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OPTN/SRTR 2014 ANNUAL DATA REPORT:

KIDNEY

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Abstract

Kidney transplant provides significant survival, cost, and quality-of-life benefits over dialysis in patients with end-stage kidney disease, but the number of kidney transplant candidates on the waiting list continues to grow annually. By the end of 2014, nearly 100,000 adult candidates and 1500 pediatric candidates were waiting for kidney transplant. Not surprisingly, waiting times also continued to increase, along with the number of adult candidates removed from the list due to death or deteriorating medical condition. Death censored graft survival has increased after both living and deceased donor transplants over the past decade in adult recipients. The majority of the trends seen over the past 5 years continued in 2014. However, the new allocation system was implemented in late 2014, providing an opportunity to assess changes in these trends in the coming years.

Keywords

End-stage renal disease; kidney transplant; organ allocation; waiting list

Introduction

The 2014 kidney transplant data report reveals ongoing trends consistent with the past 5–10 years, including a growing waiting list, longer waiting times, and decreasing rates of living donation. More encouraging are ongoing improvements in posttransplant outcomes, such as rates of acute rejection, death censored graft loss, and posttransplant diabetes. These trends are particularly interesting, however, in light of the new allocation system implemented in December 2014, and they provide an opportunity to look for signals of changes brought about by the new system in 2015.

The new allocation system characterizes deceased donors using the kidney donor risk index (KDRI), which includes donor age, height, weight, race/ethnicity, history of hypertension or diabetes, cause of death, serum creatinine, hepatitis C status, and donation after cardiac death status. A lower KDRI score is associated with longer graft survival. KDRI scores are converted to percentiles (kidney donor profile index [KDPI]) every year based on all donors from whom a kidney was recovered for the purpose of transplant during the previous year. In an attempt to better match donor kidneys that have a longer predicted survival to recipients with the longest predicted survival, kidneys with a KDRI percentile of 20% or less are now preferentially allocated to candidates in the top 20% of estimated posttransplant survival. Priority is given to candidates awaiting multiple organs, candidates with calculated panel-reactive antibodies (CPRA) 98% and above, zero-HLA mismatch kidneys, pediatric candidates, and prior living donors. Additional priority points are given on a sliding scale to candidates with CPRA greater than 19%, and the most priority is given to the most highly sensitized candidates, with local, regional, and national priority for organ offers given to those with CPRA 98%, 99%, and 100%, respectively. Blood type A2 and A2B kidneys are now offered to medically suitable type B candidates. In addition, children receive priority for kidneys with a KDPI of less than 35%. Finally, candidates who are listed after initiating dialysis are given credit for time spent on dialysis prior to listing.

Many predictions have been made regarding how these changes will affect waitlist and posttransplant outcomes. However, these forecasts were not designed to predict how human behaviors will change in response to this new system, allowing the possibility of some unexpected changes. Results from the first 6 months under the new system reveal several noteworthy changes that were predicted, including greatly increased access to transplant for high-CPRA candidates, more transplants for candidates with longer dialysis duration, and fewer mismatches in expected longevity between donor kidneys and recipients. Since the new system was not implemented until late in the year, its impact was limited in 2014 but will be fully evident in 2015 and in subsequent years.

Regarding overall trends, 2014 was similar to the previous 5 years, and this consistency may provide increased ability to detect early signals of changing outcomes in the years to come. Of particular interest are the populations who are intended to benefit from the new system, such as highly sensitized candidates or those with blood type B, as well as candidates with lengthy pre-listing dialysis time. While we will have to wait several years to assess many of the anticipated benefits of the new system, such as the rate of death with a functioning graft among deceased donor recipients, some changes may be evident within 1 or 2 years, such as the proportion of waitlisted candidates who have been on dialysis for longer than 6 years.

Ultimately, the new allocation system may have only limited ability to correct the most fundamental challenge to kidney transplantation in the current era: a growing demand for kidney transplants that continues to outpace a stagnant or declining supply of both deceased and living donor kidneys. These data illustrate this issue while also highlighting potential targets for improvement.

Adult Kidney Transplant

Waiting List

The number of candidates on the kidney transplant waiting list continued to increase steadily, from nearly 58,000 in 2004 to 98,956 in 2014 (Figure KI 1.1). More than a third of the nearly 100,000 candidates on the list in 2014 were listed as inactive. Seventy-three percent of those who were inactive on day 7 post-listing were still undergoing workup. Of those who were active at the time of listing but inactive at the end of 2014, 36.8% were inactivate due to deteriorating medical condition (Table KI 1.1). Given that prevalent dialysis patients are now given credit for time spent on dialysis, the numbers of new candidates listed as inactive may decline, as there will be no benefit to early inactive listing.

Candidates aged 65 years or older continued to make up an increasing proportion of the waiting list; although they accounted for only 21.2% of the waiting list in 2014, this is an increase from 13.8% in 2004. Candidate racial and sex distribution changed little in 10 years, with slight increases in the proportion of Hispanic candidates and decreases in the proportion of white candidates. Diabetes as the cause of end-stage kidney disease also increased slightly from 29.7% to 35.5% over 10 years. The number of candidates on dialysis for at least 6 years remained high but relatively stable at 29.0%, but this proportion may change, particularly within the next 1 or 2 years as patients who were on dialysis for many years prior to listing will immediately gain priority. Time on the waiting list continued to increase; the proportion of candidates waiting more than 5 years rose from 10.9% in 2004 to 14.7% in 2014, and fewer candidates had been waiting for less than 1 year (27.4%, vs. 34.3% in 2004). Waiting time increased despite an increase from 43.0% to 51.5% in the proportion of candidates who reported willingness to accept an expanded criteria kidney (Figure KI 1.2, Table KI 1.2). Large geographic variation by donation service area remained in the percentage of candidates undergoing deceased donor transplant within 5 years, ranging from 6.0% to 72.2% (Figure KI 1.5).

The new kidney allocation system may alleviate this geographic disparity somewhat, but reducing geographic imbalances in access to transplant was not its central goal. Rather, it was designed such that future changes to the geographic distribution of kidneys could be integrated into the system while still preserving its core elements (e.g., longevity matching). Under the new allocation system, more priority is given to the most highly sensitized candidates with the highest CPRA values (≥ 98%), and blood type A2 and A2B kidneys are offered to appropriate blood type B candidates; it will be interesting to see whether the proportion of candidates with these characteristics who undergo transplant increases in the years to come. In addition, as priority for low KDPI kidneys will be given to patients with the greatest predicted posttransplant survival, it will be important to note the proportion of older patients who undergo transplant.

The demand for kidney transplant continues to outstrip supply. In 2014, 31,288 adult candidates were added to the waiting list and 29,023 were removed. While the number of candidates on the list increased, the number of living donor kidney transplants decreased. In 2014, 11,594 candidates underwent deceased donor transplant and 5082 underwent living donor transplant (after waiting on the deceased donor waiting list), and over 8000 candidates

died or were removed from the list due to deteriorating medical condition. Although the mortality rate on the waiting list has been declining (Figure KI 1.9), the number of candidates removed from the list due to deteriorating medical condition increased from 2511 in 2012 to 3384 in 2014 (Table KI 1.3). The median number of years to deceased donor transplant also increased markedly from 5.5 in 2003 and 7.6 in 2007. The median time to transplant for candidates listed since 2008 has yet to be determined as half of these candidates have not yet undergone transplant (Figure KI 1.7). Of candidates listed in 2011, 45.7% were still waiting by the end of 2014, 8.7% had died, 9.0% had been removed from the list, 20.8% had undergone deceased donor transplant, and 15.7% had undergone living donor transplant (Figure KI 1.6). Given the increased morbidity, mortality, and allograft failure associated with longer time on dialysis before transplant, these trends may worsen, particularly in older adults, as waiting times continue to increase. In addition, as the new allocation system may decrease the likelihood of transplant in older adults, trends in waitlist outcomes by age and willingness to accept a kidney with KDPI greater than 85% will be important areas of research.

Deceased Donation

The rate of deceased donor kidney donation by state ranged from 6.7 to 29.7 donations per 1000 deaths in 2011–2013 (Figure KI 2.2). Demographic characteristics of donors remained relatively unchanged over the past decade (Figure KI 2.1). However, as in previous years, a large proportion of kidneys recovered for transplant were not transplanted, particularly kidneys recovered from donors aged 50 to 64 years (30.7% not transplanted); donors aged 65 years or older (58.5%); and donors with diabetes (43.5%), hypertension (34.5%), or terminal creatinine above 1.5 mg/dL (33.6%). Of particular alarm, 29.8% of kidneys that were biopsied were not transplanted, compared with 6.6% of kidneys that were not biopsied, despite lack of evidence that biopsy findings predict patient or graft survival. Given increasing time on the waiting list and increasing rates of removal from the list due to deteriorating medical condition, in conjunction with relatively stagnant rates of deceased donor kidney transplants, the potential use of these kidneys should be investigated. Figure KI 2.4 shows the percentages of kidneys recovered in 2014 that were not transplanted by donation after circulatory death (DCD)/donation after brain death (DBD) status (18.7% and 17.8%, respectively). Of note, the rate of discard was no higher for DCD than for DBD kidneys, despite the challenges of successfully transplanting DCD kidneys. This may be due to obtaining transplant center commitment to use DCD kidneys before they are retrieved. In contrast, there was a graded effect of KDPI on the rate of kidneys not transplanted; 56.2% of kidneys with a KDPI greater than 85% were not transplanted in 2014. The new allocation system includes changes in the way these kidneys are allocated with the intent of reducing the numbers not transplanted, and it will be important to assess whether this desired effect is realized. Percentages of donors with the ten characteristics included in the KDRI remained relatively stable for most factors; however, the percentage of donors with cerebrovascular accident as cause of death continued a long-term decreasing trend, while the percentages with weight greater than 80 kg, terminal serum creatinine greater than 1.5, and DCD status continued to increase (Figure KI 2.5). Among donors whose kidneys were ultimately transplanted, the number who died of anoxia increased and the number who died of head trauma or cerebrovascular accident/stroke decreased (Figure KI 2.6).

Living Donation

Living donation rates have declined steadily for more than a decade, largely driven by a decrease in the number of biologically related kidney donations, from 4340 in 2004 to 2693 in 2014 (Figure KI 3.1). The proportion of donors aged 50 years or older increased, while the proportion of younger donors decreased (Figure KI 3.2). Living kidney donation remained largely a laparoscopic procedure, with a rate of conversion to open procedures of only 1.2.% (Figure KI 3.3). Reported complications at the time of donation and at 6 months and 12 months, including readmission, re-operation, vascular complications, and other complications were rare, but loss to follow-up, particularly at 12 months, may result in underreporting of adverse events (Figure KI 3.4, Figure KI 3.5). Transplant programs have been accepting living donors with increasing donor body mass index (BMI); percentages of donors with BMI 25 to less than 30 and 30 to less than 35 kg/m^2 increased from 35.3% and 15.9% in 2004 to 41.2% and 19.7% in 2014 (Figure KI 3.6), respectively. Deaths within 1 year of living donation were rare; in all, 20 deaths were reported within the first year between 2010 and 2014, only nine of which were attributed to causes other than trauma or suicide (Table KI 3.1).

Transplant

In all, 17,814 adult and pediatric kidney transplants were performed in the US in 2014 (Figure KI 4.1). The distribution by age, sex, race, and primary diagnosis is shown in Figure KI 4.2; rates have been relatively stable among these groups, except for an increase in the number of transplants among adults aged 65 years or older and slight increases among black and Hispanic candidates and candidates with diabetes as a primary diagnosis. Table KI 4.1 shows the demographics for all adults who underwent transplant in 2014; most transplants occurred in recipients aged 50 to 64 years; 61.5% of recipients were male and 50.7% were white, 25.4% black, 15.7% Hispanic, and 6.8% Asian. Diabetes was a primary diagnosis for 28.6%, and 12.5% had a CPRA of 80% or higher. Medicare was primary payer for 58.6%, and most had some time on renal replacement therapy (Table KI 4.1).

Immunosuppressive medication use has continued to evolve over the past decade, with more recipients receiving induction therapy with T-cell depleting agents and 92.3% receiving tacrolimus, compared with 2.4% receiving cyclosporine. Seventy percent of recipients were on corticosteroids at 1 year posttransplant, a decrease from 81.6% in 2003 (Figure KI 4.4).

Outcomes

For both deceased donor and living donor transplants, rates of death-censored graft failure improved steadily over the past decade; 5-year all-cause graft failure rates were 26.5% for deceased donor transplants and 14.3% for living donor transplants. Rates of death with a functioning graft have remained the same or slightly increased at 10 years for both deceased and living donor transplants, which may reflect a higher rate of transplants in older recipients who are more likely to die before graft failure (Figure KI 5.1, Figure KI 5.2). Of particular interest under the new allocation system will be how kidneys with the highest KDPI compare to expanded criteria donor kidneys; 5-year graft survival was substantially lower for the highest KDPI group of greater than 85%, at 60.0%, compared with 81.3% for the lowest KDPI group of 20% or less. Graft survival also differed by primary diagnosis;

recipients with cystic kidney disease and glomerulonephritis had better graft survival at 5 years than those with hypertension or diabetes as a cause of kidney failure (Figure KI 5.3). Among living donors, 5-year graft survival differed by recipient age and primary diagnosis. In addition, race continued to play a role; graft survival was worse for black recipients and best for Asian recipients (Figure KI 5.4).

Rates of acute rejection in the first year posttransplant have improved consistently since 2008 and have been similar for deceased donor and living donor recipients (Figure KI 5.6). Rates of posttransplant diabetes have also improved, including rates at 1 year for recipients with BMI 35 kg/m^2 or higher at the time of transplant (Figure KI 5.7). The incidence of posttransplant lymphoproliferative disorder (PTLD) at 5 years remained highest for recipients who were Epstein-Barr virus (EBV) negative at the time of transplant, 1.7% compared with 0.5% for those who were EBV positive. Finally, the percentage of recipients with an estimated glomerular filtration rate (eGFR) of 60 mL/min/1.73 m^2 or higher at 6 months increased from 42.4% in 2004 to 48.2% in 2014 (Figure KI 5.9).

Pediatric Kidney Transplant

Waiting List

In 2014, 967 pediatric candidates were added to the kidney transplant waiting list; 60% were added as inactive (Figure KI 6.1). The number of prevalent pediatric candidates on the waiting list has been slowly increasing and reached 1480 on December 31, 2014. The most common reason for inactive status among newly listed candidates in 2014 was incomplete work-up (60.3%). In contrast, the most common reasons among candidates who were active at listing but were inactive at the end of the year were too sick to undergo transplant (27.7%), too well to require transplant (20.5%), incomplete work-up (17.5%), and medical noncompliance (13.3%) (Table KI 6.1). The largest proportion of waitlisted pediatric candidates in 2014 were adolescents (aged 11 to 17 years, 68.4%), followed by ages 1 to 5 (16.3%) and 6 to 10 years (14.3%) (Figure KI 6.2). From 2004 to 2014, the age distribution shifted toward a lower proportion of adolescent candidates (49.6% in 2004, 37.8% in 2014) (Table KI 6.2). Proportions with congenital anomalies of the kidney and urinary tract (CAKUT) as primary cause of disease increased from 25.7% on December 31, 2004, to 32.6% on December 31, 2014, and glomerulonephritis decreased from 15.1% to 10.7%. Regarding sensitization, most candidates (66.1%) had a CPRA of less than 20%, and 20% had a CPRA of greater than 80%. Multi-organ listing was uncommon; only 1.8% of pediatric candidates were awaiting multi-organ transplant in 2014. The leading cause of end-stage kidney disease changed with age; CAKUT was most common in children aged younger than 6 years, while focal segmental glomerulosclerosis and glomerulonephritis were more common in older children (Figure KI 6.3).

Of pediatric candidates removed from the waiting list in 2014, 65.1% received a deceased donor kidney, 27.0% received a living donor kidney, 2.5% died, 1.0% were considered too sick to undergo transplant, and 0.2% were removed from the list because their condition improved (Table KI 6.3). Just over 60% of patients newly listed in 2011 underwent deceased donor transplant within 3 years, 22.7% underwent living donor transplant, 0.7% died, 2.6% were removed from the list, and 13.7% were still waiting (Figure KI 6.4). The rate of

deceased donor transplant in 2014 among pediatric waitlisted candidates was 98.2 per 100 active waitlist years (Figure KI 6.5), compared to 18.0 for adult candidates (Figure KI 1.4). The intent of the new kidney allocation system is to maintain this high level of access to transplant for pediatric patients. Transplant rates varied by age; the highest rate was for candidates aged younger than 6 years, at 117 per 100 active waitlist years. Rates also varied by CPRA, ranging from 143.0 per 100 active waitlist years for candidates with a CPRA of less than 1% to only 6.9 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: 1.3 per 100 waitlist years in 2013–2014 (Figure KI 6.6).

Transplant

The number of pediatric kidney transplants peaked in 2005 at 899, was approximately 750 between 2010 and 2013, and decreased to 716 in 2014 (Figure KI 6.7). The number of deceased donor transplants has exceeded the number of living donor transplants since 2005; in 2014 these numbers were 472 and 244, respectively. Just over 40% of recipients aged younger than 6 and 6 to 10 years underwent living donor transplant in 2014, compared with only 29.3% of those aged 11 to 17 years (Figure KI 6.8).

Regarding donor source and age at transplant, a higher proportion of living donor transplants were in recipients aged 1 to 5 years; this group accounted for 30.4% of pediatric living donor transplants and 20.2% of pediatric deceased donor transplants, compared with 20.5% and 17.6%, respectively, for recipients aged 6 to 10 years. A higher proportion of deceased donor transplants were in recipients aged 11 to 17 years (62.0% vs. 48.8%) (Table KI 6.4). The racial distribution differed among deceased and living donor transplant recipients. A higher proportion of living donor recipients were white (72.1% vs. 39.1%) and a higher proportion of deceased donor recipients were black (24.2% vs. 7.7%) and Hispanic (29.8% vs. 14.9%). Private insurance was more common among living donor recipients and Medicare/Medicaid was more common among deceased donor recipients. Most deceased donor recipients (63.9%) underwent transplant with a kidney from a donor with KPDI less than 20%; these kidneys are expected to last the longest. ABO incompatible transplants remained uncommon in pediatric kidney recipients, less than 1%. The number of HLA mismatches was higher among deceased donor recipients than among living donor recipients; 83.5% of deceased donor recipients and 22.2% of living donor recipients had more than three HLA mismatches in 2012–2014.

The combination of a donor who was positive for cytomegalovirus and a pediatric recipient who was negative occurred in 34.8% of deceased donor transplants and in 29.2% of living donor transplants (Table KI 6.5). The combination of a donor who was positive for EBV and a recipient who was negative occurred in 36.9% of deceased donor transplants and in 43.1% of living donor transplants.

