	2,751	45.5	7,002	46.1	5,244	45.8	2,384	43.7	7,628	45.1
PRA/CPRA	< 1%	4,130	45.1	3,775	62.5	7,905	52.0	7,139	62.4	3,962	72.7	11,101	65.7
	1-20%	2,697	29.5	1,348	22.3	4,045	26.6	875	7.6	438	8.0	1,313	7.8
	20-80%	1,319	14.4	547	9.1	1,866	12.3	1,778	15.5	687	12.6	2,465	14.6
	80-98%	597	6.5	154	2.5	751	4.9	1,315	11.5	187	3.4	1,502	8.9
	98-100%	321	3.5	88	1.5	409	2.7	340	3.0	99	1.8	439	2.6
	Unknown	89	1.0	132	2.2	221	1.5	1	0.0	80	1.5	81	0.5
History of RRT	Preemptive tx	576	6.3	1,309	21.7	1,885	12.4	1,207	10.5	1,642	30.1	2,849	16.9
	< 1 year	871	9.5	1,805	29.9	2,676	17.6	909	7.9	1,266	23.2	2,175	12.9
	< 3 years	2,737	29.9	1,680	27.8	4,417	29.1	2,479	21.7	1,326	24.3	3,805	22.5
	< 5 years	2,322	25.4	456	7.5	2,778	18.3	2,648	23.1	424	7.8	3,072	18.2
	5+ years	2,647	28.9	794	13.1	3,441	22.6	4,205	36.7	795	14.6	5,000	29.6
Insurance	Private	2,983	32.6	3,575	59.1	6,558	43.2	2,848	24.9	3,092	56.7	5,940	35.1
	Medicare	5,596	61.1	2,094	34.6	7,690	50.6	7,798	68.1	2,046	37.5	9,844	58.2
	Medicaid	415	4.5	255	4.2	670	4.4	487	4.3	172	3.2	659	3.9
	Other government	129	1.4	91	1.5	220	1.4	178	1.6	65	1.2	243	1.4
	Other/unknown	30	0.3	29	0.5	59	0.4	137	1.2	78	1.4	215	1.3
HLA mismatches	0	974	10.6	579	9.6	1,553	10.2	903	7.9	352	6.5	1,255	7.4
	1	322	3.5	346	5.7	668	4.4	86	0.8	253	4.6	339	2.0
	2	474	5.2	1,093	18.1	1,567	10.3	465	4.1	763	14.0	1,228	7.3
	3	1,216	13.3	1,684	27.9	2,900	19.1	1,468	12.8	1,397	25.6	2,865	17.0
	4	2,133	23.3	817	13.5	2,950	19.4	3,043	26.6	878	16.1	3,921	23.2
	5	2,556	27.9	950	15.7	3,506	23.1	3,680	32.1	1,113	20.4	4,793	28.4
	6	1,413	15.4	535	8.9	1,948	12.8	1,725	15.1	595	10.9	2,320	13.7
	Unknown	65	0.7	40	0.7	105	0.7	78	0.7	102	1.9	180	1.1
Kidney tx history	First transplant	8,061	88.1	5,365	88.8	13,426	88.3	10,107	88.3	4,847	88.9	14,954	88.5
	Retransplant	1,092	11.9	679	11.2	1,771	11.7	1,341	11.7	606	11.1	1,947	11.5
DCD status*	DBD	8,757	95.7					9,634	84.2				
	DCD	396	4.3					1,814	15.8				
SCD/ECD status*	SCD	7,615	83.2					9,501	83.0				
	ECD	1,538	16.8					1,947	17.0				
All recipients		9,153	100.0	6,044	100.0	15,197	100.0	11,448	100.0	5,453	100.0	16,901	100.0

KI 4.6 Characteristics of adult kidney transplant recipients, 2003 and 2013

Adult kidney transplant recipients, including retransplants. CKD, cystic kidney disease; RRT, renal replacement therapy. *DCD and SCD/ECD status apply to deceased donor transplants only.



KI 4.7 Immunosuppression in adult kidney transplant recipients

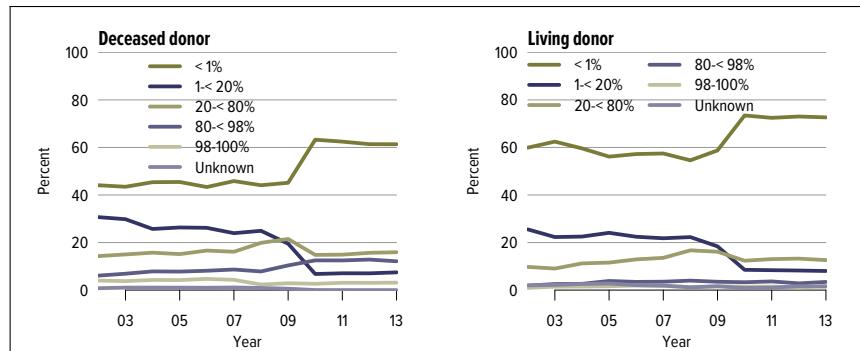
One-year posttransplant data are limited to patients alive with graft function at 1 year posttransplant. Mycophenolate includes mycophenolate mofetil and mycophenolate sodium. IL2-RA, interleukin-2 receptor antagonist; mTOR, mammalian target of rapamycin.

Medication	% 1yr post-tx	Medication	% 2-3yr post-tx
Tacrolimus	51.2	Mycophenolate	65.6
Sulfamethoxazole-Trimethoprim	47.9	Prednisone	64.9
Prednisone	41.6	Hydrocodone	41.3
Valganciclovir	38.7	Amlodipine Besylate	38.1
Hydrocodone	30.1	Metoprolol Tartrate	32.0
Amlodipine Besylate	27.5	Sulfamethoxazole-Trimethoprim	28.4
Oxycodone	27.5	Oxycodone	27.0
Metoprolol Tartrate	27.1	Amoxicillin	26.7
Furosemide	24.0	Furosemide	25.9
Ciprofloxacin	22.2	Omeprazole	24.6
Omeprazole	19.9	Ciprofloxacin	24.5
Amoxicillin	17.7	Azithromycin	23.1
Nystatin	16.2	Lisinopril	22.7
Docusate Sodium	15.2	Simvastatin	21.0

KI 4.8 Top 15 medications filled by adult kidney transplant recipients, 2009

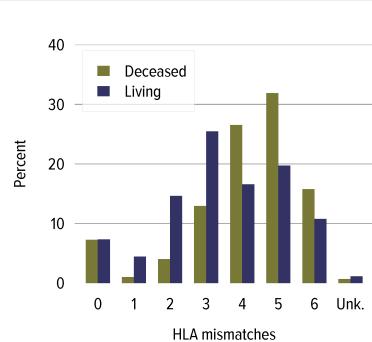
Adult kidney transplant recipients, 2009, who were matched to the IMS Health pharmacy claims database and had at least one medication filled during year 1 or year 2 or 3 posttransplant.

donor-recipient matching



KI 5.1 PRA at time of kidney transplant in adult recipients

From December 1, 2007, through September 30, 2009, CPRA was used if greater than 0; otherwise, the maximum pretransplant PRA was used. Before December 1, 2007, the maximum pretransplant PRA was used unconditionally. CPRA is used after September 30, 2009, unless it is missing; if it is missing, the maximum pretransplant PRA is used. Kidney-alone transplants only.



KI 5.2 Total HLA A, B, and DR mismatches among adult kidney transplant recipients, 2009-2013

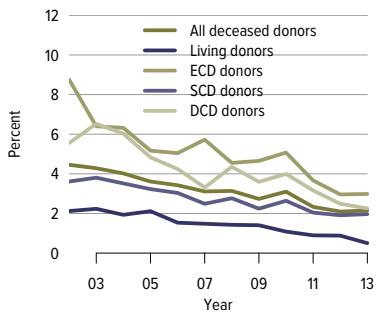
Donor and recipient antigen matching is based on OPTN antigen values and split equivalences policy as of 2013.