Immunosuppressive Medication Use

Trends in immunosuppressive medications used in children and adolescents were similar to trends for adults. In 2014, interleukin-2 receptor antagonist (IL-2-RA) therapy for induction

was used in 35.8% and T-cell depleting agents in 57.0%. The percentage of recipients receiving no induction therapy continued to decline, reaching a low of 10.7% in 2014 (Figure KI 6.9). In 2014, tacrolimus was used as part of the initial maintenance immunosuppressive medication regimen in 95.0% of pediatric transplant recipients and mycophenolate in 94.9%. Mammalian target of rapamycin inhibitors were used in 5.3% of 2013 pediatric recipients at 1 year posttransplant. Corticosteroids were used in 61.4% of 2014 pediatric recipients at the time of transplant and in 64.7% of 2013 recipients at 1 year posttransplant. Regarding induction use by CPRA, T-cell depleting agents were more common with increasing CPRA and IL-2-RA use was more common with decreasing CPRA (Figure KI 6.10).

Outcomes

All-cause graft failure for deceased donor transplants was 3.2% at 6 months and 4.4% at 1 year for transplants in 2013–2014, 8.6% at 3 years for transplants in 2011–2012, 21.3% at 5 years for transplants in 2009–2010, and 51.2% at 10 years for transplants in 2003–2004 (Figure KI 6.12). Corresponding graft failure for living donor transplants was 2.7% at 6 months and 1 year for transplants in 2013–2014, 4.8% at 3 years for transplants in 2011–2012, 14.0% at 5 years for transplants in 2009–2010, and 34.1% at 10 years for transplants in 2003–2004 (Figure KI 6.13). For a cohort of recipients who underwent transplant 2005–2009, graft survival was highest for living donor recipients aged younger than 11 years (88.7% at 5 years) and lowest for deceased donor recipients aged 11 to 17 years (69.9% at 5 years) (Figure KI 6.14). The incidence of PTLD among EBV-negative recipients was 3.4% at 5 years posttransplant, compared with 0.7% among EBV-positive recipients (Figure KI 6.15). By age, incidence of reported acute rejection in the first posttransplant year was highest for recipients aged 11 to 17 years, at 13.2% for patients who underwent transplant in 2012–2013, compared with 11.5% among recipients aged younger than 6 years and 9% among recipients aged 6 to 10 years (Figure KI 6.16).

Short-term renal function, measured by eGFR, improved substantially over the past decade. The proportion of recipients with an eGFR of 90 mL/min/1.73 m^2 or higher at discharge increased from 20.7% in 2005 to 33.8% in 2014; at 6 months posttransplant, from 18.5% to 27.8; and at 1 year posttransplant, from 13.0% to 28.1% (Figure KI 6.17). Of recipients in the 2013 cohort, 75.1% had chronic kidney disease stage 1–2 at 1 year posttransplant, with an eGFR of 60 mL/min/1.73 m^2 or higher.

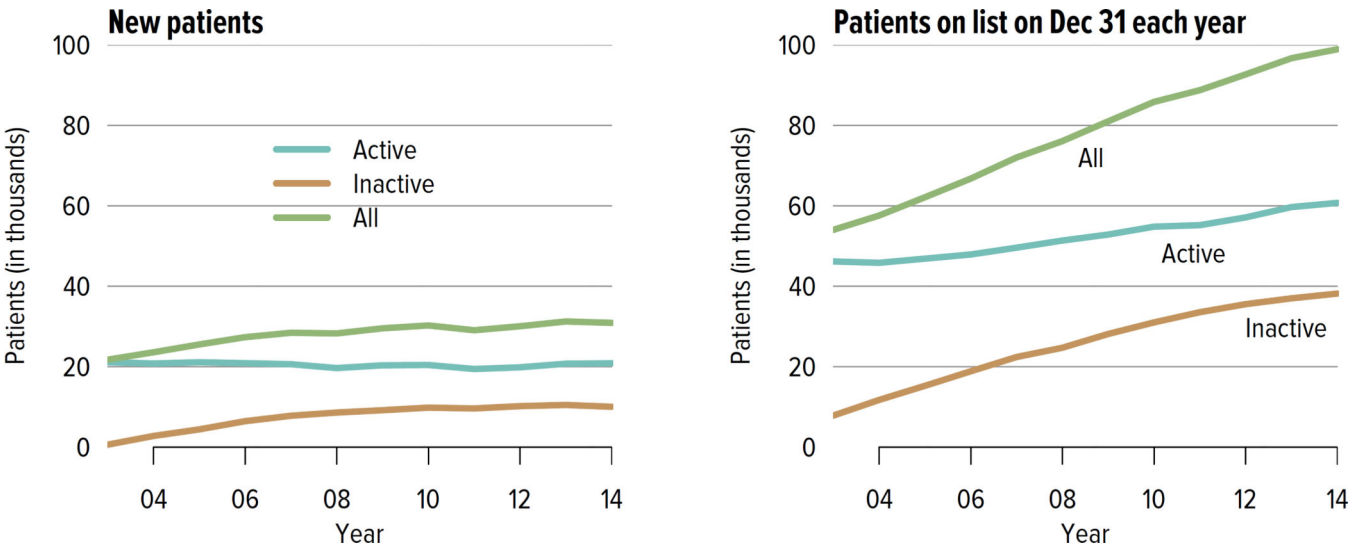

Figure KI 1.1. Adults waiting for kidney transplant

Candidates concurrently listed at multiple centers are counted once. Candidates who are active at at least one program are considered active; otherwise they are inactive. Active status is determined on day 7 after first listing. A new patient is one who first joined the list during the given year without ever listing in a prior year, or one who listed and underwent transplant in a prior year and relisted in the given year.

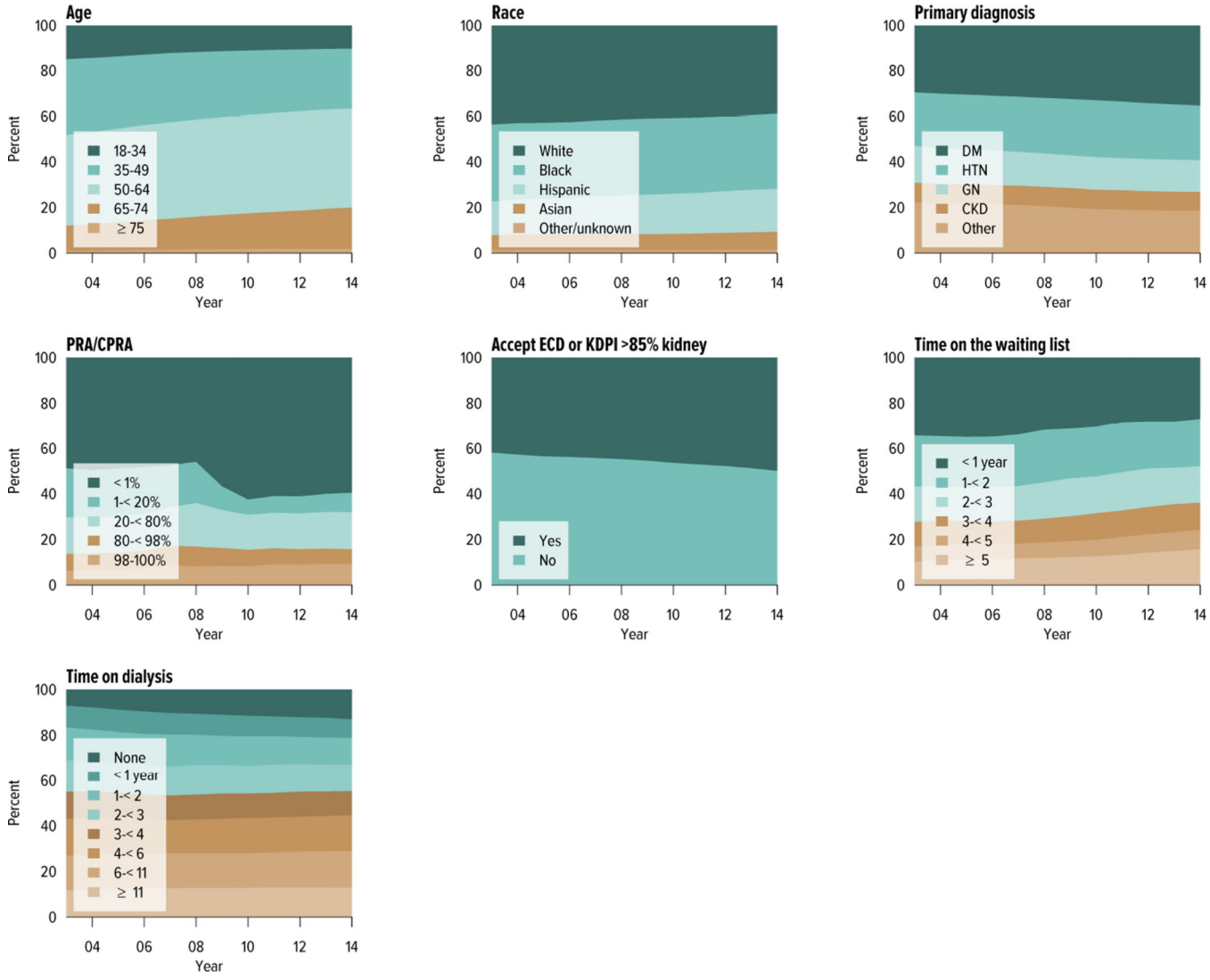

Figure KI 1.2. Distribution of adults waiting for kidney transplant

Candidates waiting for transplant at 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. ECD, expanded criteria donor.

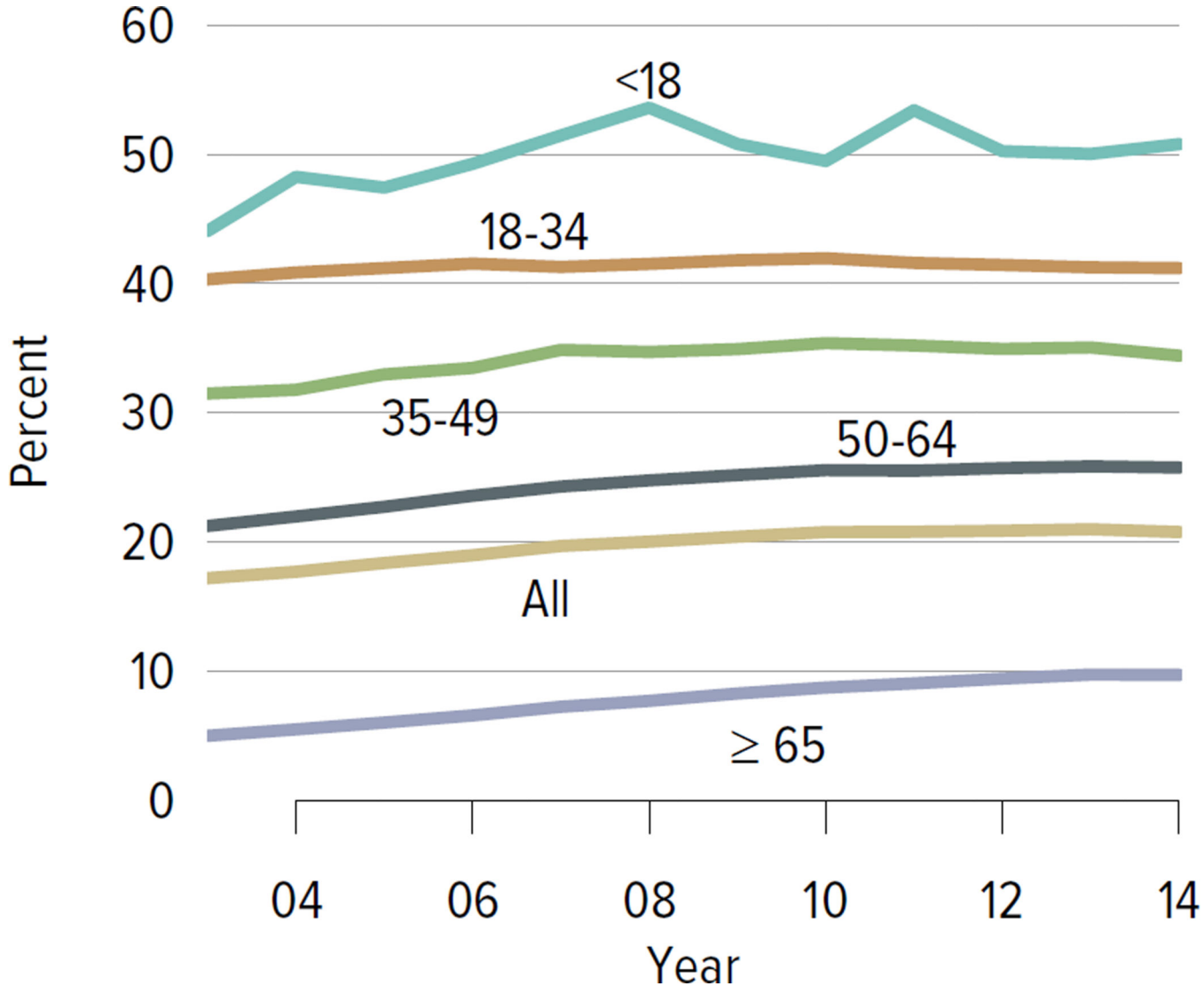

Figure KI 1.3. Prevalent dialysis patients waitlisted for kidney transplant, by age

Estimated percentage of prevalent dialysis patients waitlisted for kidney-alone transplant. Percentage calculated as the sum of point prevalent waitlist candidates divided by the sum of point prevalent dialysis patients on December 31 of each year. Dialysis data from the Consolidated Renal Operations in a Web-enabled Network (CROWN) dataset. Age calculated on December 31 of given year.

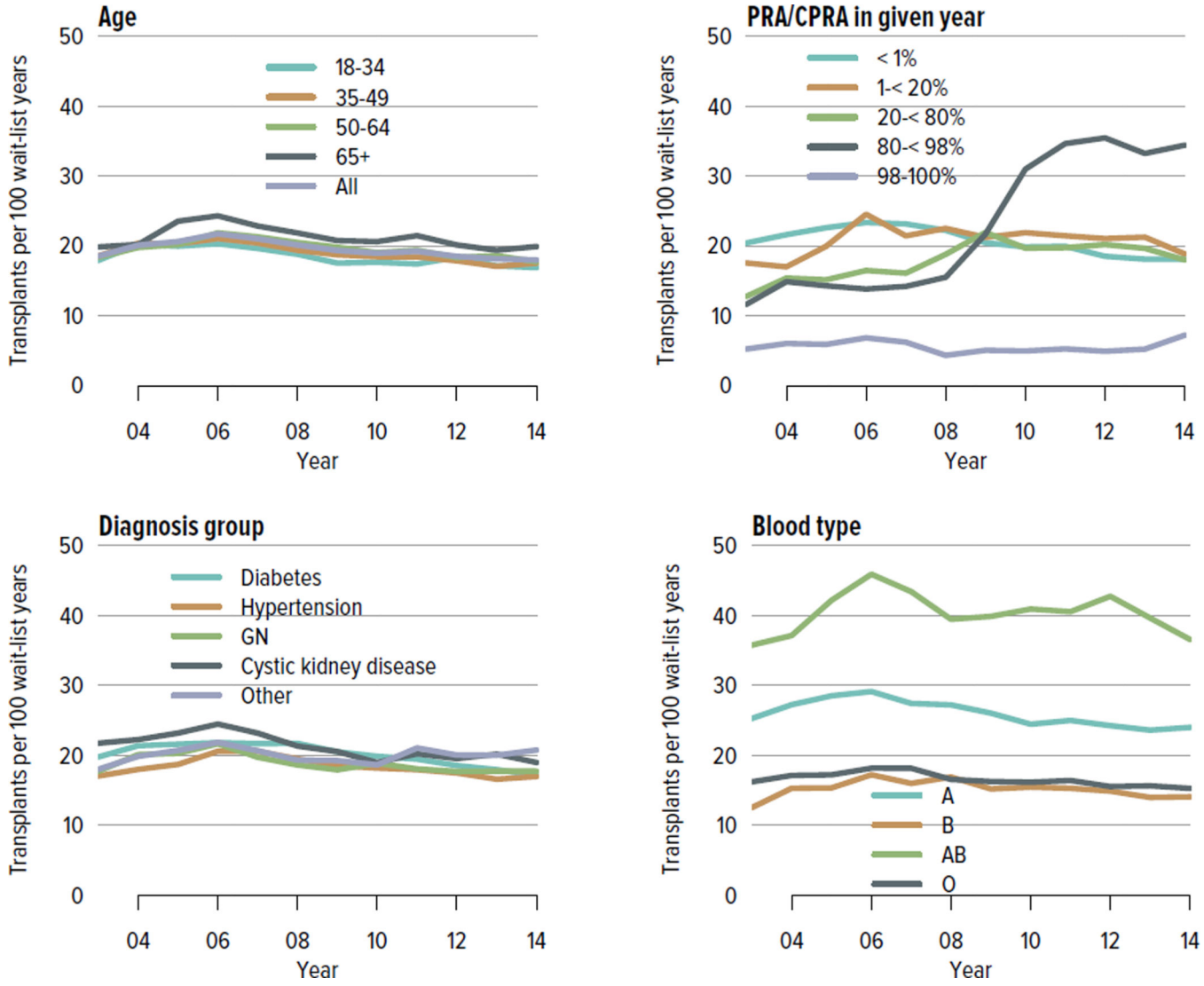

Figure KI 1.4. Deceased donor kidney transplant rates among active adult waitlist candidates

Transplant rates are computed as the number of deceased donor transplants per 100 patient-years of active waiting in a given year. Individual listings are counted separately. Rates with less than 10 patient-years of exposure are not shown. Rates by PRA/CPRA are computed in a time-dependent manner. GN, glomerulonephritis.

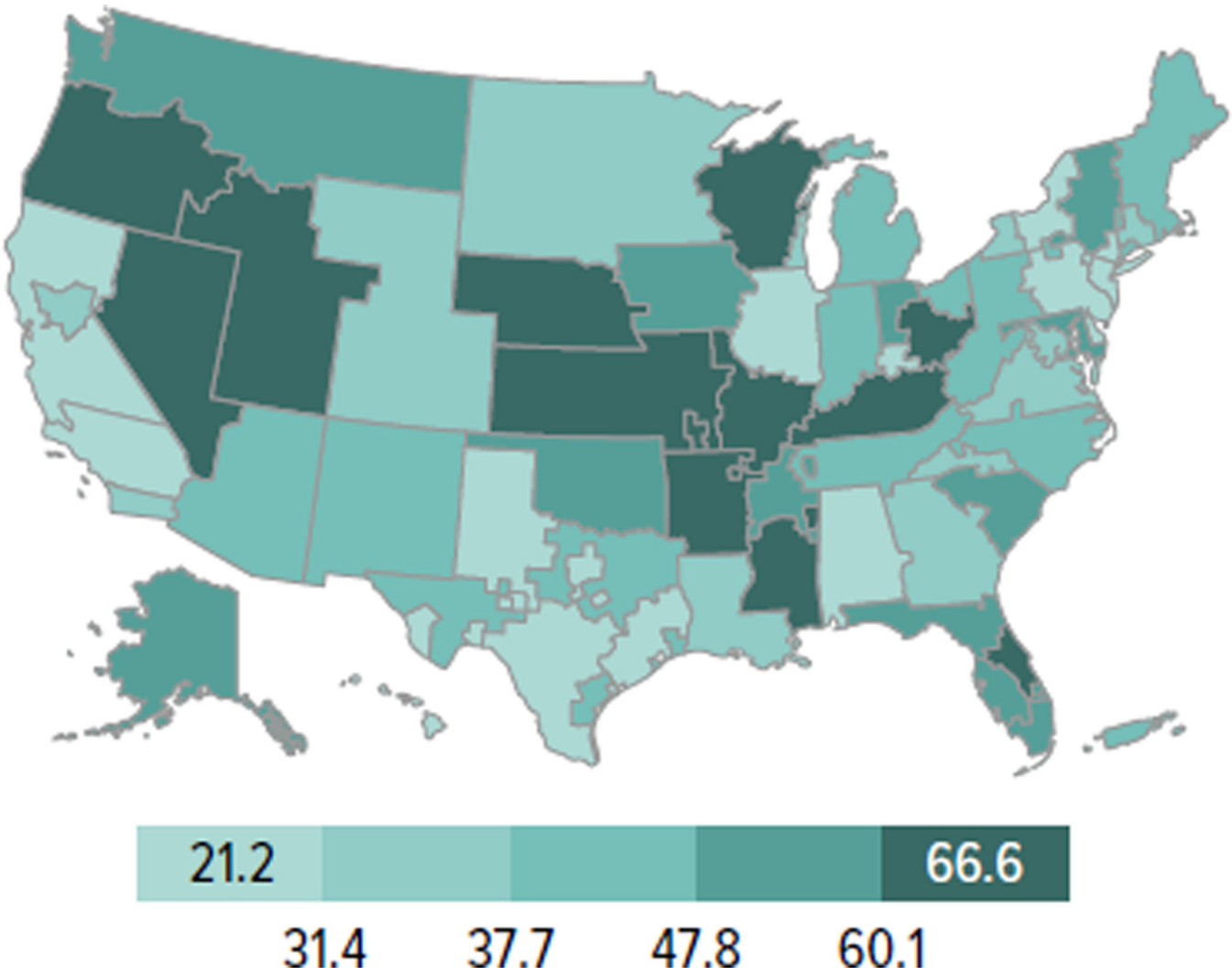

Figure KI 1.5. Percentage of adults who underwent deceased donor kidney transplant within 5 years of listing in 2009, by DSA

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

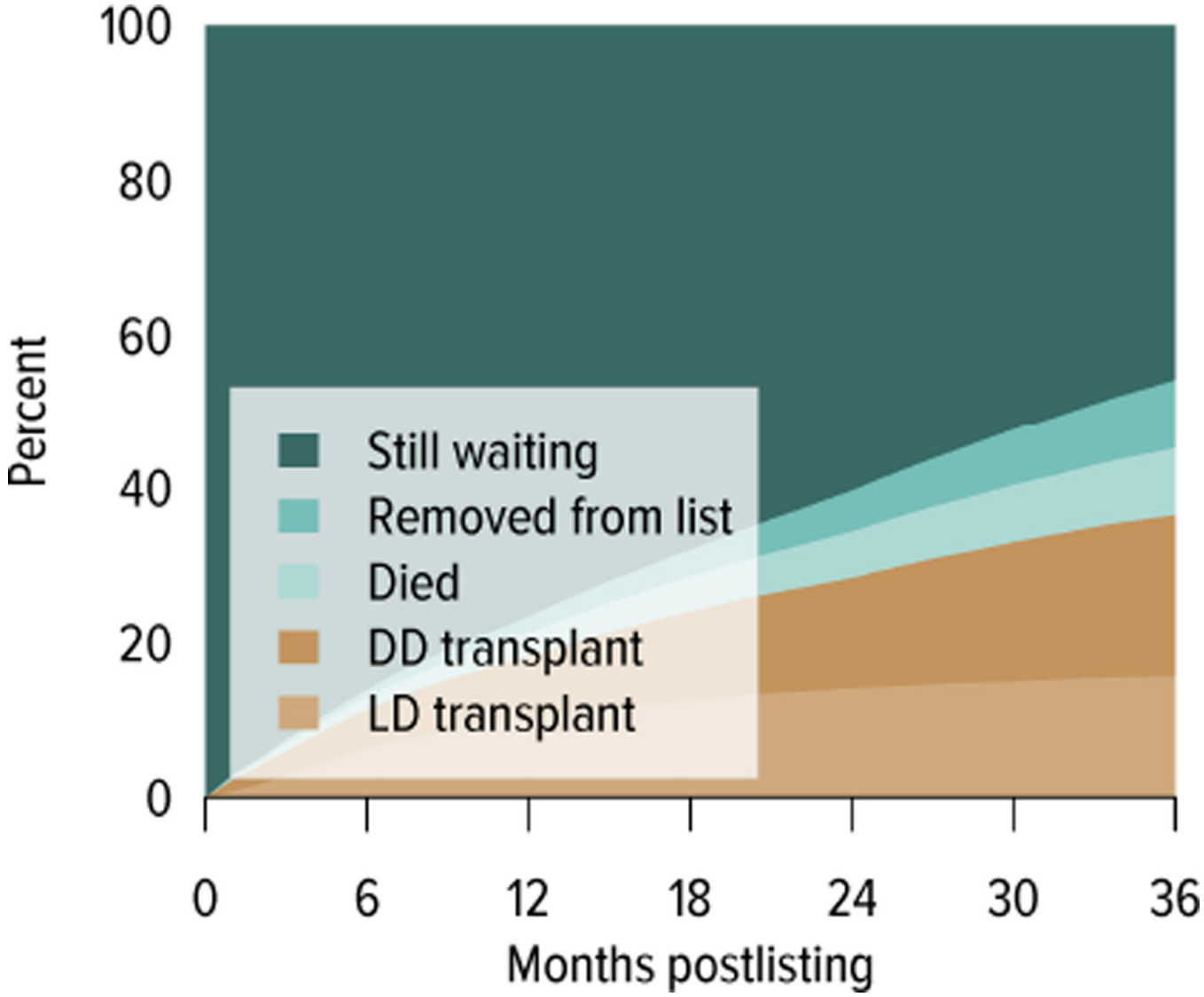

Figure KI 1.6. Three-year outcomes for adults waiting for kidney transplant, new listings in 2011

Adults waiting for any kidney transplant and first listed in 2011. 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.

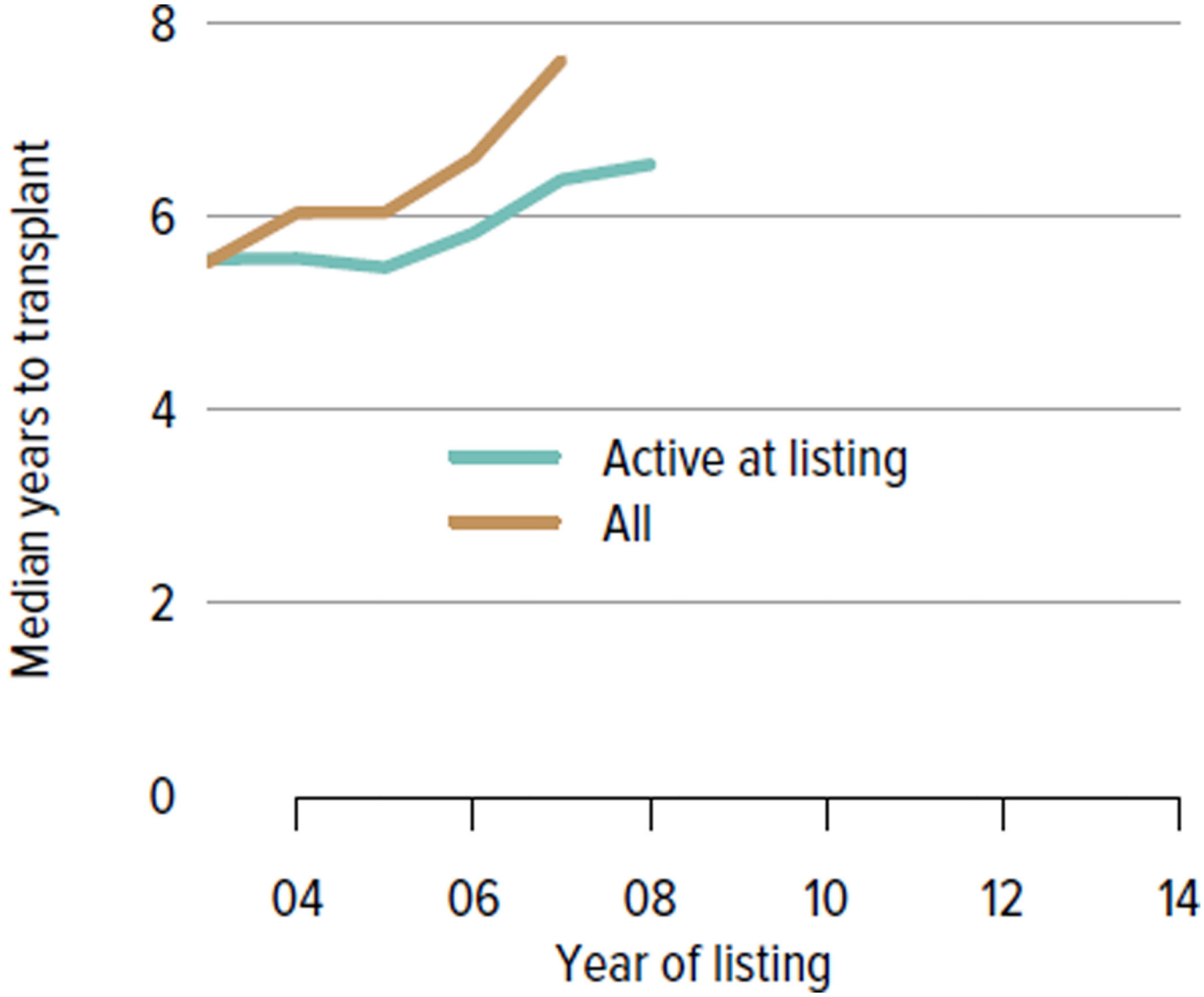

Figure KI 1.7. Median years to deceased donor kidney transplant for waitlisted adults

Observations censored on December 31, 2014; Kaplan-Meier competing risk 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.

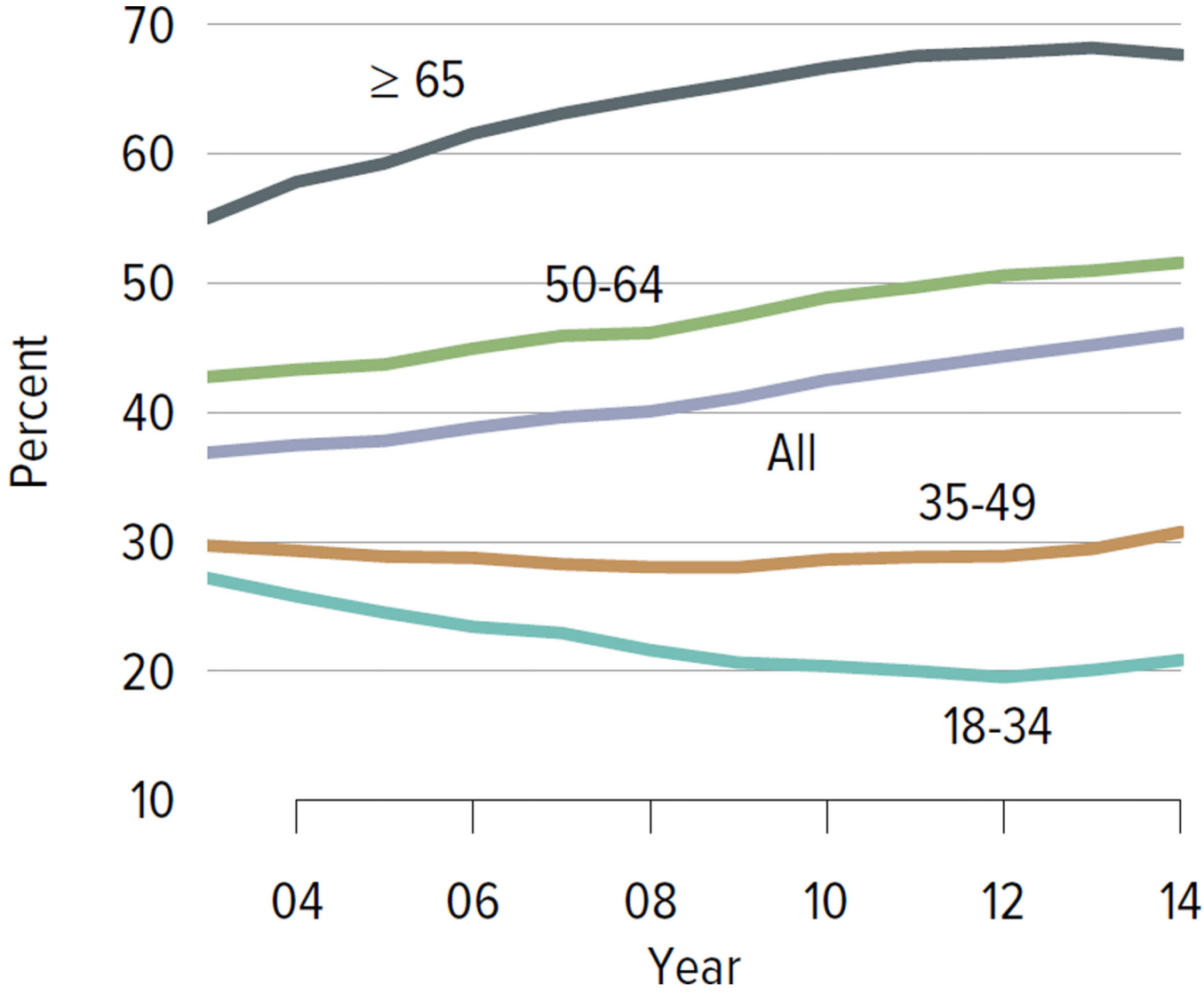

Figure KI 1.8. Adults willing to accept an ECD kidney, by age

Adults waiting for kidney transplant on December 31 of the given year. 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. In 2014, willingness to accept an ECD kidney also included willingness to accept a kidney with kidney donor profile index > 85%.

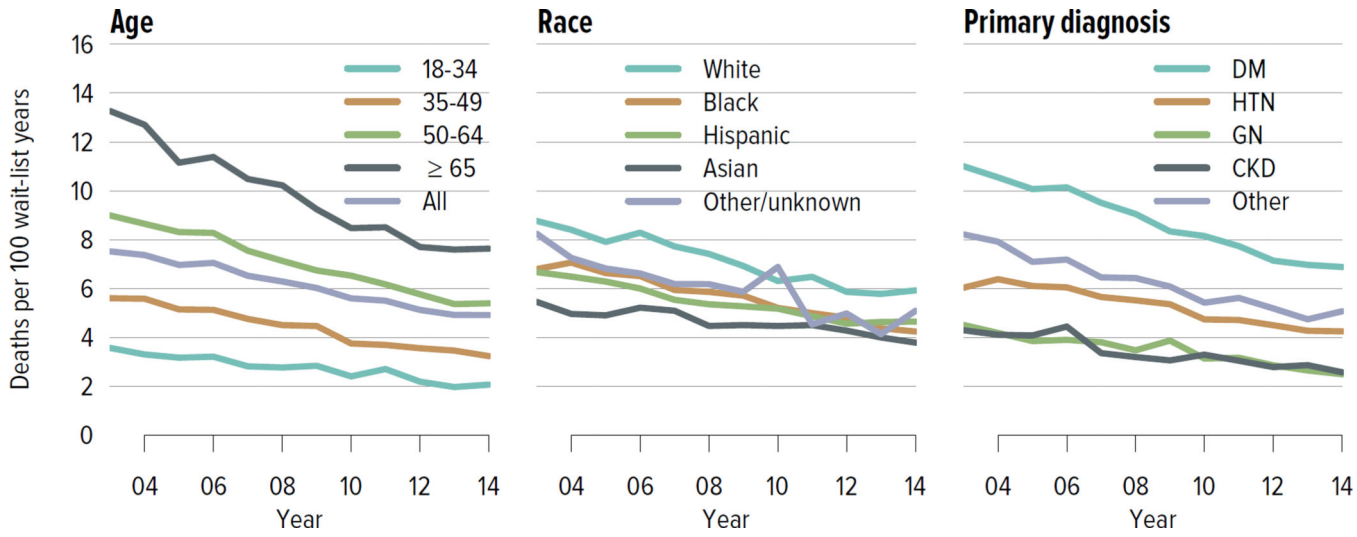

Figure KI 1.9. Mortality rates among adults waitlisted for kidney transplant

Mortality rates are computed as the number of deaths per 100 patient-years of waiting in the given year. Individual listings are counted separately. Rates with less than 10 patient-years of exposure are not shown. 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.

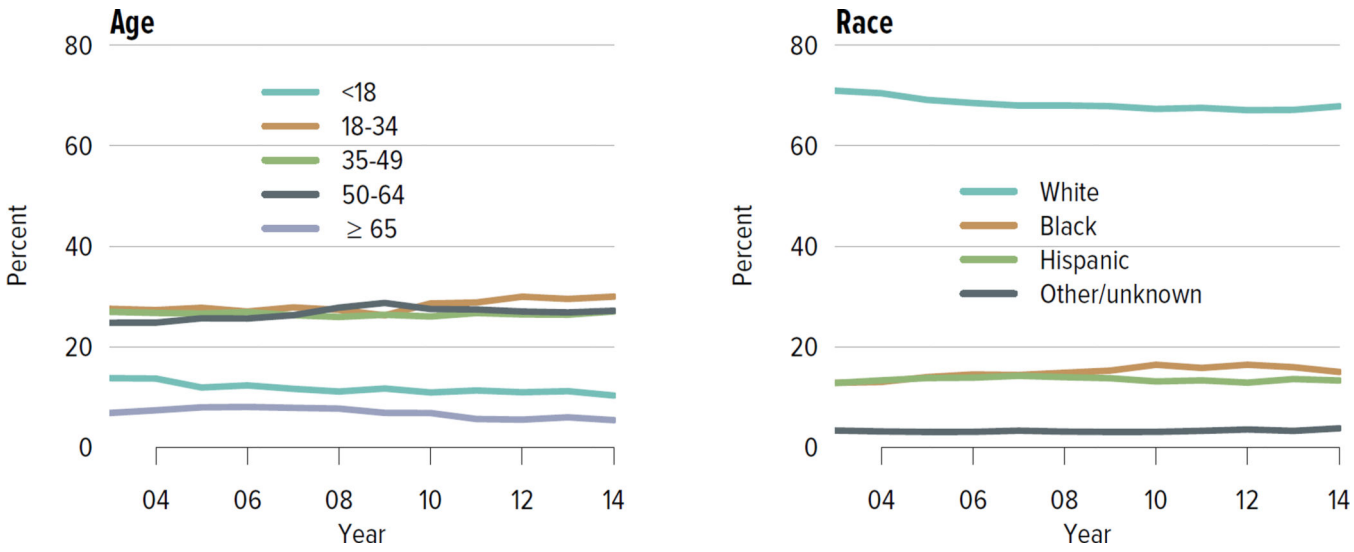

Figure KI 2.1. Demographics of deceased kidney donors

Deceased donors with at least one kidney recovered for transplant. Donors whose kidneys were recovered en-bloc are counted once, and donors whose kidneys were recovered separately are counted twice.