Donor	Recipient -			Recipient +			Recipient unk.			
	D-	D+	D unk.	D-	D+	D unk.	D-	D+	D unk.	
CMV	Deceased	12.6	18.6	0.1	24.3	43.0	0.2	0.5	0.9	0.0
	Living	23.3	16.0	1.7	20.6	34.5	2.5	0.4	0.5	0.4
EBV	Deceased	0.7	9.5	0.0	4.3	68.8	0.2	1.0	15.5	0.1
	Living	1.6	6.8	1.8	5.2	60.5	7.1	0.5	4.4	12.0
HB core	Deceased	76.3	2.8	0.0	7.7	0.7	0.0	12.1	0.4	0.0
	Living	72.8	14	7.3	3.5	0.4	0.5	7.2	0.1	6.8
HB surface antigen	Deceased	95.1	0.0	0.1	2.4	0.0	0.0	2.3	0.0	0.0
	Living	87.9	0.0	7.6	1.4	0.0	0.1	2.2	0.0	0.8
HCV	Deceased	90.8	0.2	0.0	4.3	2.0	0.0	2.6	0.1	0.0
	Living	89.3	0.2	5.0	2.2	0.0	0.1	2.1	0.0	1.2
HIV	Deceased	89.0	0.0	0.1	0.7	0.0	0.0	10.3	0.0	0.0
	Living	82.6	0.0	7.1	0.3	0.0	0.0	3.6	0.0	6.4

KI 5.3 Adult kidney donor-recipient serology matching, 2009-2013

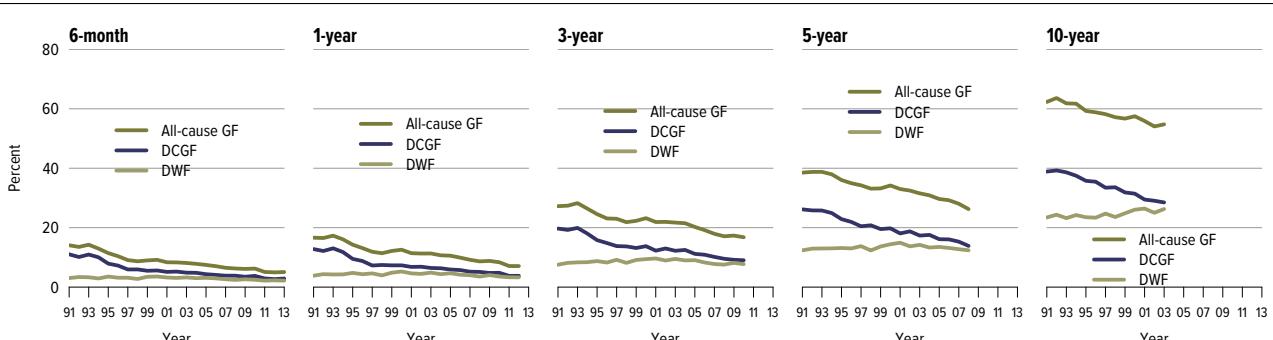
Donor serology is reported on the OPTN Donor Registration Form and recipient serology on the OPTN Transplant Recipient Registration Form. Any evidence for a positive serology indicates positive for that serology. If all fields are unknown, incomplete, or pending, the person is categorized as "unknown" for that serology; otherwise, serology is assumed negative. CMV, cytomegalovirus; EBV, Epstein-Barr virus; HB, hepatitis B; HCV, hepatitis C virus; HIV, human immunodeficiency virus.

outcomes



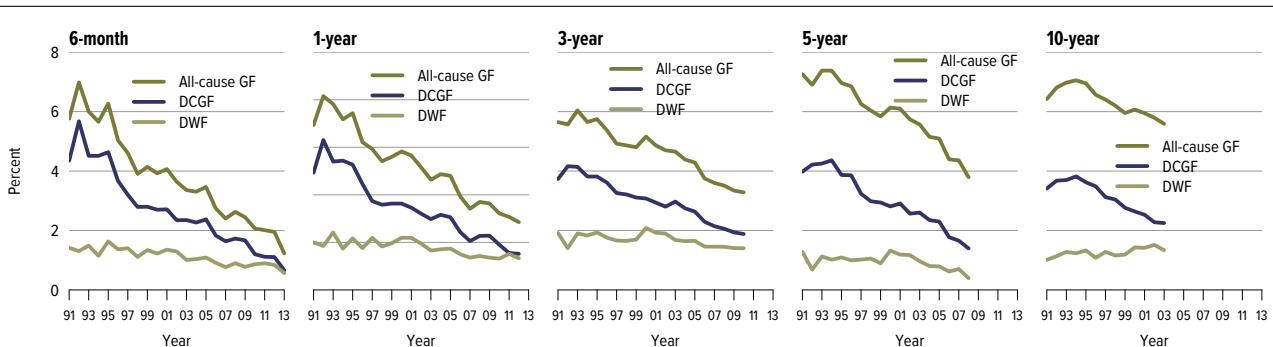
KI 6.1 Death-censored graft failure within 90 days among adult kidney transplant recipients

Limited to kidney-alone recipients. Retransplant, graft failure, or return to dialysis within the first 90 days posttransplant. Graft failure due to death is not included. Graft failure dates are determined from multiple data sources, including the OPTN Transplant Recipient Registration and OPTN Transplant Recipient Follow-up Forms. Transplants through September 30, 2013, are included to allow for sufficient follow-up.



KI 6.2 Outcomes among adult kidney transplant recipients: deceased donor

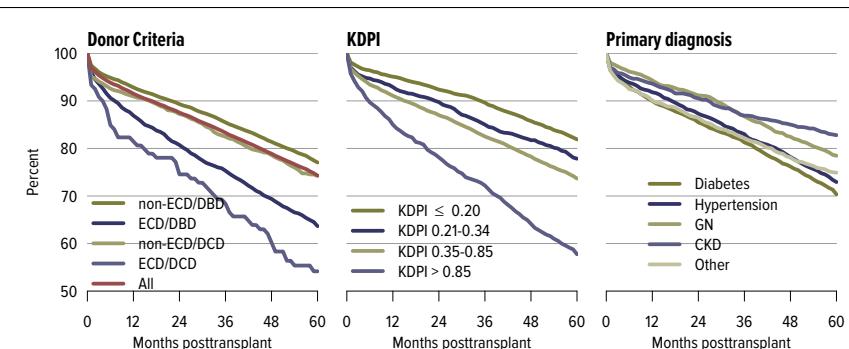
Percentage for each outcome is unadjusted, computed using Kaplan-Meier competing risk methods. Death with function (DWF) is defined as no graft failure before death; death-censored graft failure (DCGF) is defined as return to dialysis or retransplant; all-cause graft failure (GF) is defined as any graft failure.



KI 6.3 Outcomes among adult kidney transplant recipients: living donor

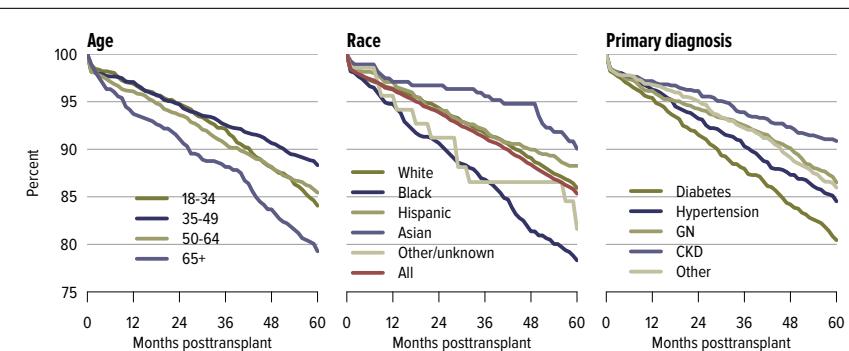
Percentage for each outcome is unadjusted, computed using Kaplan-Meier competing risk methods. Death with function (DWF) is defined as no graft failure before death; death-censored graft failure (DCGF) is defined as return to dialysis or retransplant; all-cause graft failure (GF) is defined as any graft failure.

outcomes



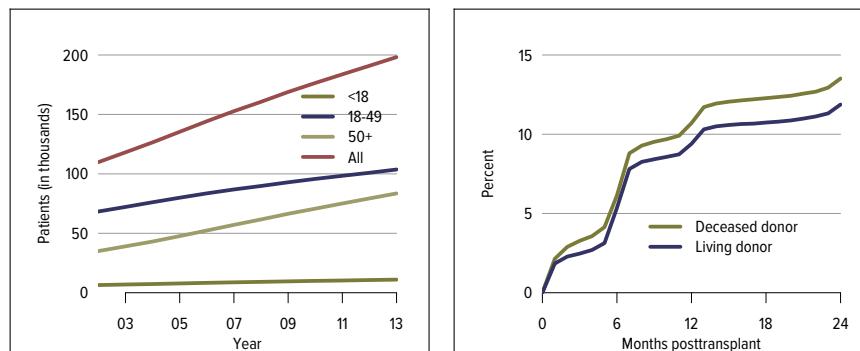
KI 6.4 Graft survival among adult kidney transplant recipients, 2008: deceased donors

Graft survival estimated using unadjusted Kaplan-Meier methods. CKD, cystic kidney disease; GN, glomerulonephritis; KDPI, kidney donor profile index.



KI 6.5 Graft survival among adult kidney transplant recipients, 2008: living donors

Graft survival estimated using unadjusted Kaplan-Meier methods. CKD, cystic kidney disease; GN, glomerulonephritis.



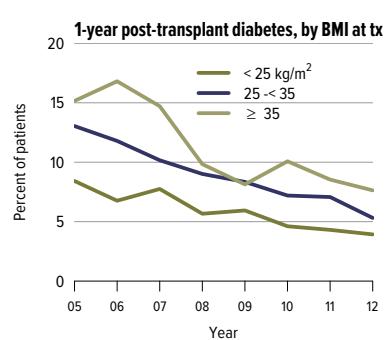
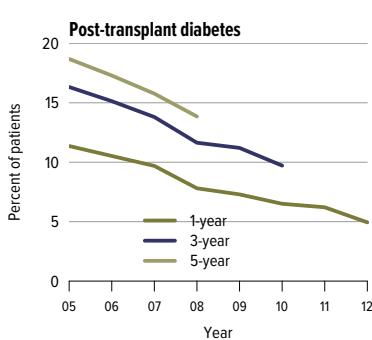
KI 6.6 Recipients alive with a functioning kidney graft on June 30 of the year, by age at transplant

Recipients are assumed to be alive with function unless a death or graft failure is recorded. A recipient may experience a graft failure and be removed from the cohort, undergo retransplant, and re-enter the cohort.

KI 6.7 Incidence of first acute rejection among adult kidney transplant recipients, 2007-2011

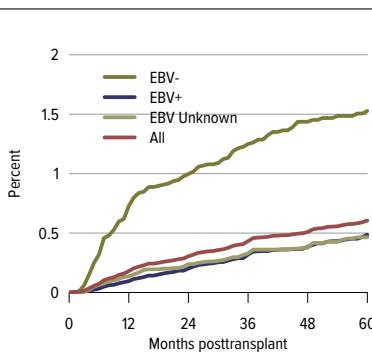
Acute rejection is defined as a record of acute or hyperacute rejection, or a record on the OPTN Transplant Recipient Registration or Transplant Recipient Follow-up Form of an anti-rejection drug being administered. Only the first rejection event is counted. Cumulative incidence is estimated using the Kaplan-Meier competing risk method.

outcomes



KI 6.8 Posttransplant diabetes among adult kidney transplant recipients

Percentage of adult deceased donor kidney recipients who were free of diabetes at transplant and developed diabetes posttransplant. Posttransplant diabetes is reported on the Transplant Recipient Follow-up Form. Death and graft failure are treated as competing events.



KI 6.9 Incidence of PTLD among adult kidney transplant recipients, by recipient EBV status at transplant, 2007-2011

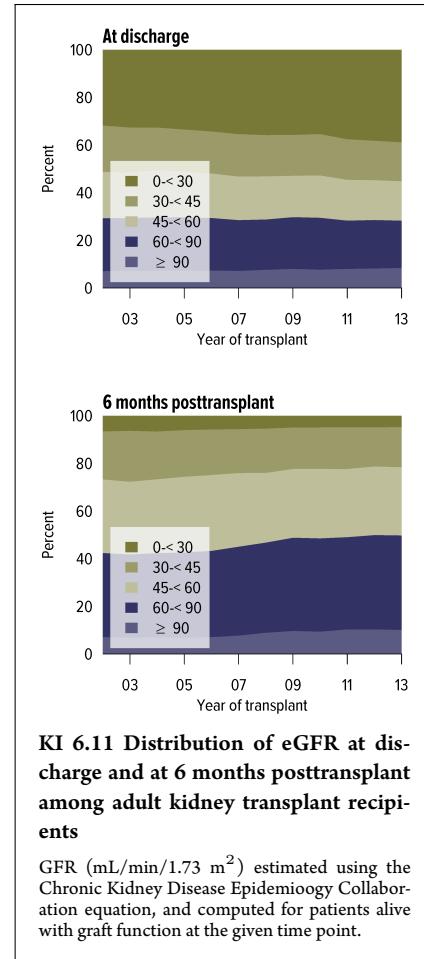
Cumulative incidence is estimated using the Kaplan-Meier competing risk method. Posttransplant lymphoproliferative disorder (PTLD) is identified as a reported complication or cause of death on the OPTN Transplant Recipient Follow-up Form or the Posttransplant Malignancy Form as polymorphic PTLD, monomorphic PTLD, or Hodgkin disease. Only the earliest date of PTLD diagnosis is considered. EBV, Epstein-Barr virus.

outcomes

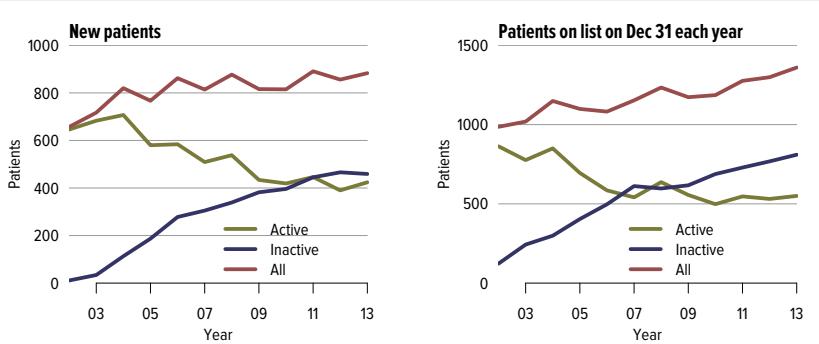
Cancer site	Observed	Rate per 100,000 PY	Lower CI	Upper CI
Lip	13	5.2	2.8	8.9
Mouth, tongue, other oral cavity and pharynx	42	16.8	12.1	22.8
Salivary gland	14	5.6	3.1	9.4
Nasopharynx	4	1.6	0.4	4.1
Oropharynx including tonsil	13	5.2	2.8	8.9
Esophagus	31	12.4	8.4	17.6
Stomach	36	14.4	10.1	20.0
Small intestine	15	6.0	3.4	9.9
Colorectum	137	55.0	46.2	65.0
Anus, anal canal and anorectum	46	18.5	13.5	24.6
Liver	31	12.4	8.4	17.6
Intrahepatic bile duct	3	1.2	0.2	3.5
Gallbladder	2	0.8	0.1	2.9
Other biliary	9	3.6	1.7	6.9
Pancreas	50	20.1	14.9	26.4
Larynx	23	9.2	5.8	13.8
Lung and bronchus	277	111.2	98.5	125.1
Bones and joints	3	1.2	0.2	3.5
Soft tissue including heart	13	5.2	2.8	8.9
Melanoma of the skin	174	69.9	59.9	81.1
Other non-epithelial skin	57	22.9	17.3	29.6
Breast	217	216.4	188.6	247.2
Cervix uteri	20	19.9	12.1	30.7
Corpus uteri	35	34.8	24.2	48.4
Ovary	22	21.9	13.7	33.1
Vagina and other female genital organs	11	10.9	5.5	19.5
Vulva	89	88.6	71.1	109.0
Prostate	325	219.7	196.5	244.9
Testis	14	9.4	5.2	15.8
Penis and other male genital organs	18	12.1	7.2	19.1
Urinary bladder, ureter, and other urinary organs	129	51.8	43.2	61.5
Kidney	370	148.8	134.0	164.7
Renal pelvis	9	3.6	1.7	6.9
Eye and orbit	12	4.8	2.5	8.4
Brain, cranial nerves, and other nervous system	66	26.5	20.5	33.7
Thyroid	99	39.7	32.3	48.4
Hodgkin lymphoma	14	5.6	3.1	9.4
Non-Hodgkin lymphoma	334	134.3	120.2	149.5
Myeloma	50	20.1	14.9	26.4
Acute lymphocytic leukemia	6	2.4	0.9	5.2
Chronic lymphocytic leukemia	9	3.6	1.7	6.9
Acute myeloid leukemia	21	8.4	5.2	12.9
Acute monocytic leukemia	2	0.8	0.1	2.9
Chronic myeloid leukemia	13	5.2	2.8	8.9
Other acute leukemia	2	0.8	0.1	2.9
Mesothelioma	6	2.4	0.9	5.2
Kaposi sarcoma	31	12.4	8.4	17.7
Miscellaneous	213	85.5	74.4	97.8
Tumors with poorly specified morphology	52	20.9	15.6	27.4