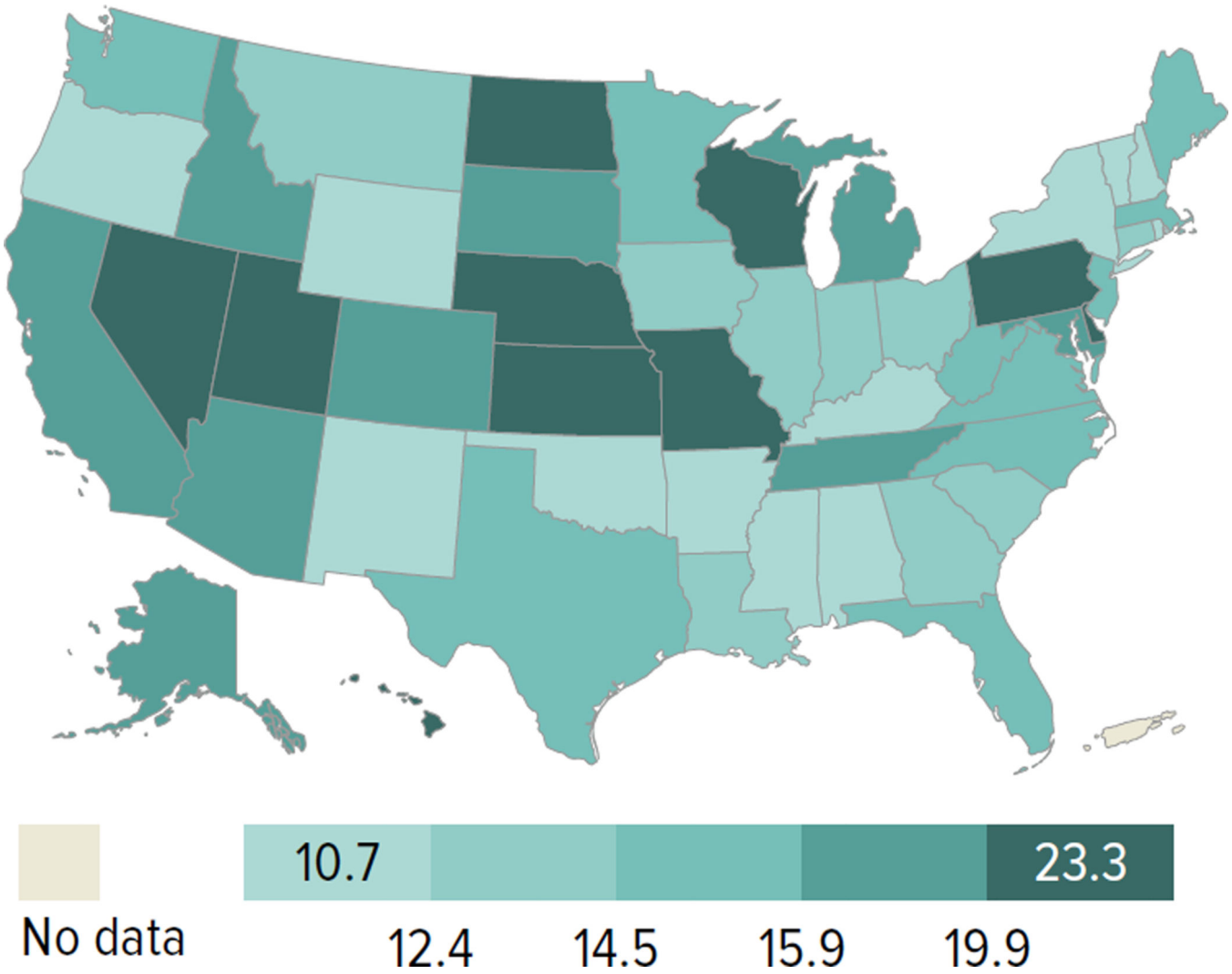

Figure KI 2.2. Deceased donor kidney donation rates (per 1000 deaths), by state, 2011–2013

Numerator: Deceased donors aged < 70 years, by state of death, whose kidneys were recovered for transplant from 2011 through 2013. Denominator: US deaths aged < 70 years, by state of death, from 2011 through 2013. State death data by age obtained through agreement with NAPHSIS (http://www.naphsis.org/programs/vital-statistics-data-research-request-process). Donors whose kidneys were recovered en-bloc are counted once, and donors whose kidneys were recovered separately are counted twice.

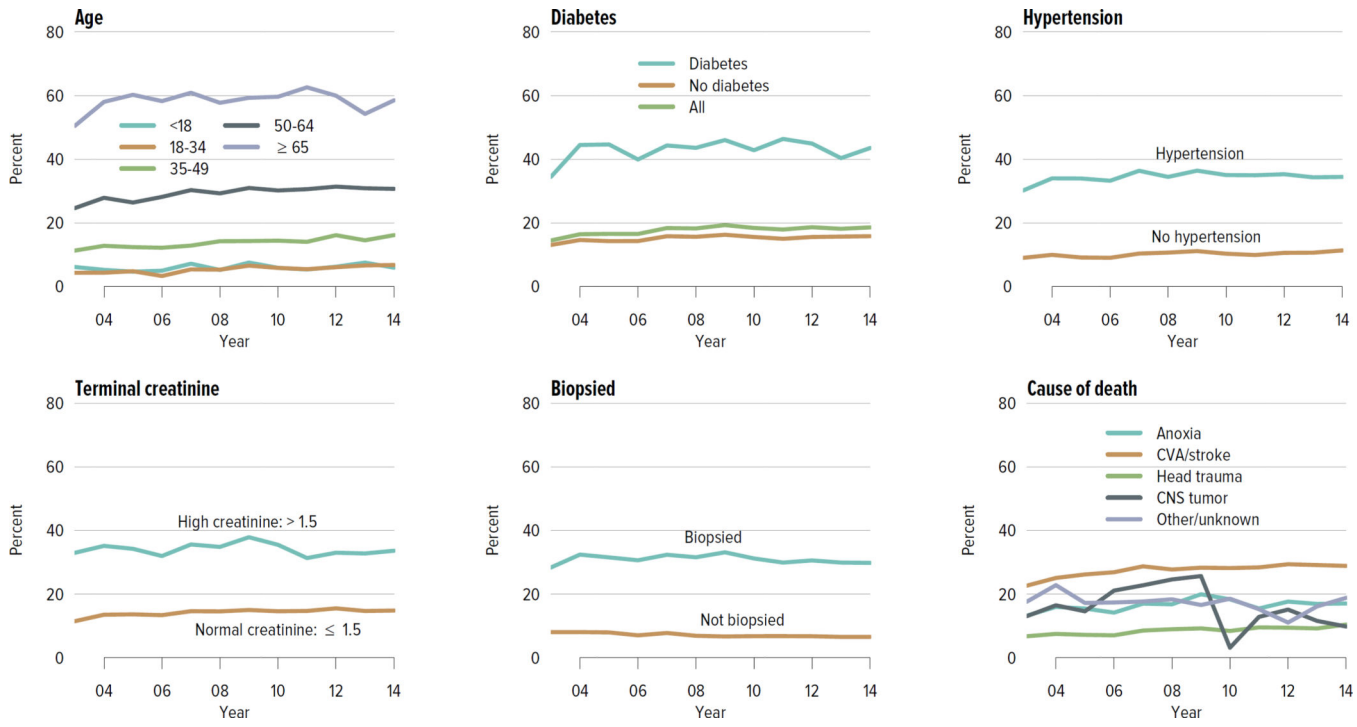

Figure KI 2.3. Rates of organs recovered for transplant and not transplanted

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

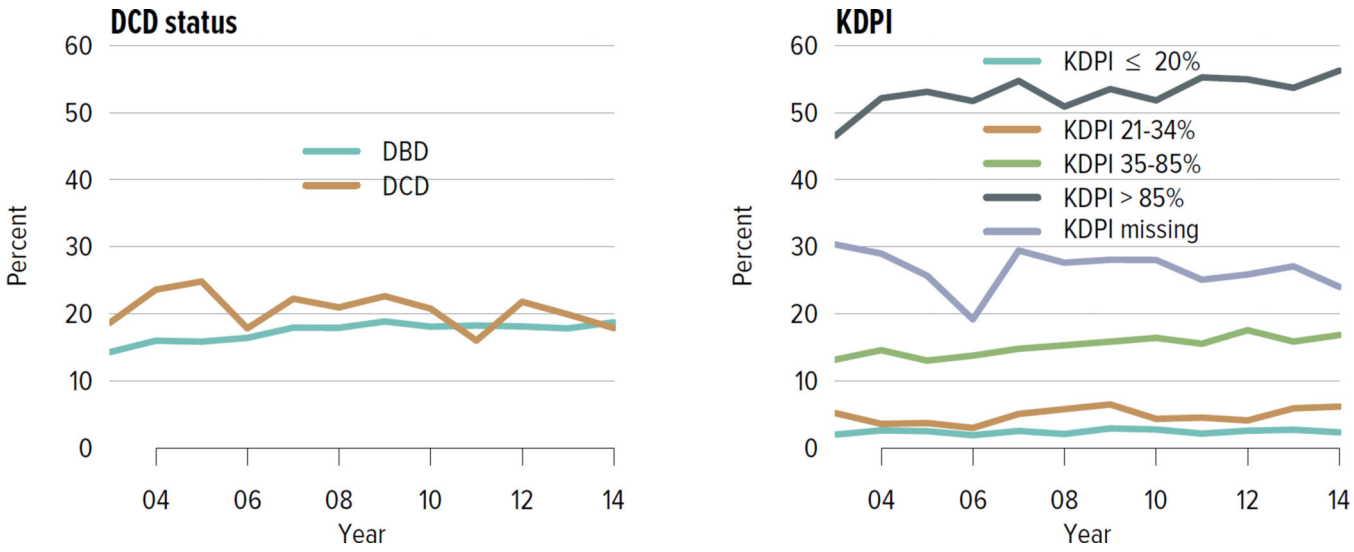

Figure KI 2.4. Kidneys recovered for transplant and not transplanted, by donor type

Percentages of kidneys not transplanted out of all kidneys recovered for transplant, by DCD/DBD and KDPI donor classification. The reference population for the KDRI to KDPI conversion is all deceased donor kidneys recovered for transplant in the US in 2014. Kidneys recovered en-bloc are counted once. DBD, donation after brain death; DCD, donation after circulatory death; KDPI, kidney donor profile index; KDRI, kidney donor risk index.

Figure KI 2.5. Donor-specific components of the kidney donor risk index

Donors with at least one transplanted kidney. The donor-specific components of the kidney donor risk index are shown, except for donor height and hepatitis C virus positive status. CVA, cerebrovascular accident; DCD, donation after circulatory death; SCr, serum creatinine.

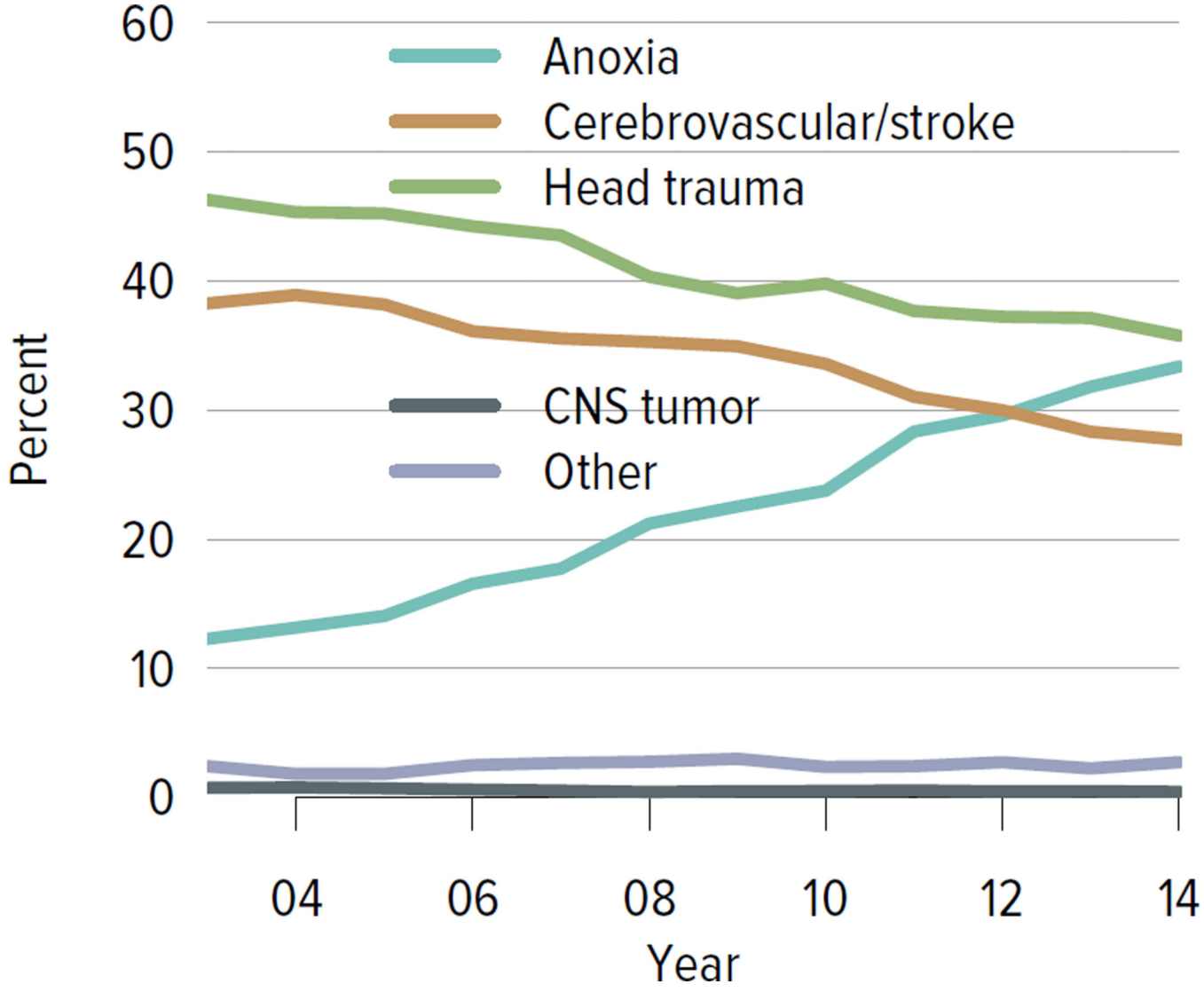

Figure KI 2.6. Cause of death among deceased kidney donors

Deceased donors whose kidneys were transplanted. Each donor is counted once. CNS, central nervous system.

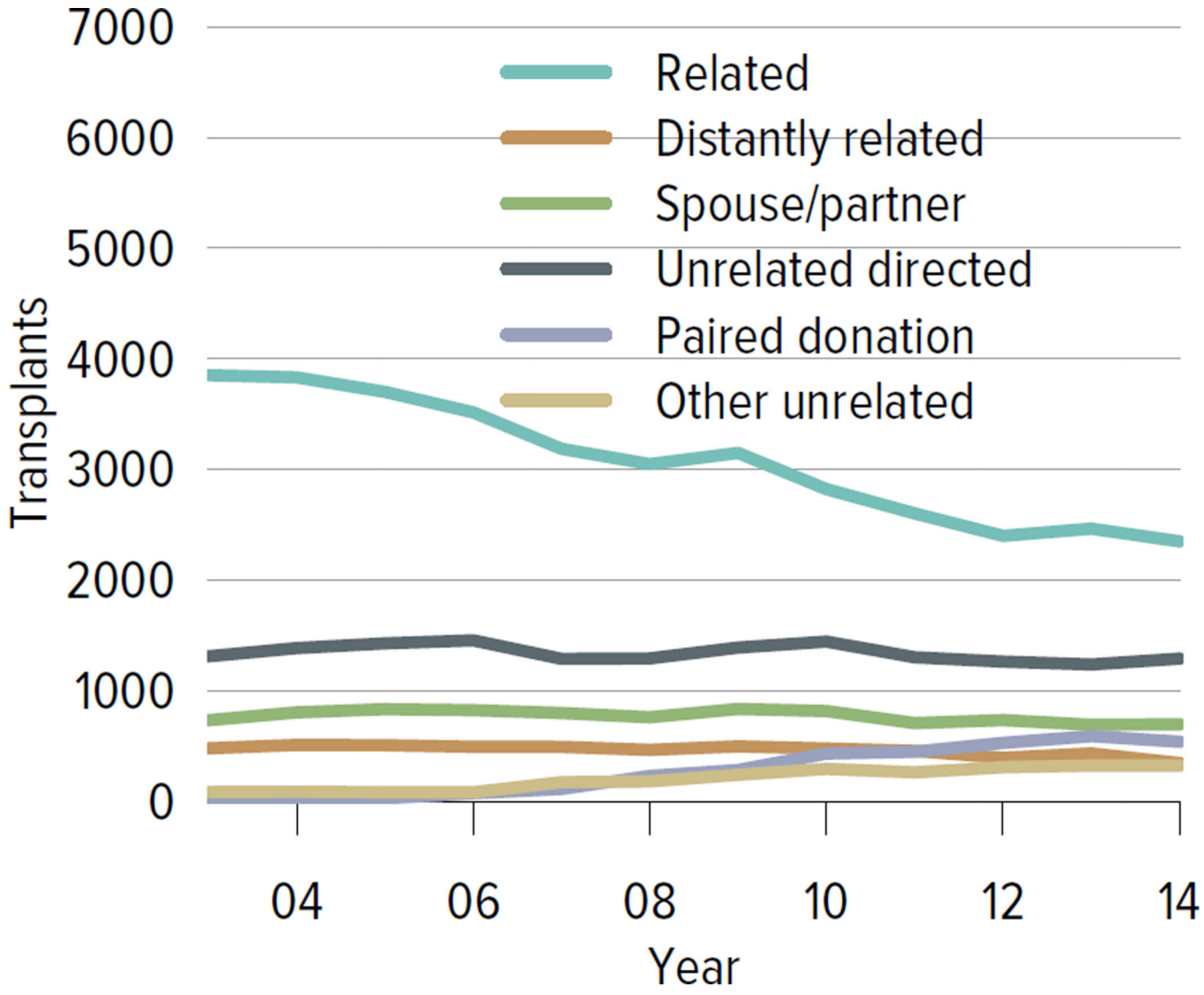

Figure KI 3.1. Kidney transplants from living donors, by donor relation

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

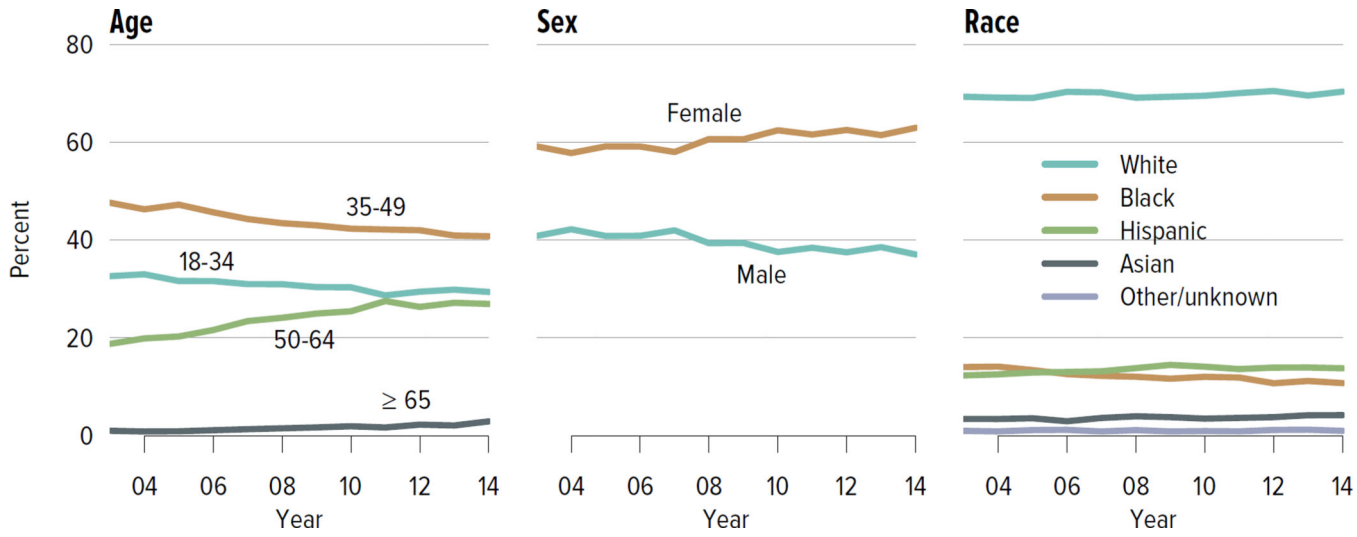

Figure KI 3.2. Living kidney donors, by age, sex and race
As reported on the OPTN Living Donor Registration Form.