KI 6.10 Posttransplant cancer among kidney transplant recipients, 2000-2009

Reported cancer data linked to OPTN data from California, Colorado, Connecticut, Georgia, Hawaii, Illinois, Iowa, Michigan, New Jersey, New York, North Carolina, Texas, Florida, and Utah state cancer registries. Reported cancers are counted once per type per person posttransplant. Denominator: person-years posttransplant for residents of the above states who underwent transplant 2000-2009. Sex-specific denominators are used to compute rates for sex-specific cancers.



pediatric transplant



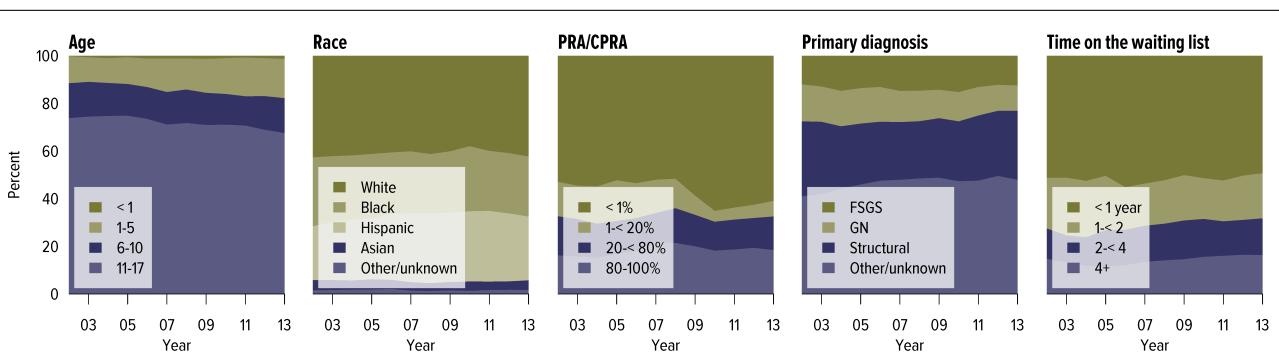
KI 7.1 Pediatric candidates waiting for kidney transplant

A new patient is one who first joined the list during the given year, without having been listed in a previous year. Previously listed candidates who underwent transplant and were subsequently relisted are considered new. Candidates concurrently listed at multiple centers are counted once. Concurrently listed candidates who are active at any program are considered active; those who are inactive at all programs are considered inactive. Active status is determined on day 7 after first listing.

Reasons for inactive status	Inactive 7 days after listing		Active at listing, inactive on Dec 31	
	N	%	N	%
Candidate work-up incomplete	302	59.2	35	19.3
Too well	52	10.2	43	23.8
Too sick	44	8.6	44	24.3
Weight inappropriate for tx	33	6.5	3	1.7
Transplant pending	28	5.5	1	0.6
Candidate choice	24	4.7	19	10.5
Insurance issues	18	3.5	12	6.6
Medical non-compliance	9	1.8	16	8.8
Unknown	0	0.0	3	1.7
Candidate could not be contacted	0	0.0	3	1.7
Inappropriate substance abuse	0	0.0	2	1.1

KI 7.2 Reasons for inactive status among pediatric kidney transplant listings, 2013

As candidates can be concurrently listed at more than one center and reasons for inactive status may differ, each listing is counted separately.



KI 7.3 Distribution of pediatric candidates waiting for kidney transplant

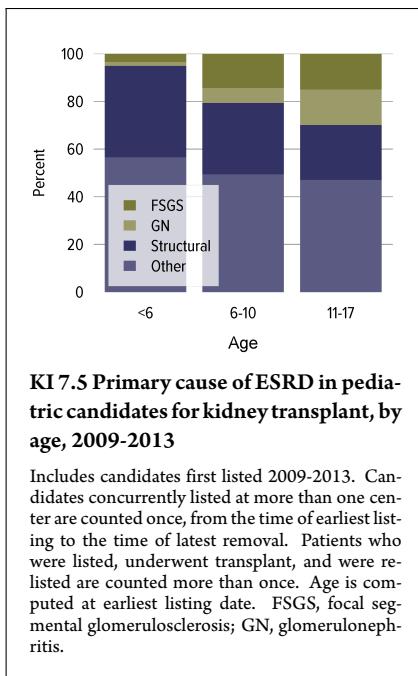
Candidates waiting for transplant any time in the given year. Candidates listed concurrently at multiple centers are counted once. Age is determined at the later of listing date or January 1 of the given year. Time on the waiting list is determined at the earlier of December 31 or removal from the waiting list. Diagnosis categories follow North American Pediatric Renal Trials and Collaborative Studies recommendations. PRA is the highest value during the year. Active and inactive patients are included. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis.

pediatric transplant

	2003		2013	
	N	%	N	%
Age				
< 1	3	0.3	4	0.3
1-5	75	7.3	177	13.0
6-10	110	10.8	182	13.4
11-17	509	49.8	521	38.2
18+	325	31.8	479	35.1
Sex				
Female	426	41.7	530	38.9
Male	596	58.3	833	61.1
Race				
White	402	39.3	536	39.3
Black	300	29.4	361	26.5
Hispanic	266	26.0	377	27.7
Asian	34	3.3	62	4.5
Other/unknown	20	2.0	27	2.0
Citizenship				
US citizen	917	89.7	1,284	94.2
Non-citizen resident	57	5.6	22	1.6
Non-citizen non-resident	30	2.9	11	0.8
Other/unknown	18	1.8	46	3.4
Primary diagnosis				
FSGS	142	13.9	181	13.3
GN	156	15.3	145	10.6
Structural	298	29.2	428	31.4
Other	426	41.7	609	44.7
Kidney tx history				
First transplant	670	65.6	947	69.5
Retransplant	352	34.4	416	30.5
Blood type				
A	297	29.1	420	30.8
B	148	14.5	234	17.2
AB	28	2.7	41	3.0
O	549	53.7	668	49.0
PRA/CPRA				
< 1%	522	51.1	755	55.4
1-20%	158	15.5	100	7.3
20-80%	139	13.6	186	13.6
80-98%	83	8.1	93	6.8
98-100%	120	11.7	229	16.8
Waiting time				
< 1 year	496	48.5	565	41.5
1-2 years	217	21.2	259	19.0
2-3 years	81	7.9	149	10.9
3-4 years	43	4.2	104	7.6
4-5 years	32	3.1	63	4.6
5+ years	153	15.0	223	16.4
Will accept ECD kidney				
	136	13.3	56	4.1
Multi-organ				
Kidney alone	1,006	98.4	1,340	98.3
Kidney-pancreas	2	0.2	3	0.2
Kidney-liver	11	1.1	14	1.0
Kidney-heart	1	0.1	2	0.1
Other	2	0.2	4	0.3
All candidates	1,022	100.0	1,363	100.0

KI 7.4 Characteristics of pediatric candidates on the kidney transplant waiting list on December 31, 2003, and December 31, 2013

Candidates waiting for transplant on December 31, 2003, and December 31, 2013, regardless of first listing date; active/inactive status is on this date, and multiple listings are not counted. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis.