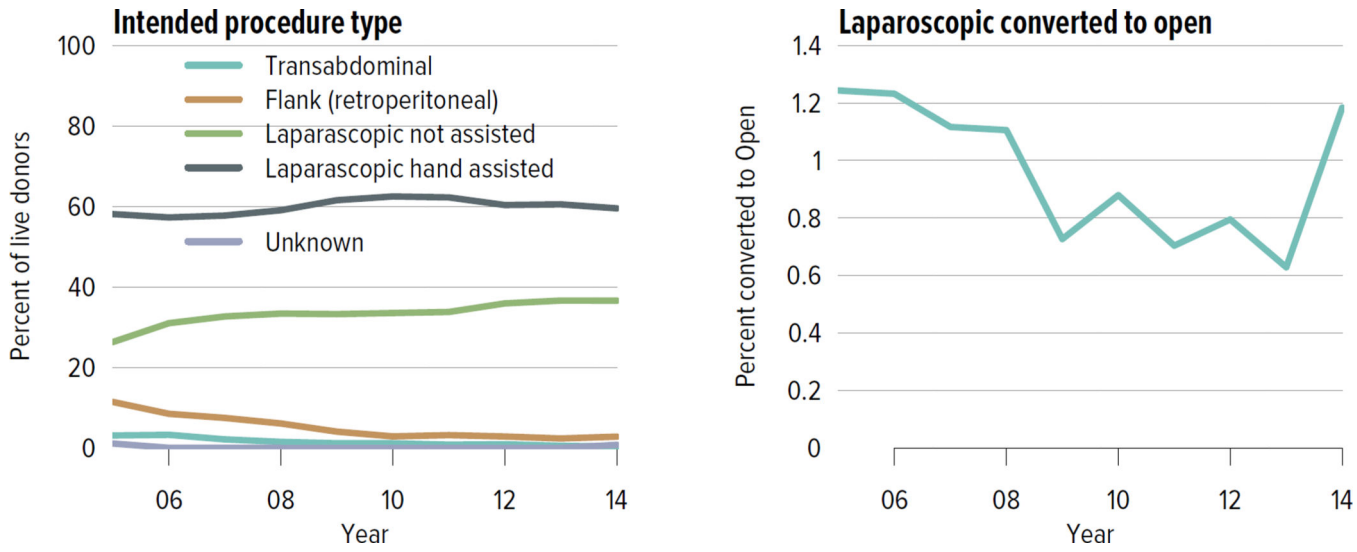

Figure KI 3.3. Intended living kidney donor procedure type

As reported on the OPTN Living Donor Registration Form. Right-hand panel shows percentages of intended laparoscopic procedures converted to open.

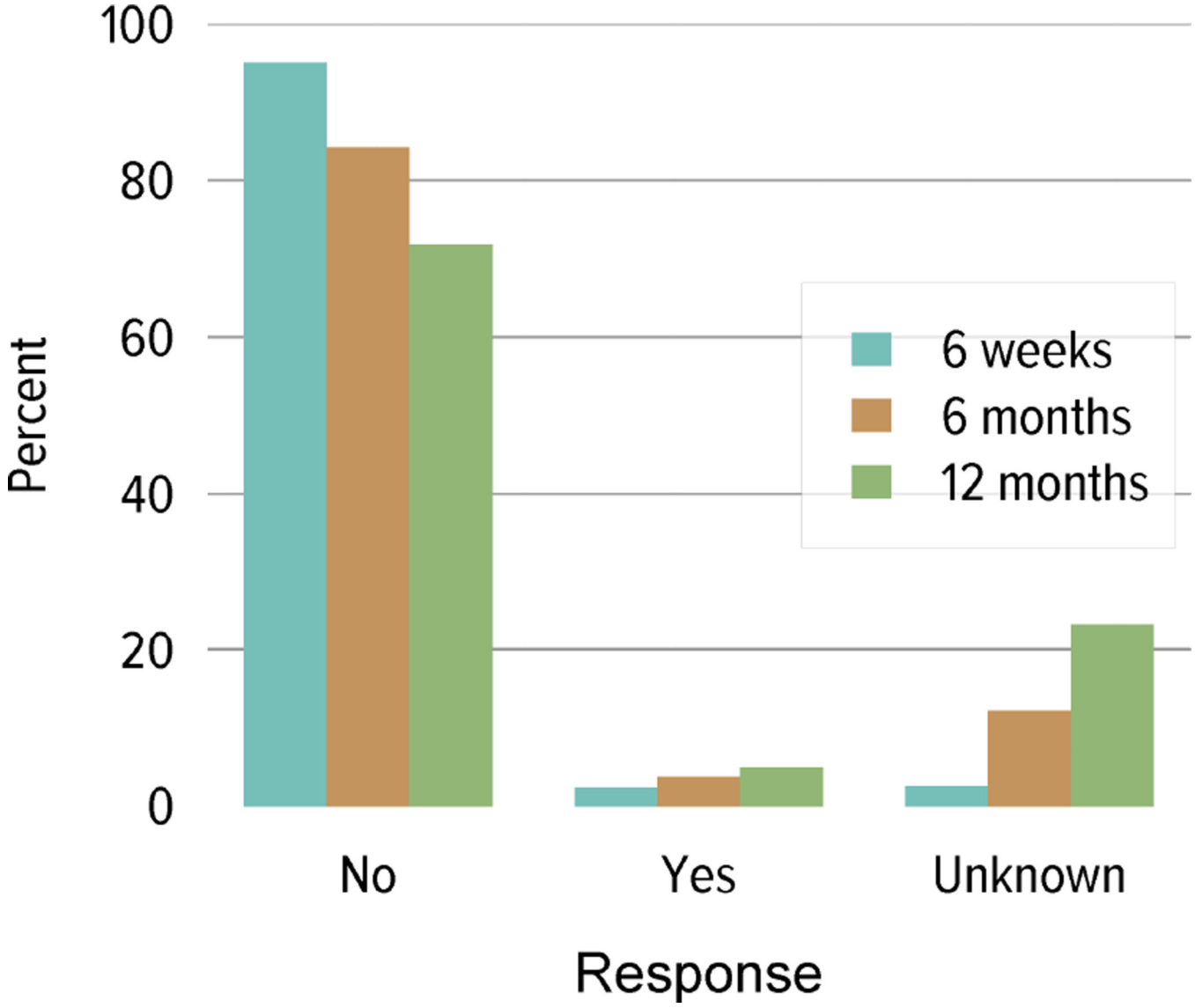

Figure KI 3.4. Rehospitalization in the first 6 weeks, 6 months, and 1 year among living kidney donors, 2009–2013

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

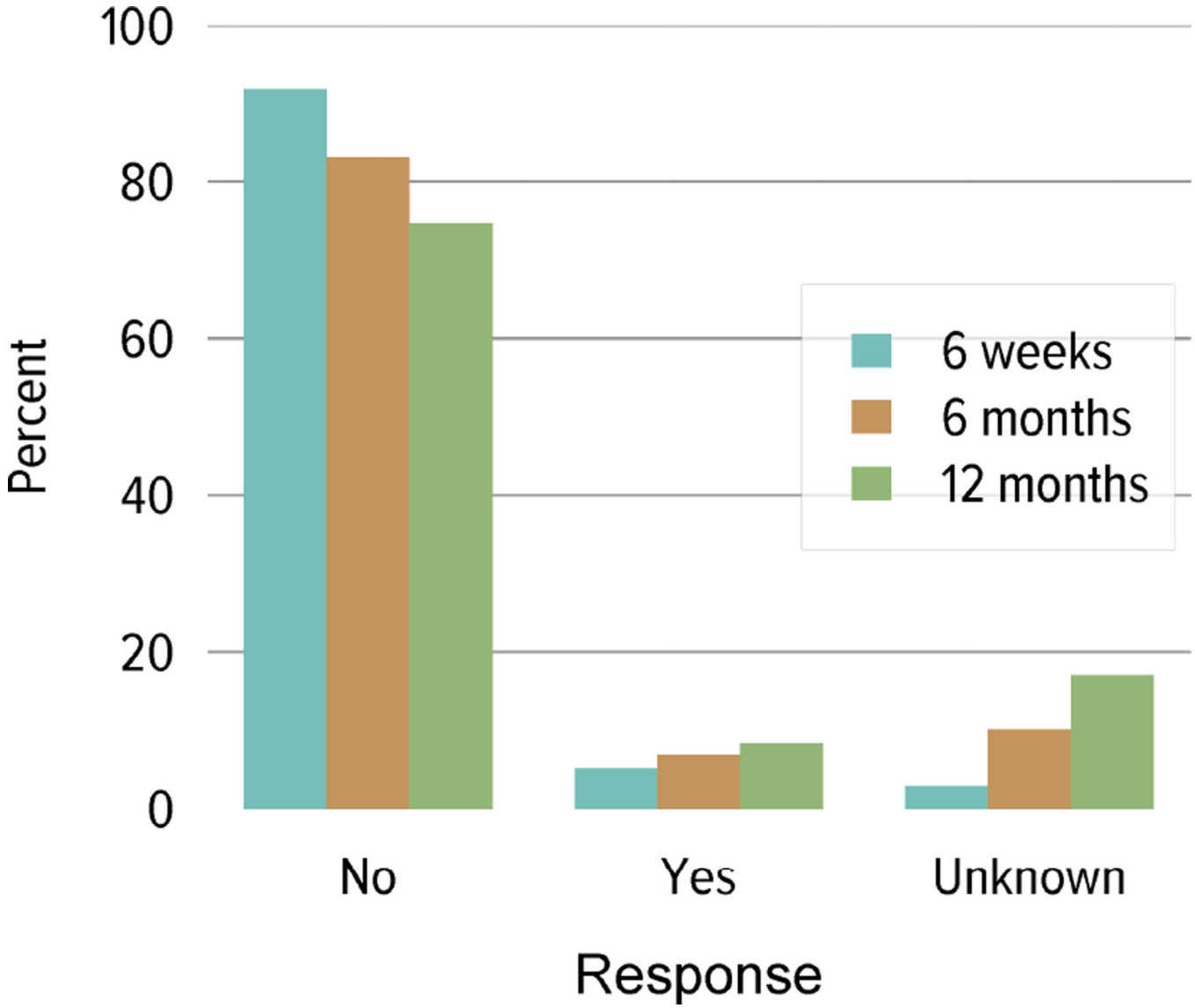

Figure KI 3.5. Kidney complications among living kidney donors, 2009–2013

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.

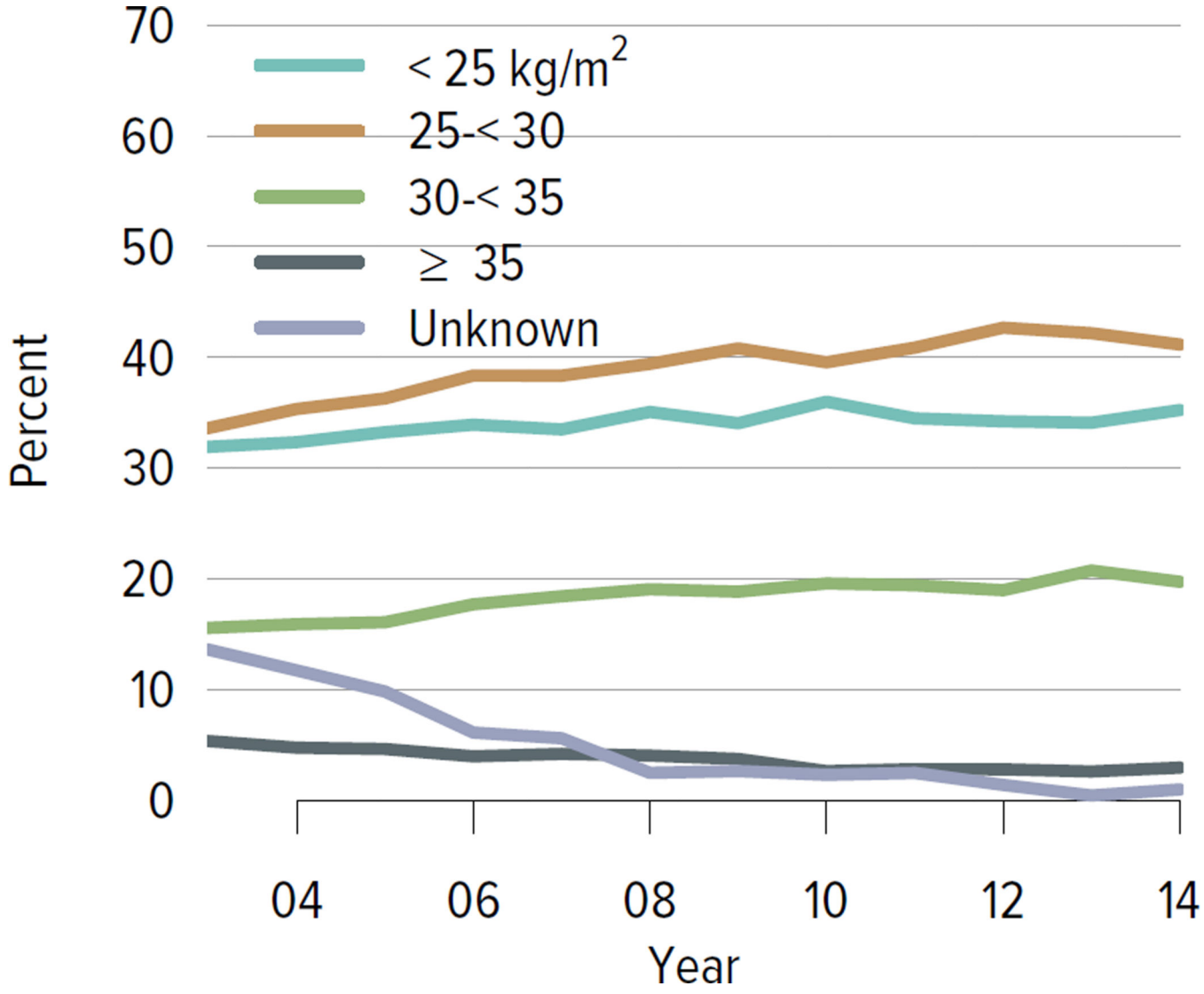

Figure KI 3.6. BMI among living kidney donors

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

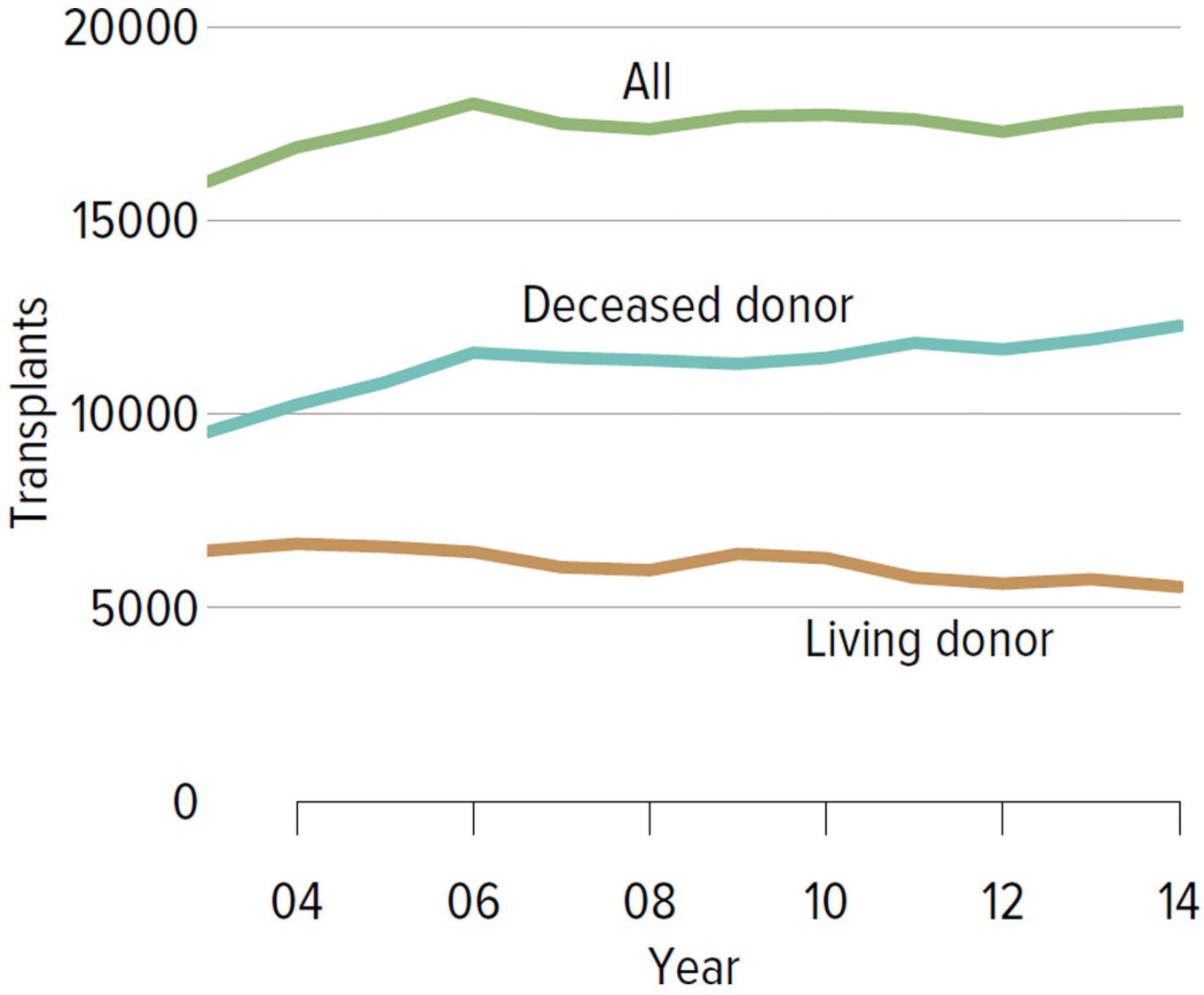

Figure KI 4.1. Total kidney transplants

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

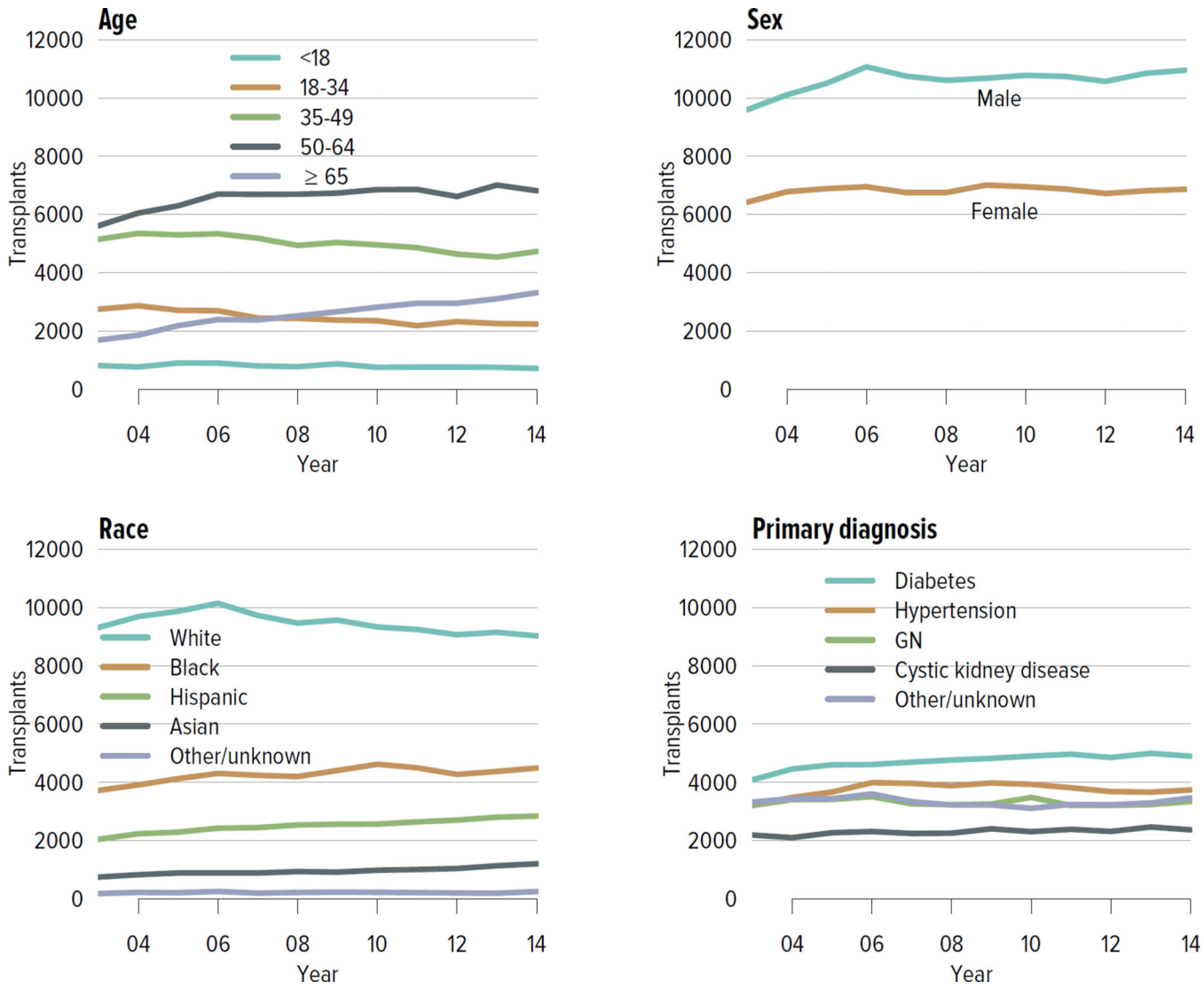

Figure KI 4.2. Kidney transplants

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

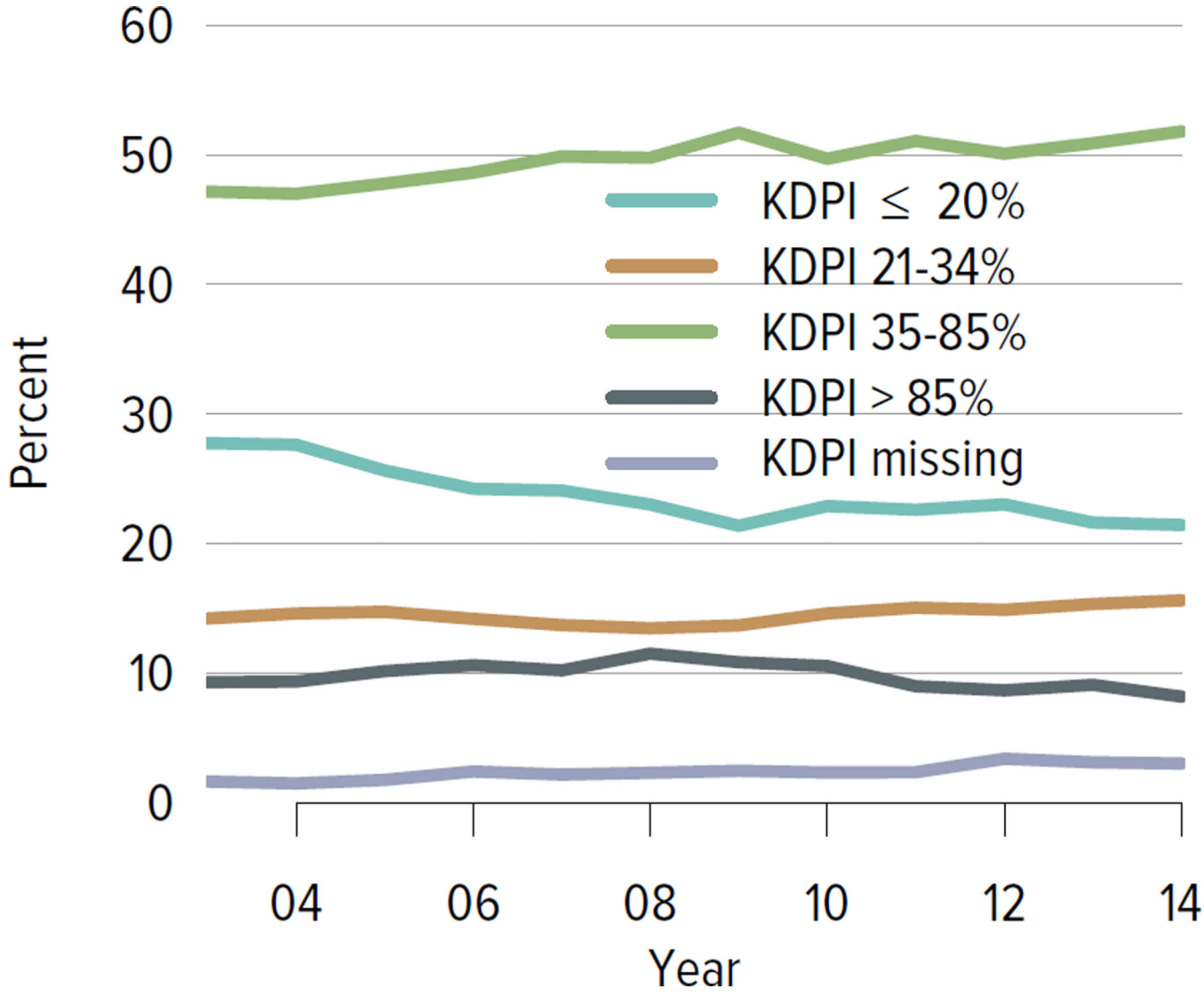

Figure KI 4.3. Kidney transplants by kidney donor profile index

All adult recipients of deceased donor kidneys, including multi-organ transplants. The reference population for the KDRI to KDPI conversion is all deceased donor kidneys recovered for transplant in the US in 2014. Kidneys recovered en-bloc are counted once. KDPI, kidney donor profile index; KDRI, kidney donor risk index.

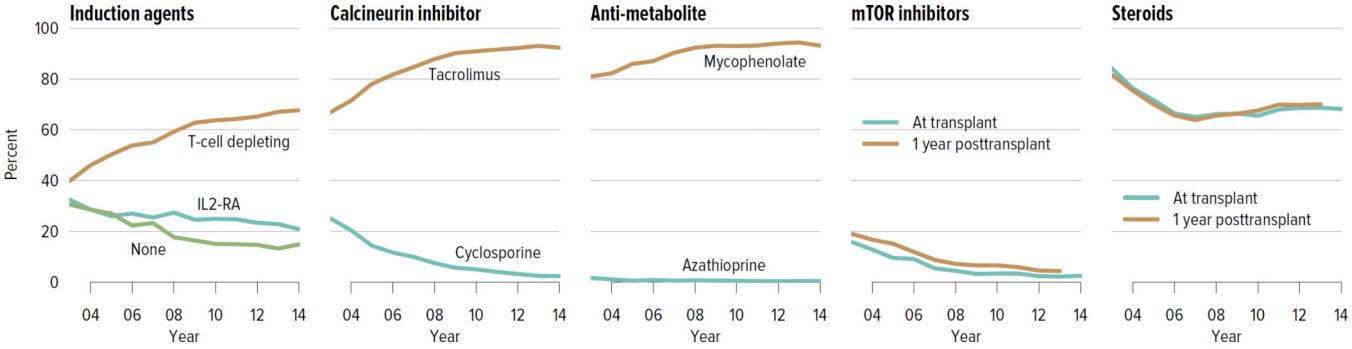

Figure KI 4.4. Immunosuppression in adult kidney transplant recipients

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.

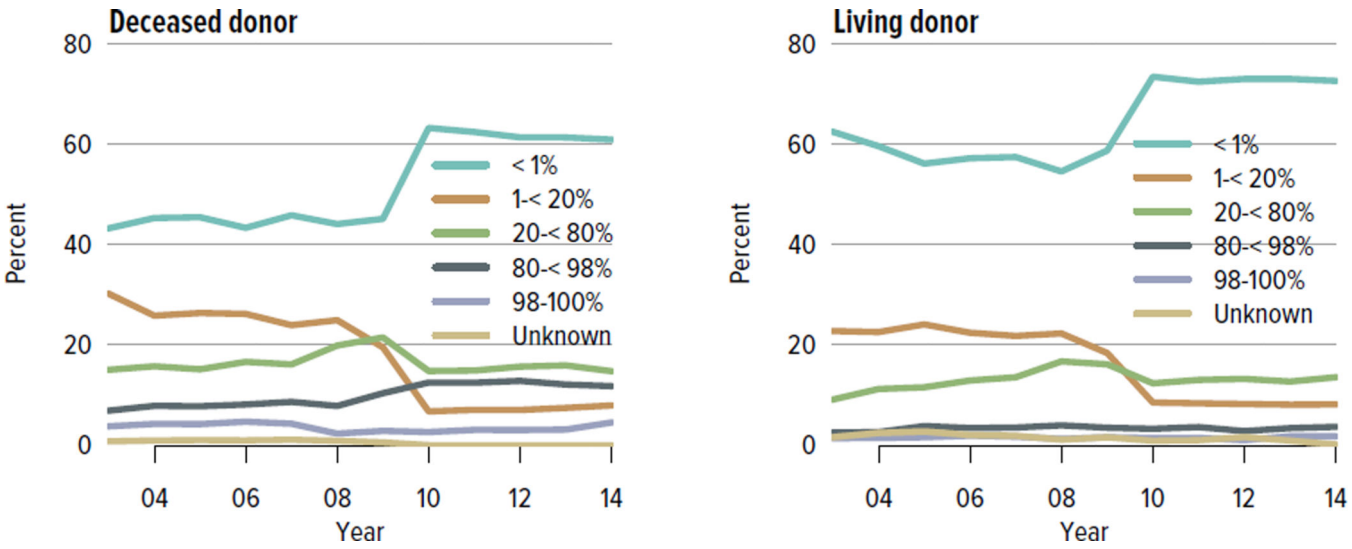

Figure KI 4.5. PRA at time of kidney transplant in adult recipients

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.

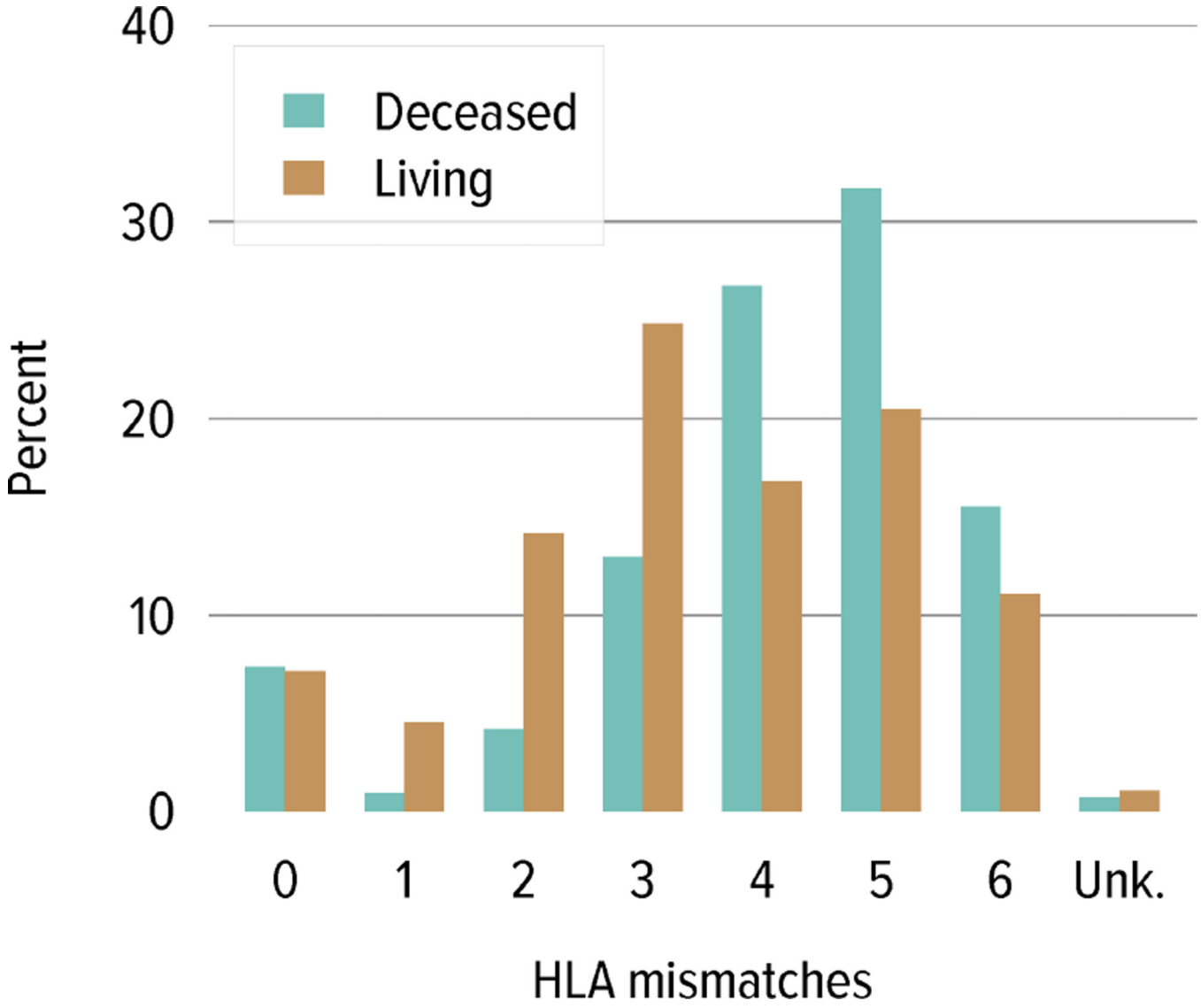

Figure KI 4.6. Total HLA A, B, and DR mismatches among adult kidney transplant recipients, 2010–2014

Donor and recipient antigen matching is based on OPTN antigen values and split equivalences policy as of 2014.

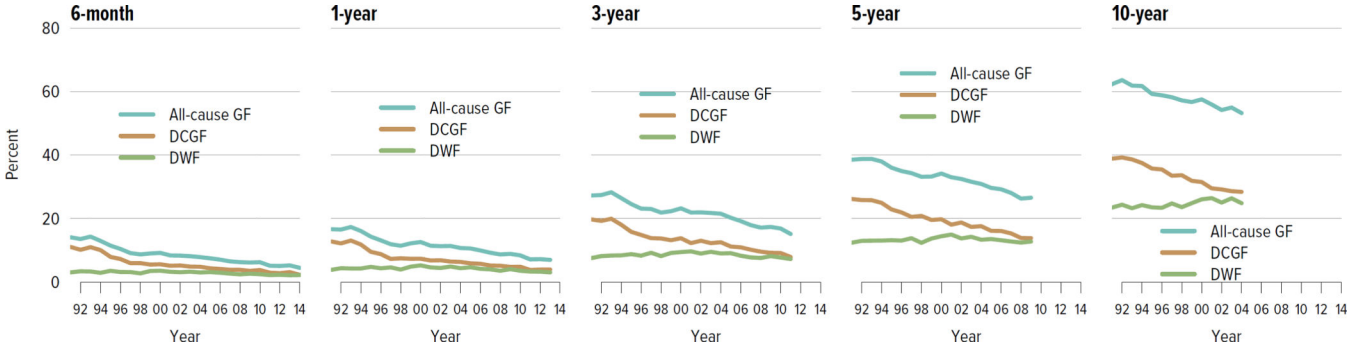

Figure KI 5.1. Outcomes among adult kidney transplant recipients: deceased donor

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.