KI 7.5 Primary cause of ESRD in pediatric candidates for kidney transplant, by age, 2009-2013

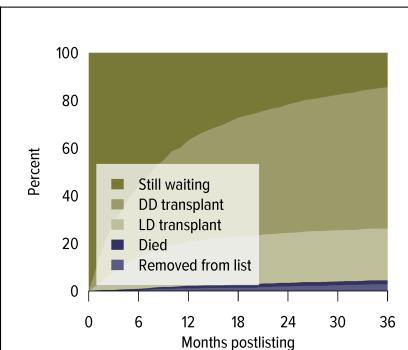
Includes candidates first listed 2009-2013. Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. Patients who were listed, underwent transplant, and were re-listed are counted more than once. Age is computed at earliest listing date. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis.

pediatric transplant

	2011	2012	2013
Patients at start of year	1,186	1,276	1,299
Patients added during year	921	884	907
Patients removed during year	831	861	846
Patients at end of year	1,276	1,299	1,360
Removal reason			
Deceased donor transplant	566	562	557
Living donor transplant	206	212	218
Transplant (type unspecified)	0	2	0
Patient died	19	22	15
Patient refused transplant	1	2	0
Improved, tx not needed	9	8	4
Too sick for transplant	4	5	9
Other	26	48	43

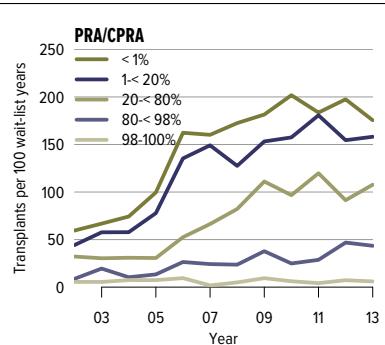
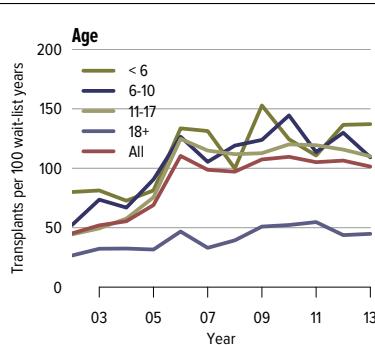
KI 7.6 Kidney transplant waitlist activity among pediatric candidates

Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. Candidates who are listed, undergo transplant, and are relisted are counted more than once. Candidates are not considered to be on the list on the day they are removed; counts on January 1 may differ from counts on December 31 of the prior year. Candidates listed for multi-organ transplants are included.



KI 7.7 Three-year outcomes for pediatric candidates waiting for kidney transplant among new listings, 2010

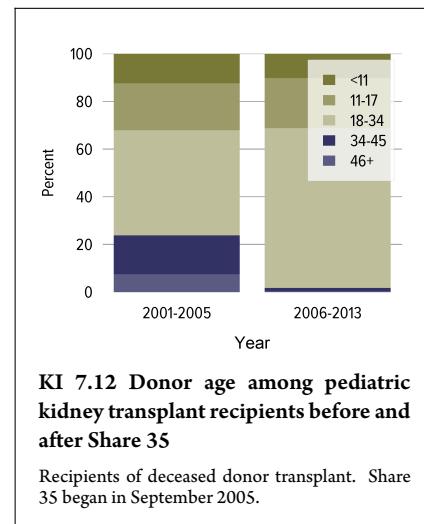
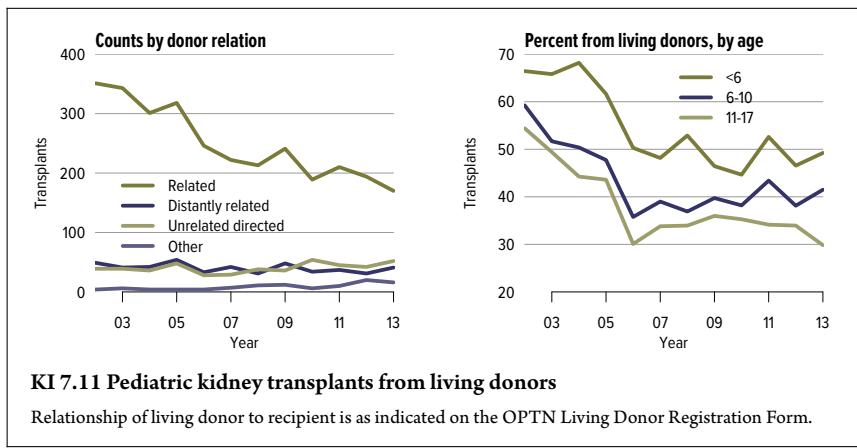
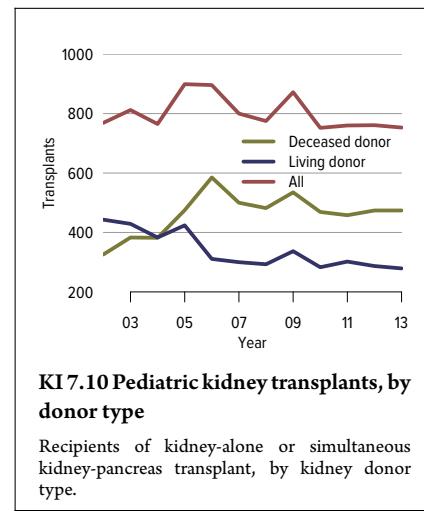
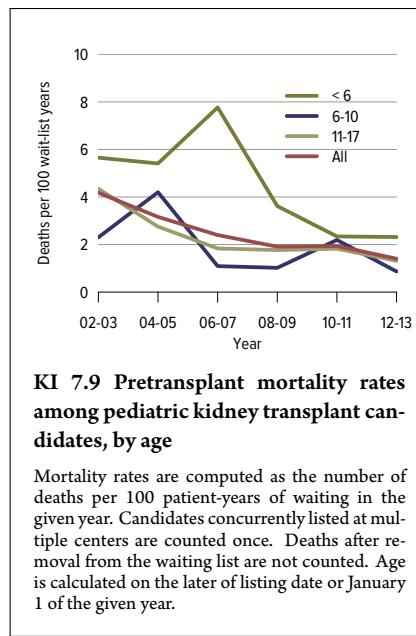
Candidates waiting for any kidney transplant and first listed in 2010. Candidates concurrently listed at more than one center are counted once, from the time of earliest listing to the time of latest removal. DD, deceased donor; LD, living donor.



KI 7.8 Deceased donor kidney transplant rates among active pediatric waitlist candidates

Transplant rates are computed as the number of deceased donor transplants per 100 patient-years of active waiting in a given year. Age is calculated on the first active listing date in a given year. The age category 18 years or older includes candidates listed when aged younger than 18 years but still on the list in the given year.