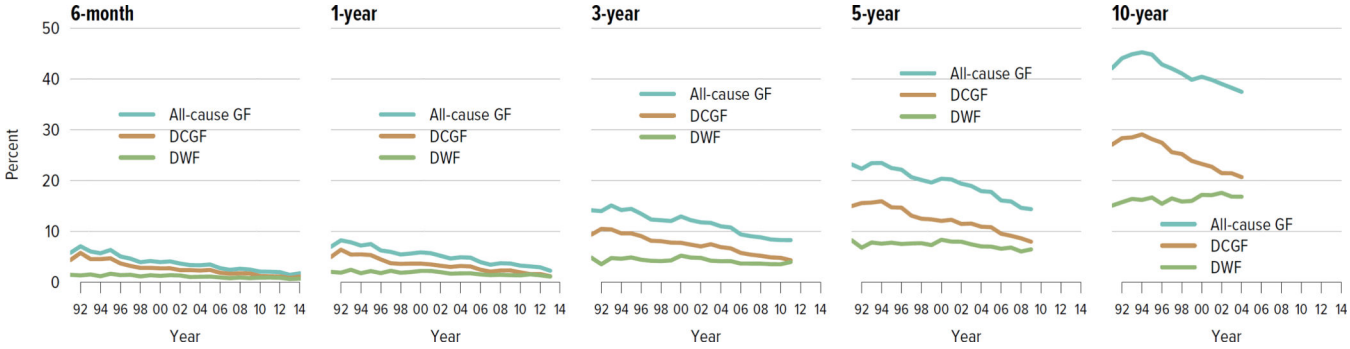

Figure KI 5.2. Outcomes among adult kidney transplant recipients: living donor

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.

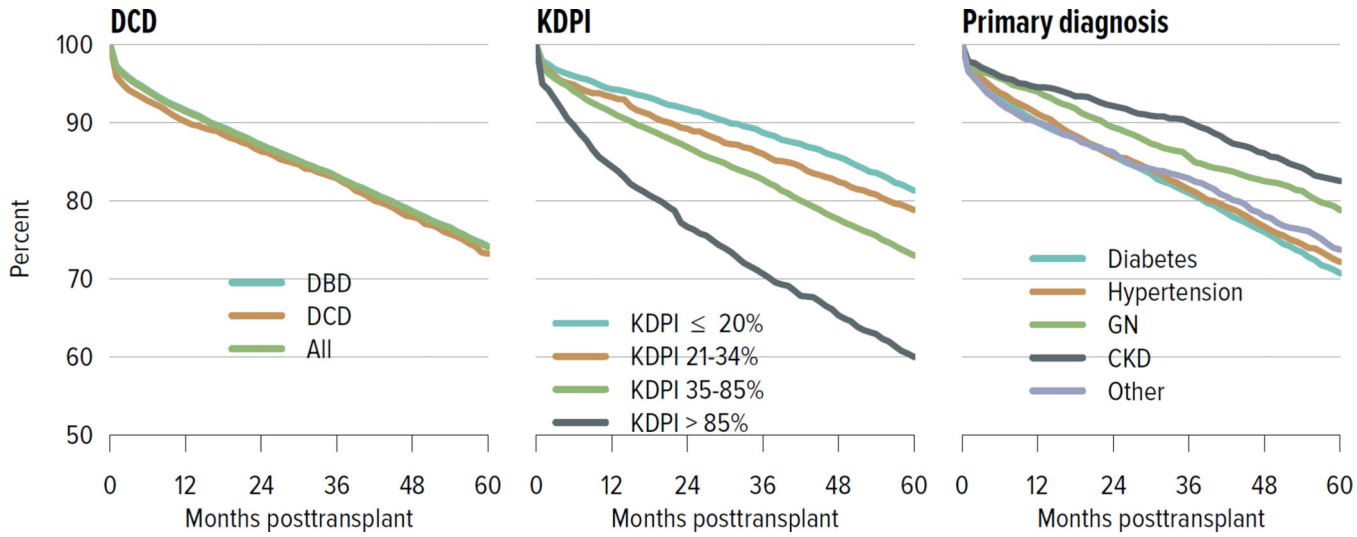

Figure KI 5.3. Graft survival among adult kidney transplant recipients, 2009: deceased donors

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

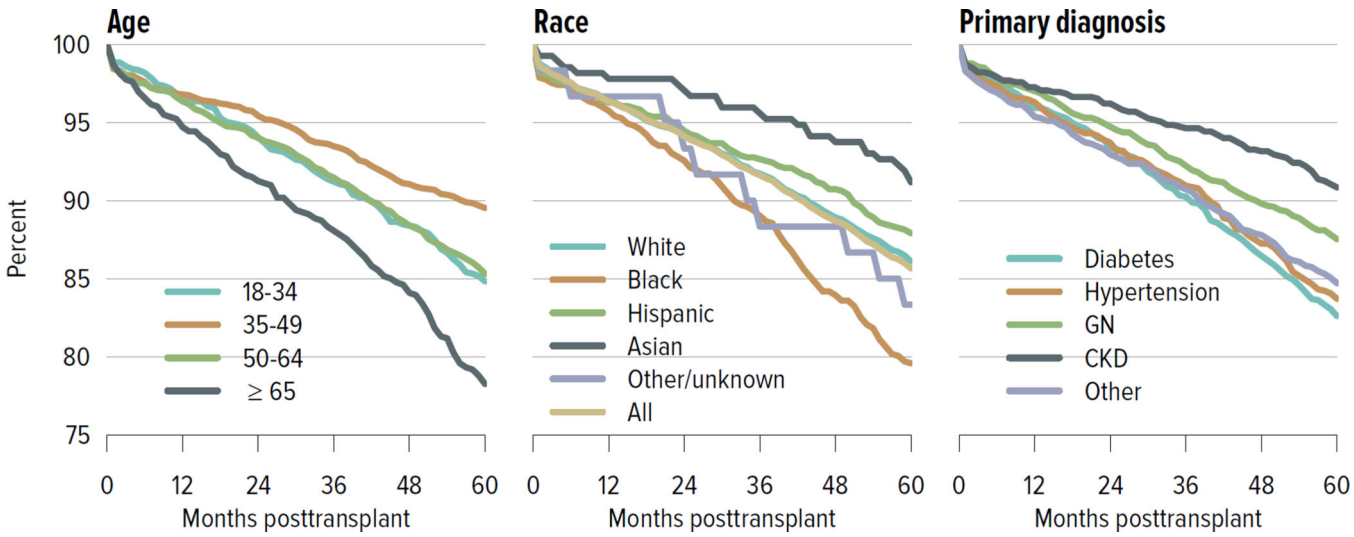

Figure KI 5.4. Graft survival among adult kidney transplant recipients, 2009: living donors

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

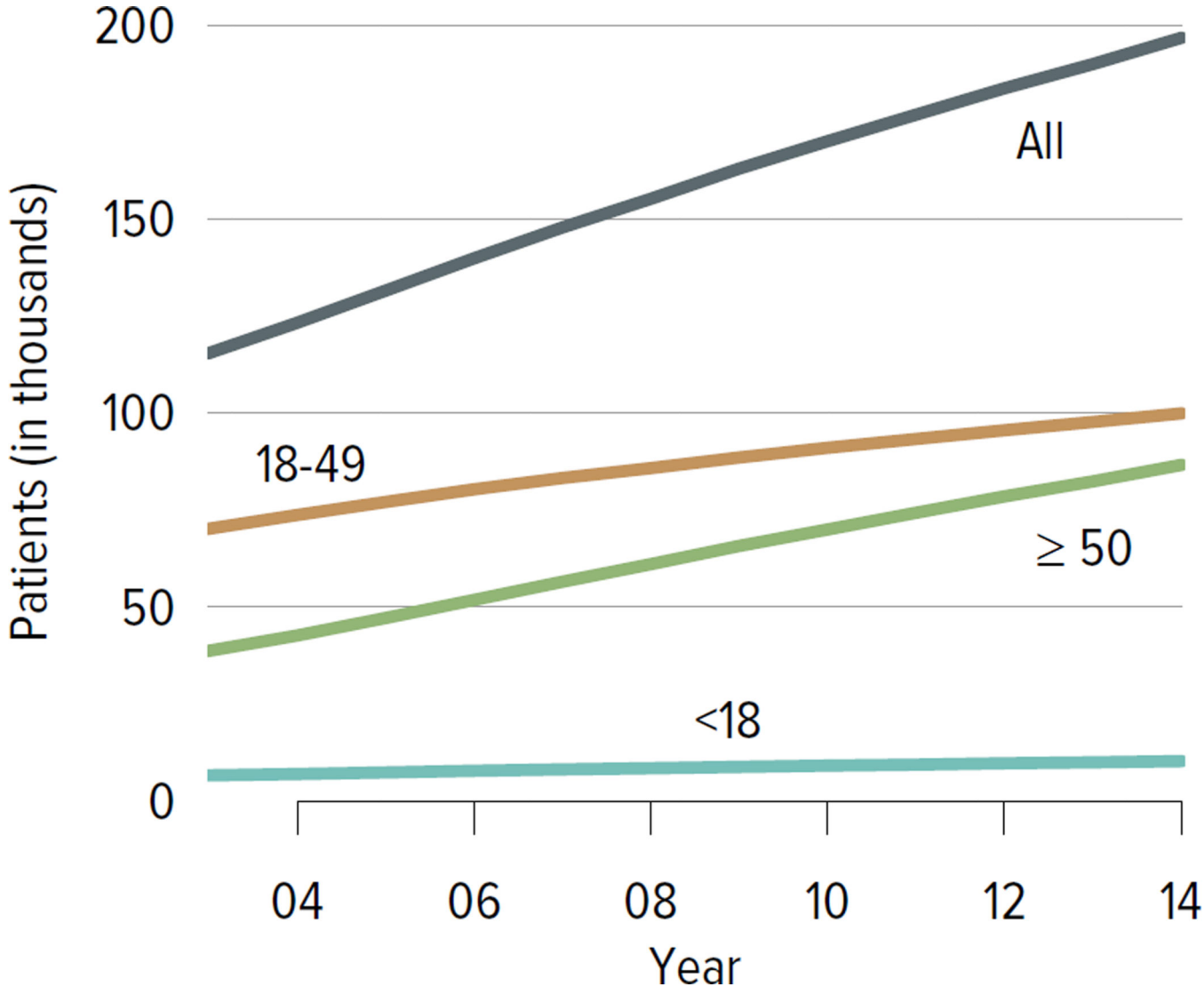

Figure KI 5.5. Recipients alive with a functioning kidney graft on June 30 of the year, by age at transplant

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.

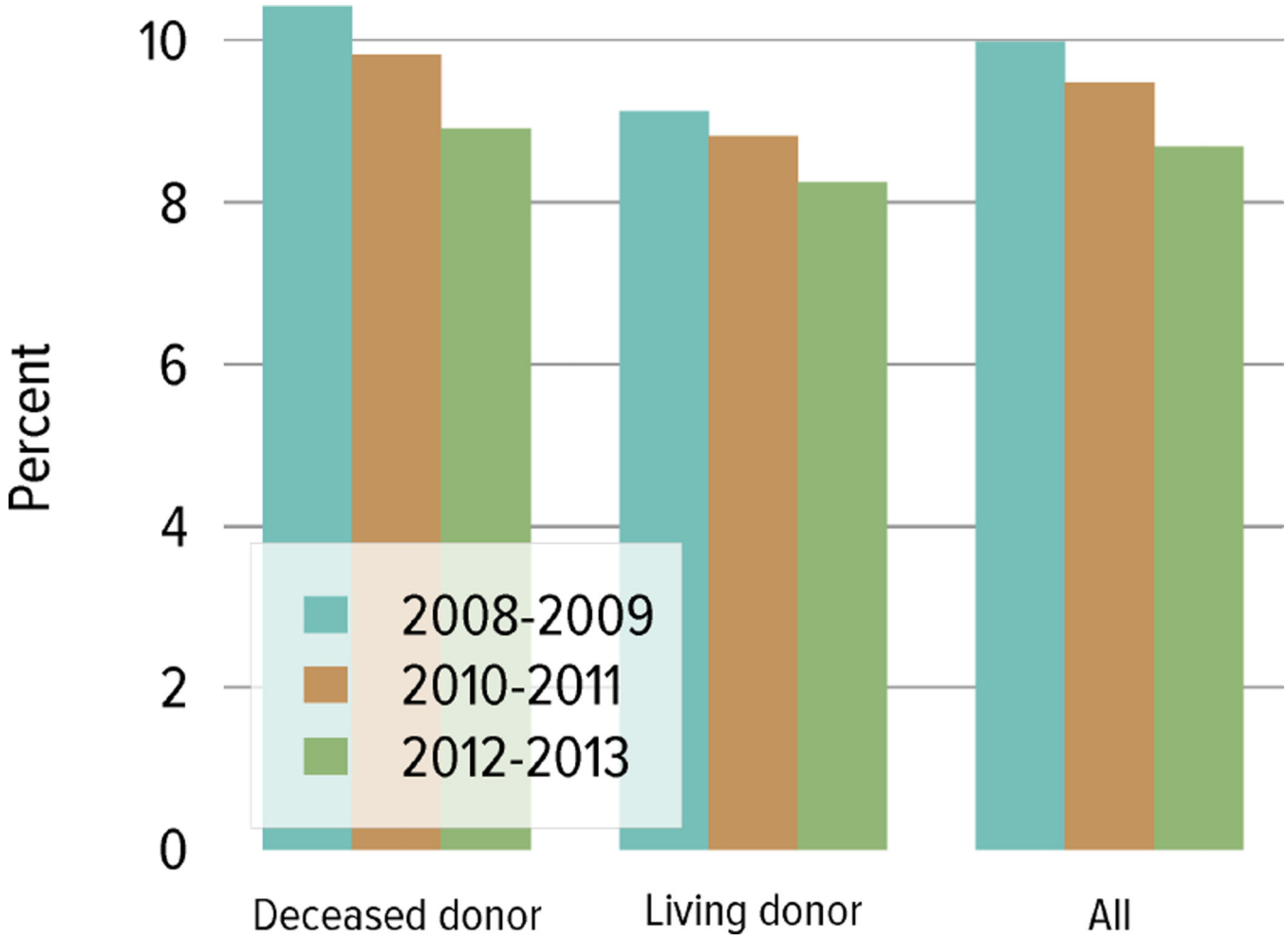

Figure KI 5.6. Incidence of acute rejection in year 1 posttransplant among adult kidney transplant recipients

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

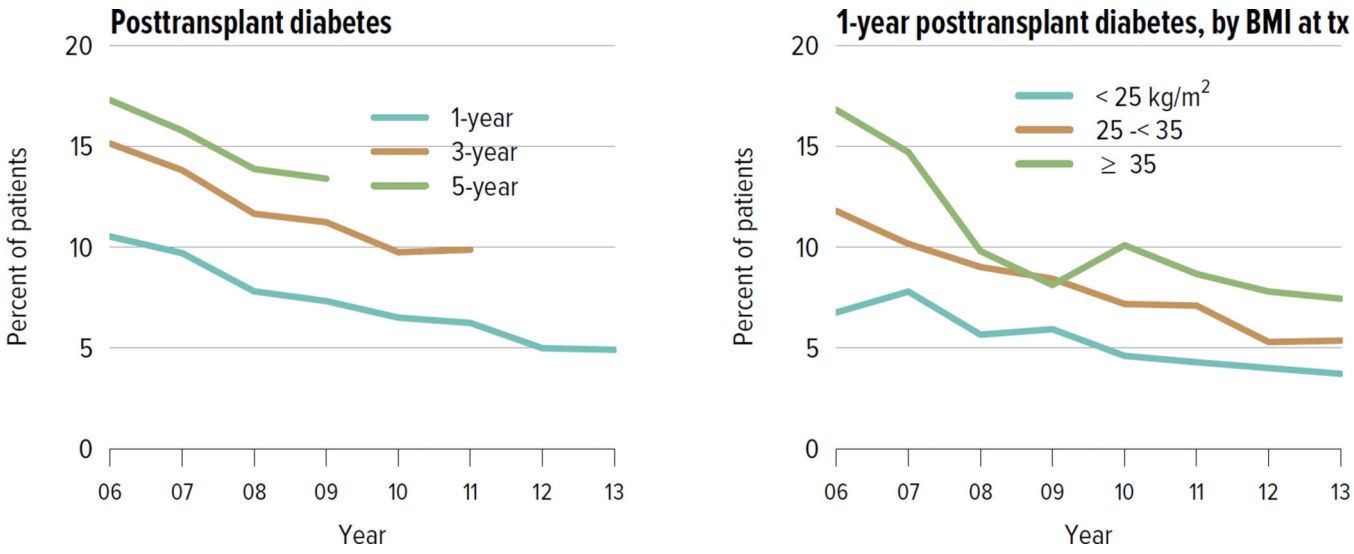

Figure KI 5.7. Posttransplant diabetes among adult kidney transplant recipients

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.

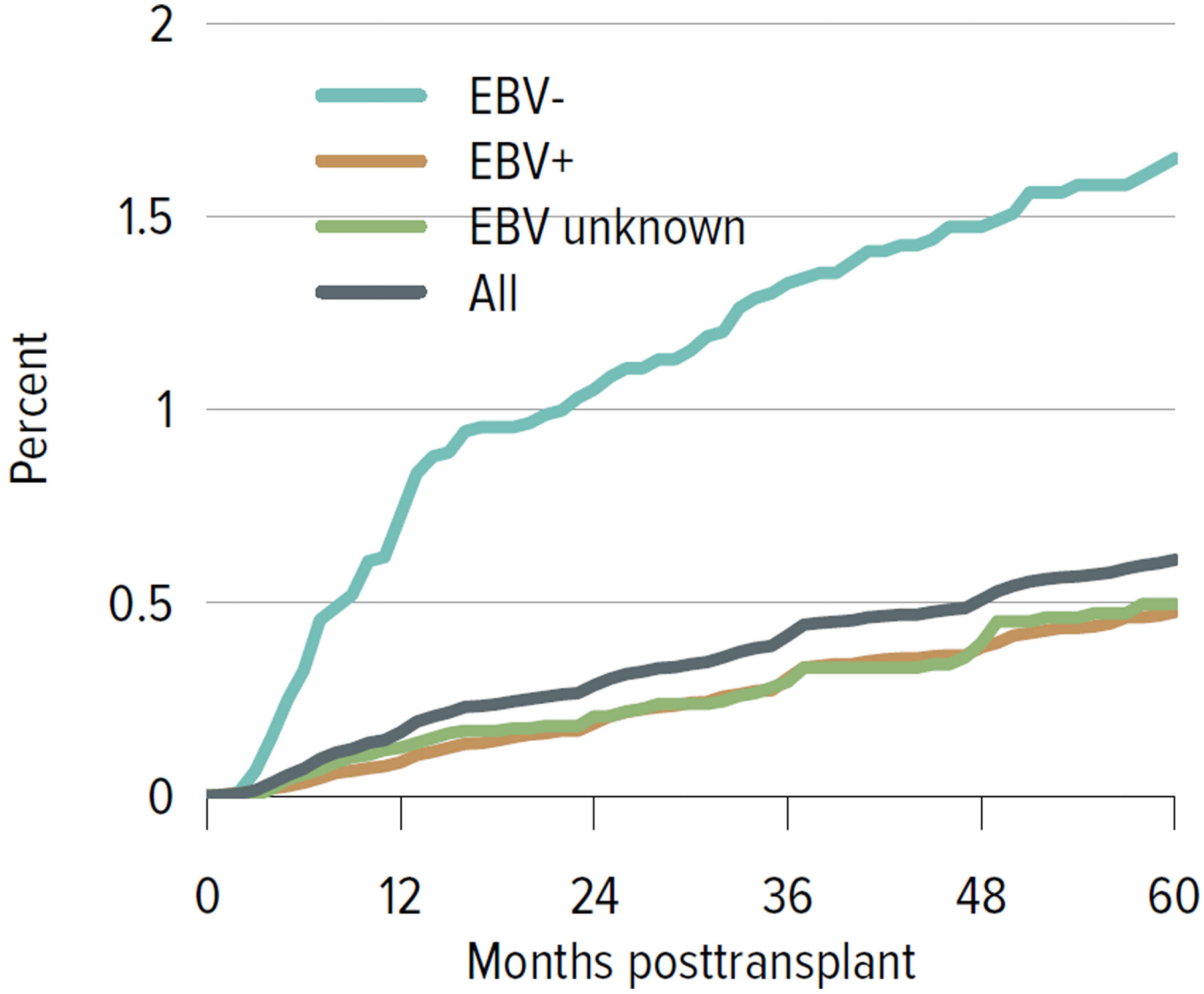

Figure KI 5.8. Incidence of PTLD among adult kidney transplant recipients, by recipient EBV status at transplant, 2008–2012

Cumulative incidence is estimated using the Kaplan-Meier competing risk method. 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; PTLD, posttransplant lymphoproliferative disorder.