pediatric transplant



pediatric transplant

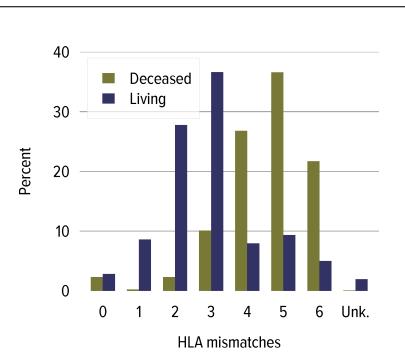
	2001-2003						2011-2013						
	Deceased		Living		All		Deceased		Living		All		
	N	%	N	%	N	%	N	%	N	%	N	%	
Age													
<1	0	0.0	9	0.7	9	0.4	1	0.1	1	0.1	2	0.1	
1-5	144	14.4	304	23.2	448	19.4	282	20.1	274	31.6	556	24.5	
6-10	200	20.0	249	19.0	449	19.5	249	17.7	170	19.6	419	18.4	
11-17	654	65.5	747	57.1	1,401	60.7	874	62.2	423	48.7	1,297	57.0	
Sex	Female	410	41.1	508	38.8	918	39.8	591	42.0	322	37.1	913	40.1
	Male	588	58.9	801	61.2	1,389	60.2	815	58.0	546	62.9	1,361	59.9
Race	White	417	41.8	885	67.6	1,302	56.4	556	39.5	591	68.1	1,147	50.4
	Black	263	26.4	170	13.0	433	18.8	327	23.3	78	9.0	405	17.8
	Hispanic	245	24.5	211	16.1	456	19.8	447	31.8	148	17.1	595	26.2
	Asian	52	5.2	32	2.4	84	3.6	50	3.6	35	4.0	85	3.7
	Other/unknown	21	2.1	11	0.8	32	1.4	26	1.8	16	1.8	42	1.8
Primary diagnosis	FSGS	139	13.9	125	9.5	264	11.4	173	12.3	85	9.8	258	11.3
	GN	175	17.5	208	15.9	383	16.6	165	11.7	73	8.4	238	10.5
	Structural	343	34.4	480	36.7	823	35.7	460	32.7	312	35.9	772	33.9
	Other	341	34.2	496	37.9	837	36.3	608	43.2	398	45.9	1,006	44.2
Blood type	A	344	34.5	503	38.4	847	36.7	434	30.9	327	37.7	761	33.5
	B	115	11.5	155	11.8	270	11.7	175	12.4	103	11.9	278	12.2
	AB	44	4.4	51	3.9	95	4.1	44	3.1	31	3.6	75	3.3
	O	495	49.6	600	45.8	1,095	47.5	753	53.6	407	46.9	1,160	51.0
PRA/CPRA	< 1%	596	59.7	900	68.8	1,496	64.8	1,087	77.3	612	70.5	1,699	74.7
	1-20%	259	26.0	264	20.2	523	22.7	116	8.3	92	10.6	208	9.1
	20-80%	96	9.6	66	5.0	162	7.0	153	10.9	88	10.1	241	10.6
	80-98%	32	3.2	11	0.8	43	1.9	45	3.2	21	2.4	66	2.9
	98-100%	11	1.1	9	0.7	20	0.9	5	0.4	12	1.4	17	0.7
	Unknown	4	0.4	59	4.5	63	2.7	0	0.0	43	5.0	43	1.9
History of RRT	Preemptive tx	127	12.7	403	30.8	530	23.0	386	27.5	361	41.6	747	32.8
	< 1 year	203	20.3	444	33.9	647	28.0	329	23.4	227	26.2	556	24.5
	< 3 years	421	42.2	334	25.5	755	32.7	437	31.1	185	21.3	622	27.4
	< 5 years	107	10.7	41	3.1	148	6.4	135	9.6	35	4.0	170	7.5
	5+ years	140	14.0	87	6.6	227	9.8	119	8.5	60	6.9	179	7.9
Insurance	Private	339	34.0	779	59.5	1,118	48.5	403	28.7	523	60.3	926	40.7
	Medicare	305	30.6	269	20.6	574	24.9	482	34.3	167	19.2	649	28.5
	Medicaid	305	30.6	204	15.6	509	22.1	397	28.2	134	15.4	531	23.4
	Other government	38	3.8	43	3.3	81	3.5	106	7.5	23	2.6	129	5.7
	Other/unknown	11	1.1	14	1.1	25	1.1	18	1.3	21	2.4	39	1.7
HLA mismatches	0	39	3.9	48	3.7	87	3.8	33	2.3	23	2.6	56	2.5
	1	12	1.2	115	8.8	127	5.5	1	0.1	76	8.8	77	3.4
	2	36	3.6	411	31.4	447	19.4	37	2.6	233	26.8	270	11.9
	3	141	14.1	539	41.2	680	29.5	143	10.2	319	36.8	462	20.3
	4	283	28.4	79	6.0	362	15.7	381	27.1	74	8.5	455	20.0
	5	323	32.4	68	5.2	391	16.9	506	36.0	77	8.9	583	25.6
	6	162	16.2	39	3.0	201	8.7	304	21.6	49	5.6	353	15.5
	Unknown	2	0.2	10	0.8	12	0.5	1	0.1	17	2.0	18	0.8
Kidney tx history	First transplant	853	85.5	1,218	93.0	2,071	89.8	1,295	92.1	809	93.2	2,104	92.5
	Retransplant	145	14.5	91	7.0	236	10.2	111	7.9	59	6.8	170	7.5
DCD status*	DBD	985	98.7					1,333	94.8				
	DCD	13	1.3					73	5.2				
SCD/ECD status*	SCD	992	99.4					1,405	99.9				
	ECD	6	0.6					1	0.1				
Delayed graft function	Non-DGF	893	89.5	1,243	95.0	2,136	92.6	1,303	92.7	836	96.3	2,139	94.1
	DGF	105	10.5	66	5.0	171	7.4	103	7.3	32	3.7	135	5.9
ABO compatibility	Comp./iden.	998	100.0	1,307	99.8	2,305	99.9	1,406	100.0	862	99.3	2,268	99.7
	Incompatible	0	0.0	2	0.2	2	0.1	0	0.0	6	0.7	6	0.3
All recipients		998	100.0	1,309	100.0	2,307	100.0	1,406	100.0	868	100.0	2,274	100.0

KI 7.13 Characteristics of pediatric kidney transplant recipients, 2001-2003 and 2011-2013

Kidney transplant recipients, including retransplants. Diagnosis categories follow North American Pediatric Renal Trials and Collaborative Studies recommendations. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis; RRT, renal replacement therapy.

*DCD and SCD/ECD status apply to deceased donor transplants only.

pediatric transplant



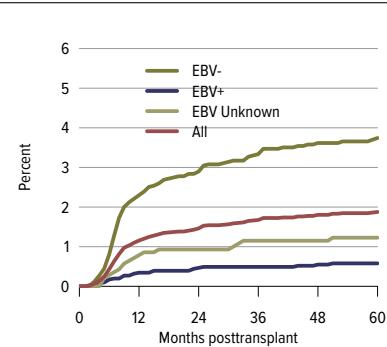
KI 7.14 Total HLA A, B, and DR mismatches among pediatric kidney transplant recipients, 2009-2013

Donor and recipient antigen matching is based on OPTN antigen values and split equivalences policy as of 2013.

Donor	Recipient -			Recipient +			Recipient unk.			
	D-	D+	D unk.	D-	D+	D unk.	D-	D+	D unk.	
CMV	Deceased	24.4	34.1	0.2	16.3	22.7	0.2	0.5	1.4	0.0
	Living	33.4	29.6	4.2	7.0	21.3	1.3	1.2	1.6	0.4
EBV	Deceased	5.2	36.3	0.2	5.9	46.6	0.0	0.7	5.1	0.0
	Living	7.0	39.5	6.4	3.0	33.7	3.8	0.9	3.7	2.1

KI 7.15 Pediatric kidney donor-recipient serology matching, 2009-2013

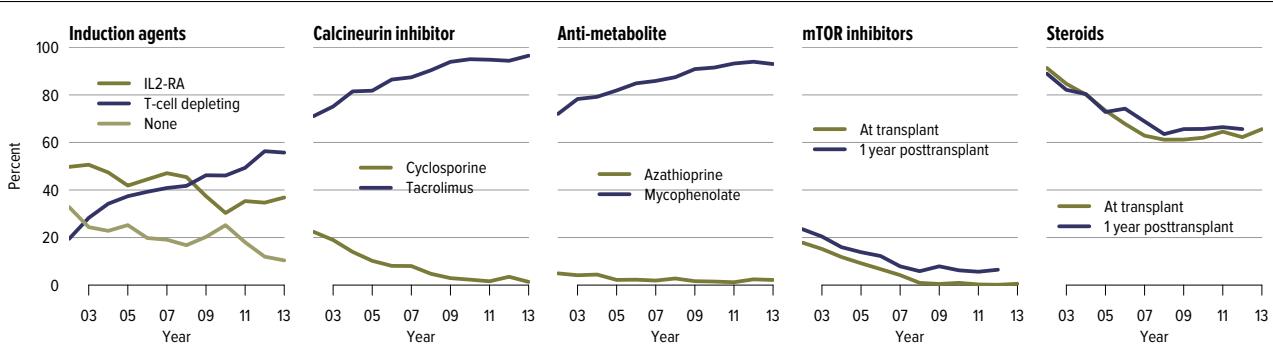
Donor serology is reported on the OPTN Donor Registration Form and recipient serology on the OPTN Transplant Recipient Registration Form. Any evidence for a positive serology indicates positive for that serology. If all fields are unknown, incomplete, or pending, the person is categorized as "unknown" for that serology; otherwise, serology is assumed negative. CMV, cytomegalovirus; EBV, Epstein-Barr virus.



KI 7.16 Incidence of PTLD among pediatric kidney transplant recipients, by recipient EBV status at transplant, 2001-2011

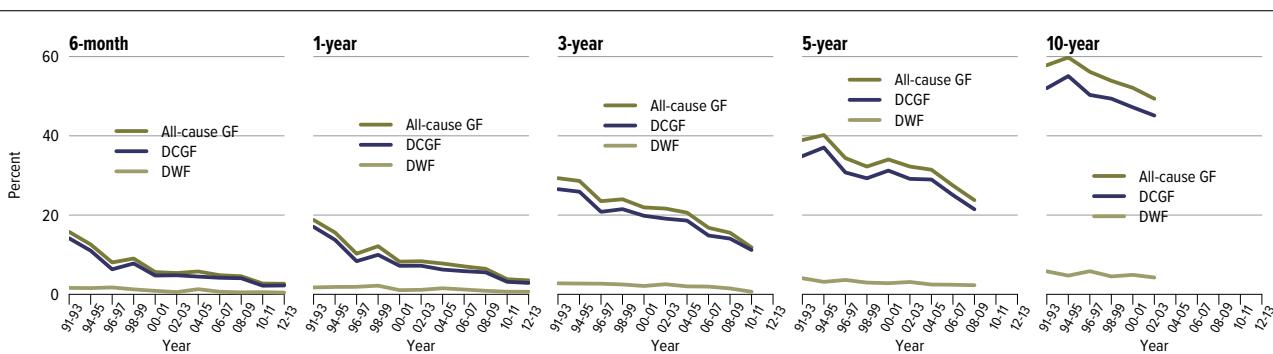
Cumulative incidence is estimated using the Kaplan-Meier competing risk method. Posttransplant lymphoproliferative disorder (PTLD) is identified as a reported complication or cause of death on the OPTN Transplant Recipient Follow-up Form or on the Posttransplant Malignancy form as polymorphic PTLD, monomorphic PTLD, or Hodgkin disease. Only the earliest date of PTLD diagnosis is considered. EBV, Epstein-Barr virus.

pediatric transplant



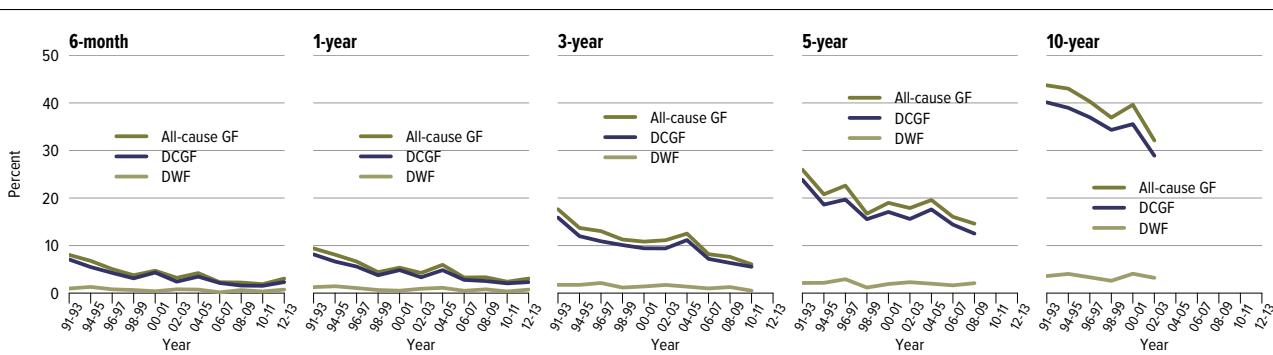
KI 7.17 Immunosuppression in pediatric kidney transplant recipients

One-year posttransplant data are limited to patients alive with graft function at 1 year posttransplant. Mycophenolate includes mycophenolate mofetil and mycophenolate sodium. IL2-RA, interleukin-2 receptor antagonist; mTor, mammalian target of rapamycin.



KI 7.18 Outcomes among pediatric kidney-alone transplant recipients: deceased donor

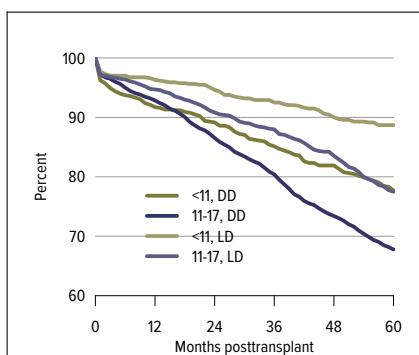
Percentage for each outcome is unadjusted, computed using Kaplan-Meier competing risk methods. Death with function (DWF) is defined as no graft failure before death; death-censored graft failure (DCGF) is defined as return to dialysis or retransplant; all-cause graft failure (GF) is defined as any graft failure.



KI 7.19 Outcomes among pediatric kidney-alone transplant recipients: living donor

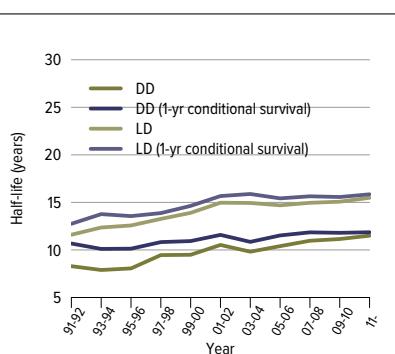
Percentage for each outcome is unadjusted, computed using Kaplan-Meier competing risk methods. Death with function (DWF) is defined as no graft failure before death; death-censored graft failure (DCGF) is defined as return to dialysis or retransplant; all-cause graft failure (GF) is defined as any graft failure.

pediatric transplant



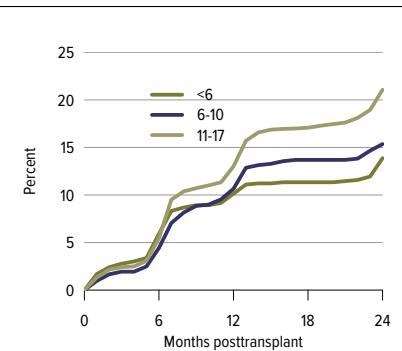
KI 7.20 Graft survival among pediatric kidney transplant recipients, by age and donor type, 2004-2008

Graft survival estimated using unadjusted Kaplan-Meier methods. DD, deceased donor; LD, living donor.



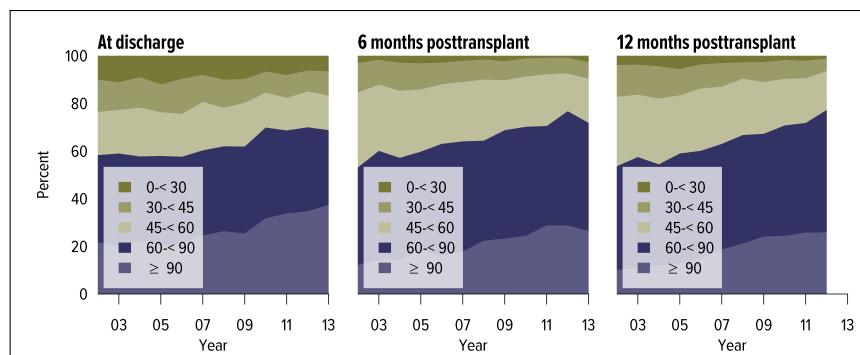
KI 7.21 Graft half-lives for pediatric kidney transplant recipients

The half-life for a transplant cohort (e.g., 2010 kidney transplants) is the time point at which 50% of transplanted grafts have failed. A conditional half-life for a transplant cohort is the same calculation but limited to recipients who survive with a functioning graft for at least 1 year posttransplant. DD, deceased donor; LD, living donor.



KI 7.22 Incidence of first acute rejection among pediatric kidney transplant recipients, by age, 2007-2011

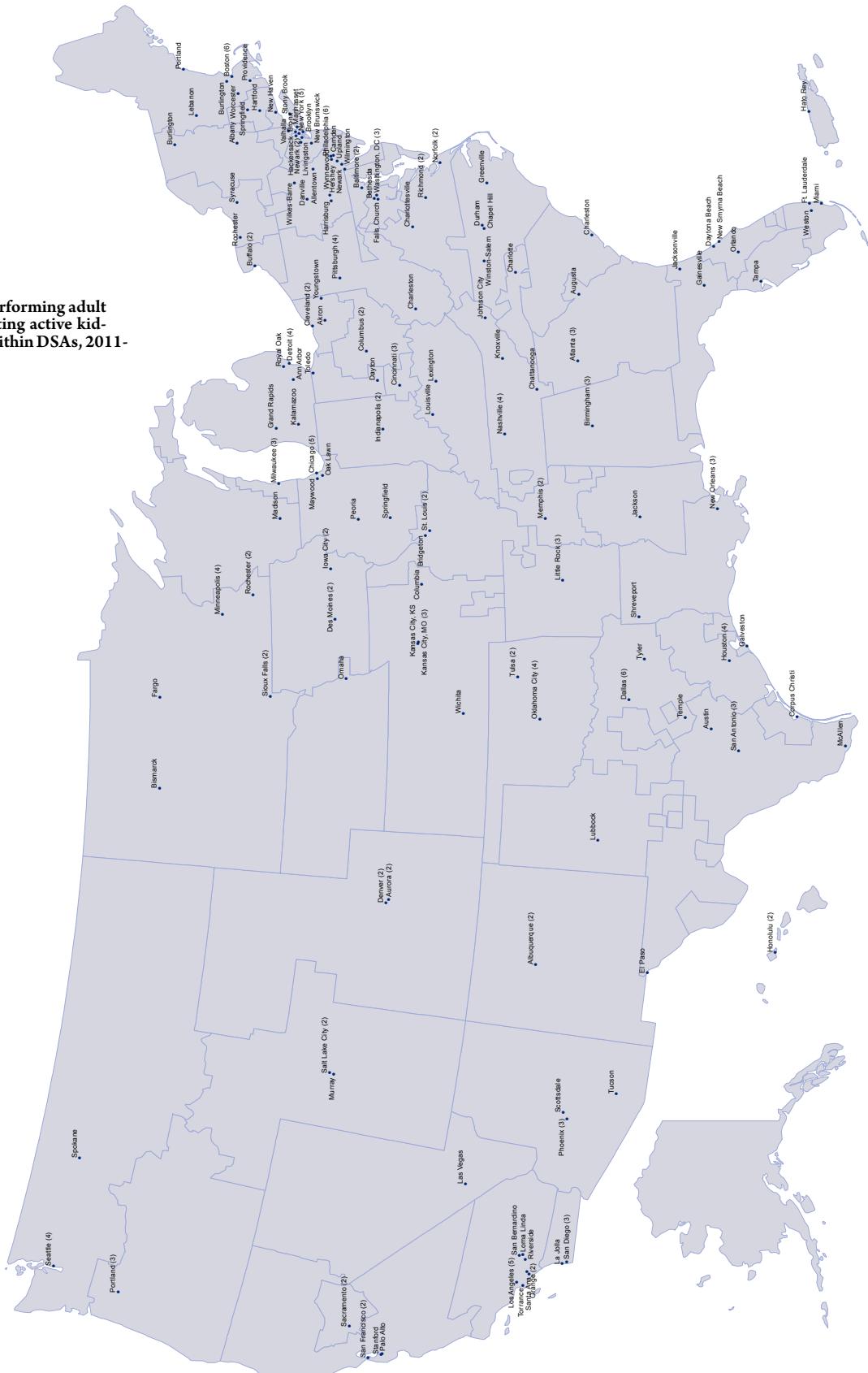
Acute rejection is defined as a record of acute or hyperacute rejection, or a record on the OPTN Transplant Recipient Registration Form or Transplant Recipient Follow-up Form of an anti-rejection drug being administered. Only the first rejection event is counted. Cumulative incidence is estimated using the Kaplan-Meier competing risk method.

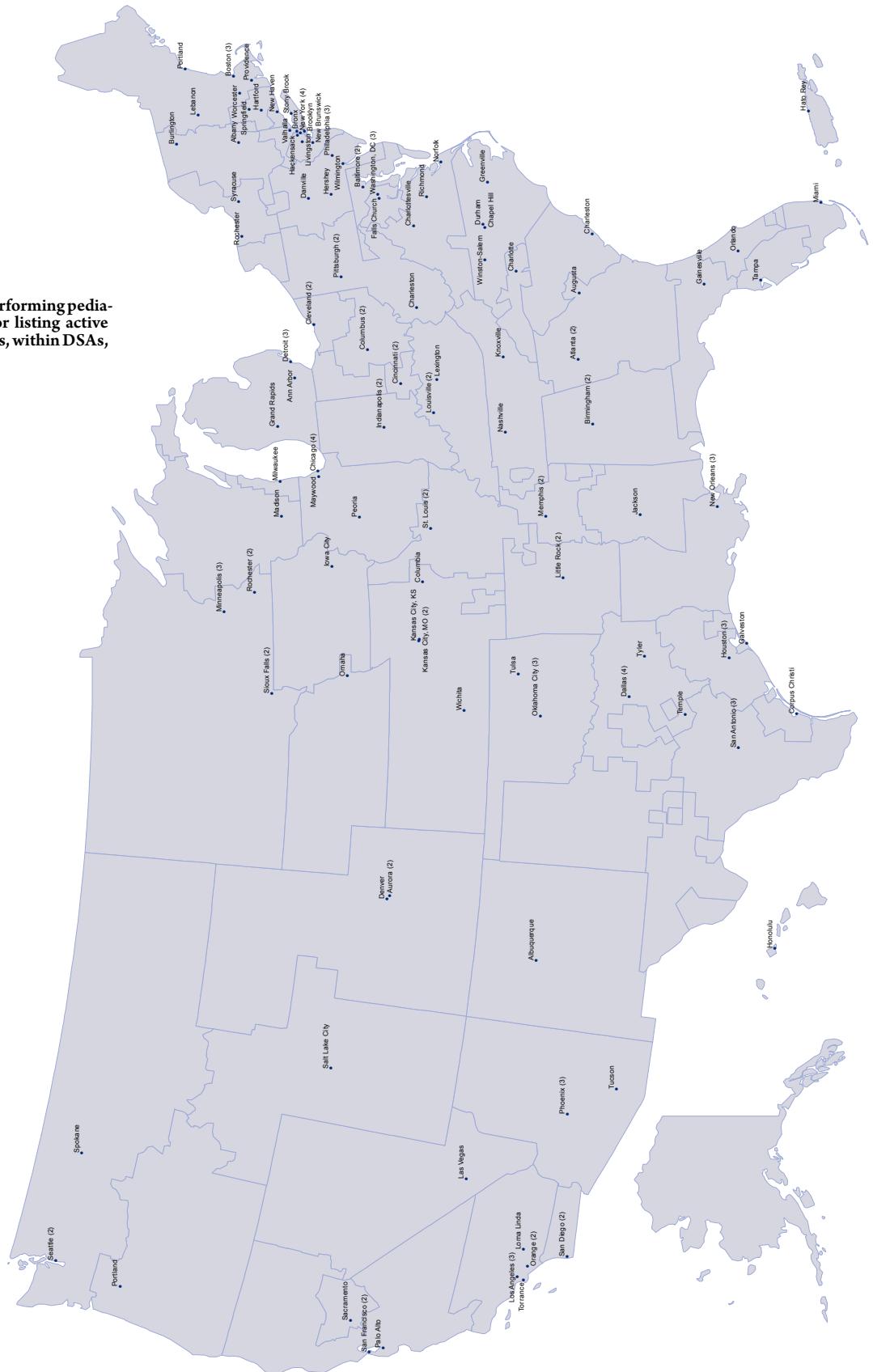


KI 7.23 Distribution of eGFR at discharge and at 6 and 12 months posttransplant, among pediatric kidney-alone transplant recipients

GFR ($\text{mL}/\text{min}/1.73 \text{ m}^2$) estimated using the bedside Schwartz equation, and computed for patients alive with graft function at the given time point. Equation: $\text{eGFR} = 0.413 \times \text{Height}(\text{cm})/\text{Creatinine}(\text{mg}/\text{dL})$.

KI 8.1 Centers performing adult transplants or listing active kidney candidates, within DSAs, 2011-2013





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