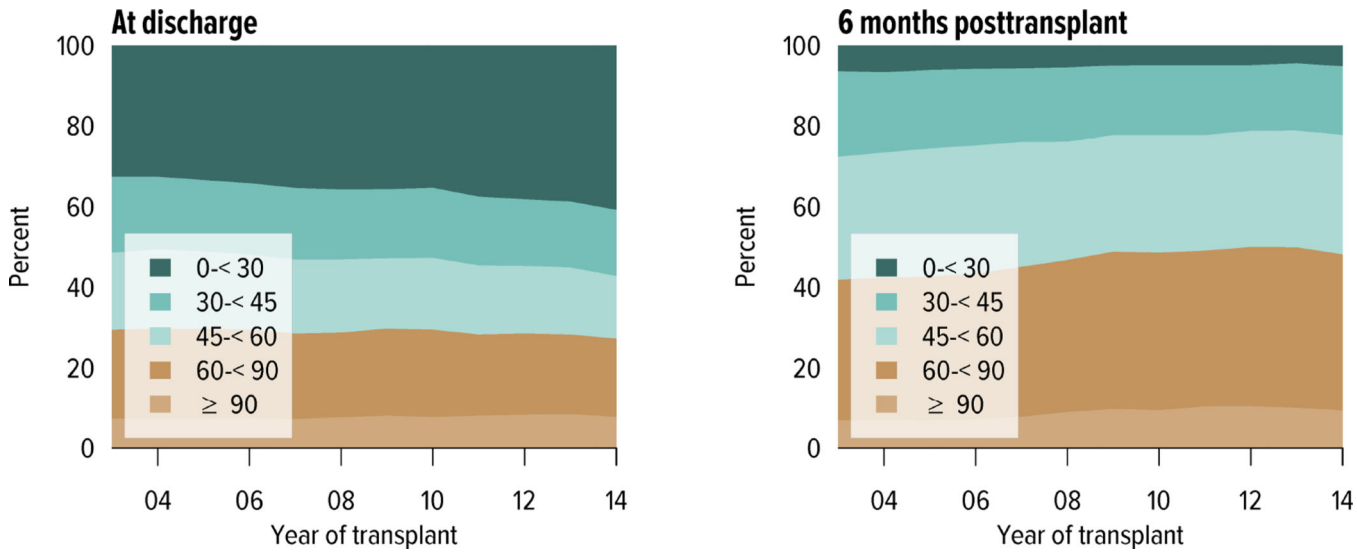

Figure KI 5.9. Distribution of eGFR at discharge and at 6 months posttransplant among adult kidney transplant recipients

GFR (mL/min/1.73 m^2) estimated using the Chronic Kidney Disease Epidemioogy Collaboration equation, and computed for patients alive with graft function at the given time point.

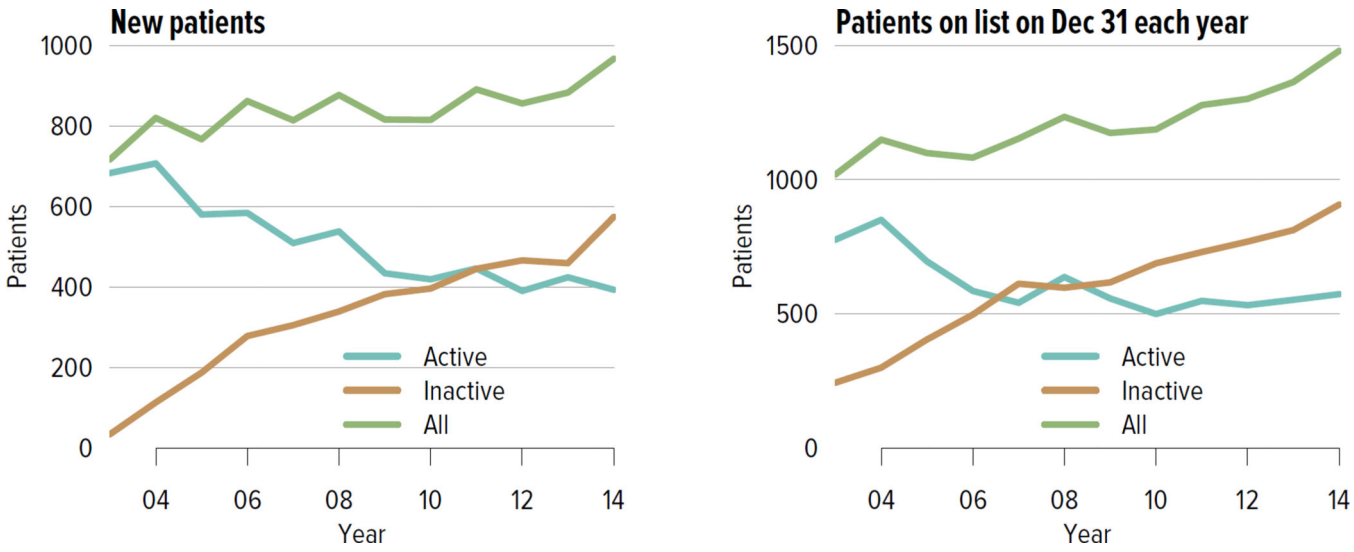

Figure KI 6.1. Pediatric candidates waiting for kidney transplant

Candidates concurrently listed at multiple centers are counted once. Candidates who are active at at least one program are considered active; otherwise they are inactive. Active status is determined on day 7 after first listing. A new patient is one who first joined the list during the given year without ever listing in a prior year, or one who listed and underwent transplant in a prior year and relisted in the given year. Patients on the list on December 31 were pediatric at listing.

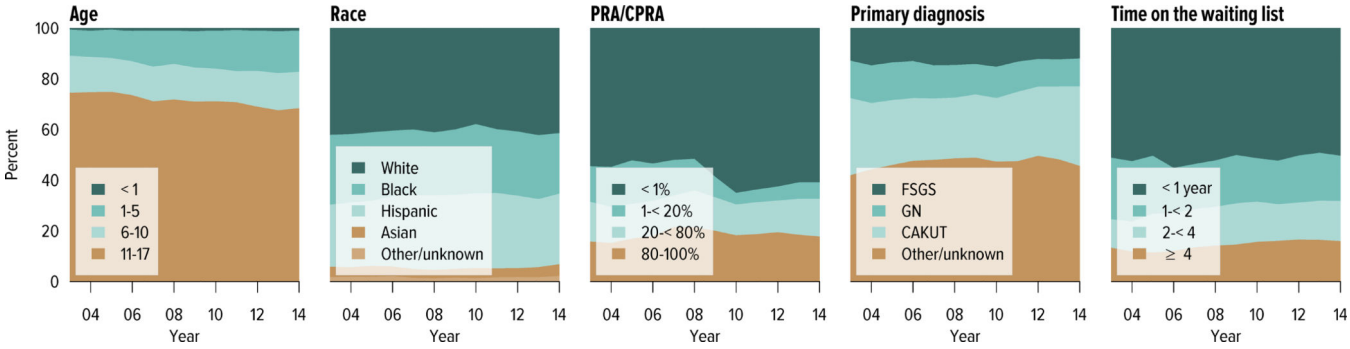

Figure KI 6.2. Distribution of pediatric candidates waiting for kidney transplant

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; CAKUT, congenital anomalies of the kidney and urinary tract.

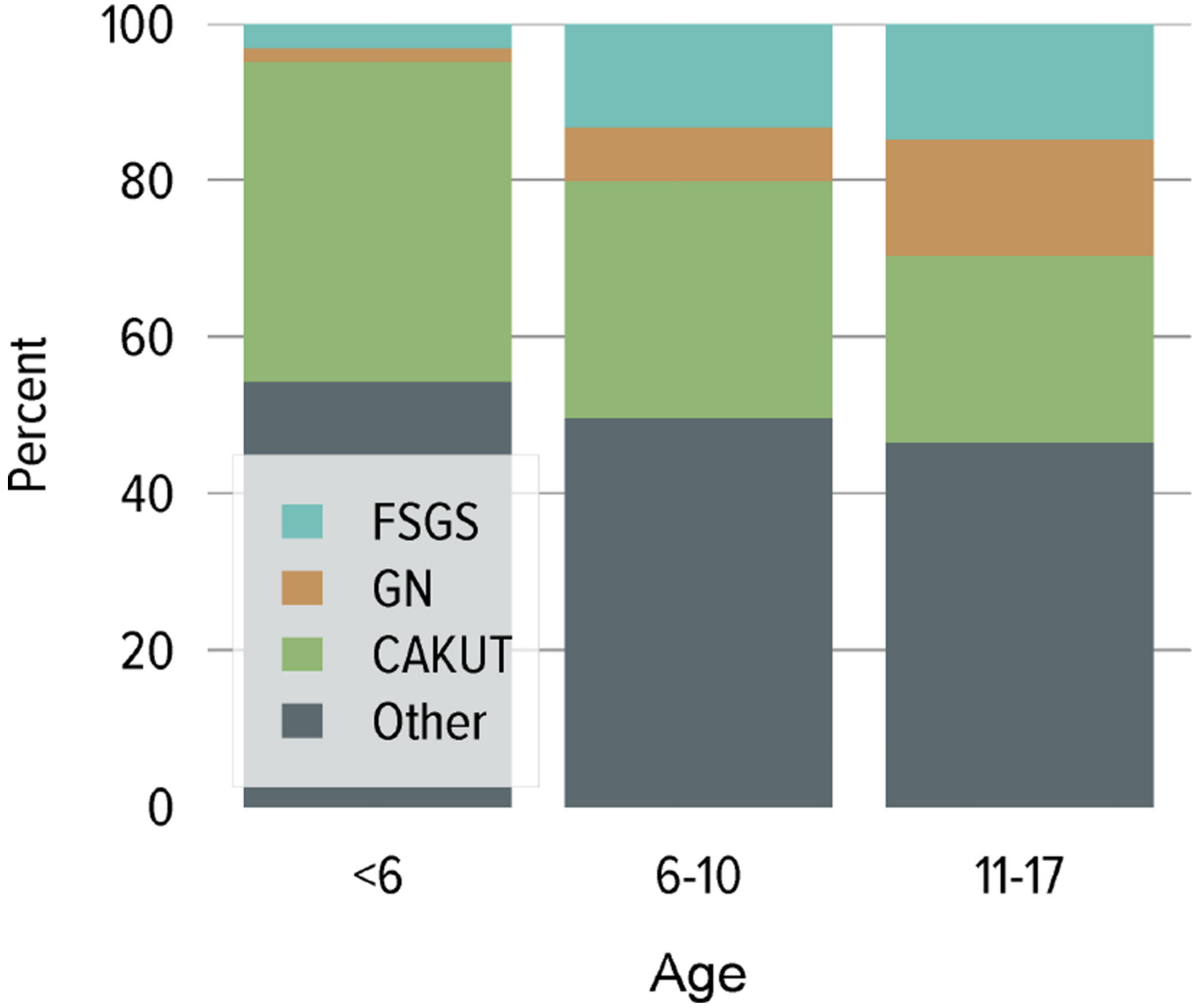

Figure KI 6.3. Primary cause of ESRD in pediatric candidates for kidney transplant, by age, 2010–2014

Includes candidates first listed 2010–2014. Candidates concurrently listed at more than one center are counted once. Patients who were listed, underwent transplant, and were relisted during the time period are counted more than once. Age is computed at earliest listing date. FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis; CAKUT, congenital anomalies of the kidney and urinary tract.

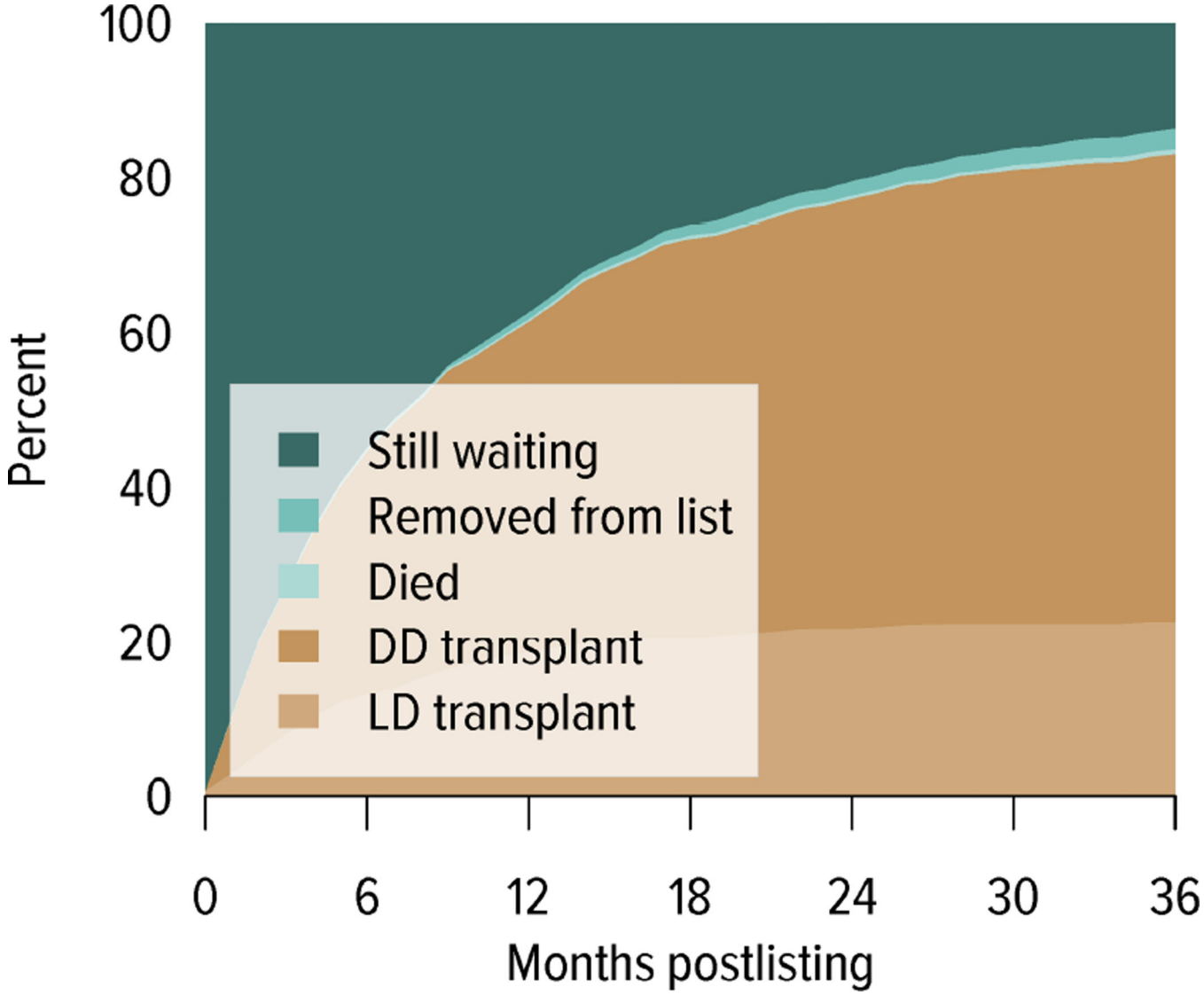

Figure KI 6.4. Three-year outcomes for pediatric candidates waiting for kidney transplant, new listings in 2011

Candidates waiting for any kidney transplant and first listed in 2011. 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.

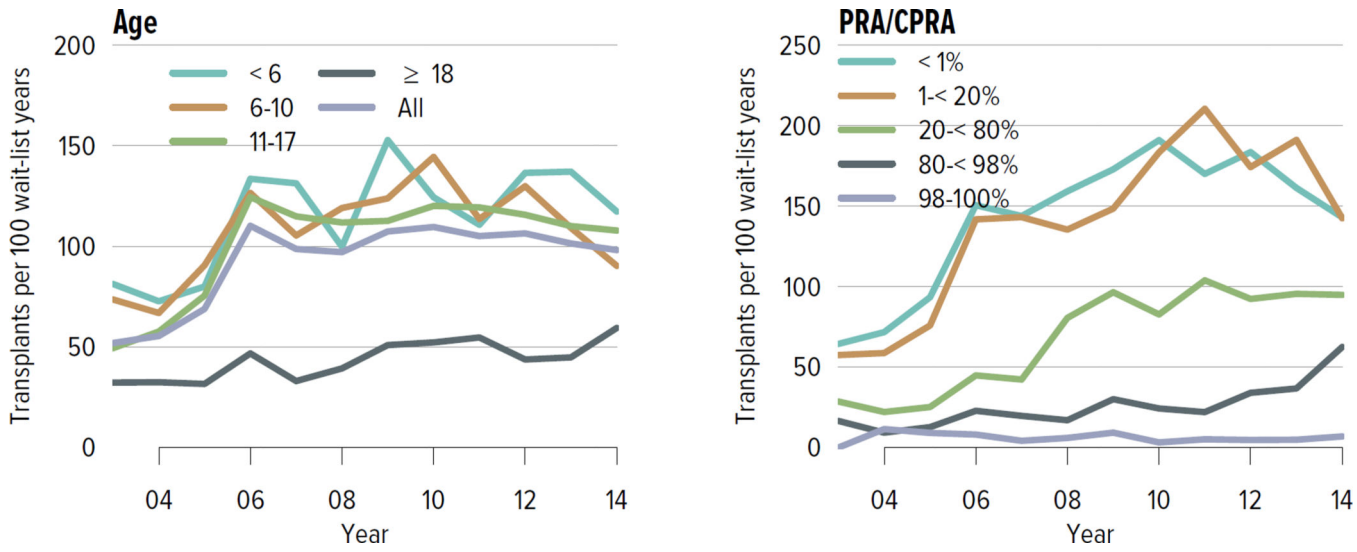

Figure KI 6.5. Deceased donor kidney transplant rates among active pediatric waitlist candidates

Transplant rates are computed as the number of deceased donor transplants per 100 patient-years of active waiting in a given year. Individual listings are counted separately. Rates with less than 10 patient-years of exposure are not shown. Rates by PRA/CPRA at computed in a time-dependent manner. 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.

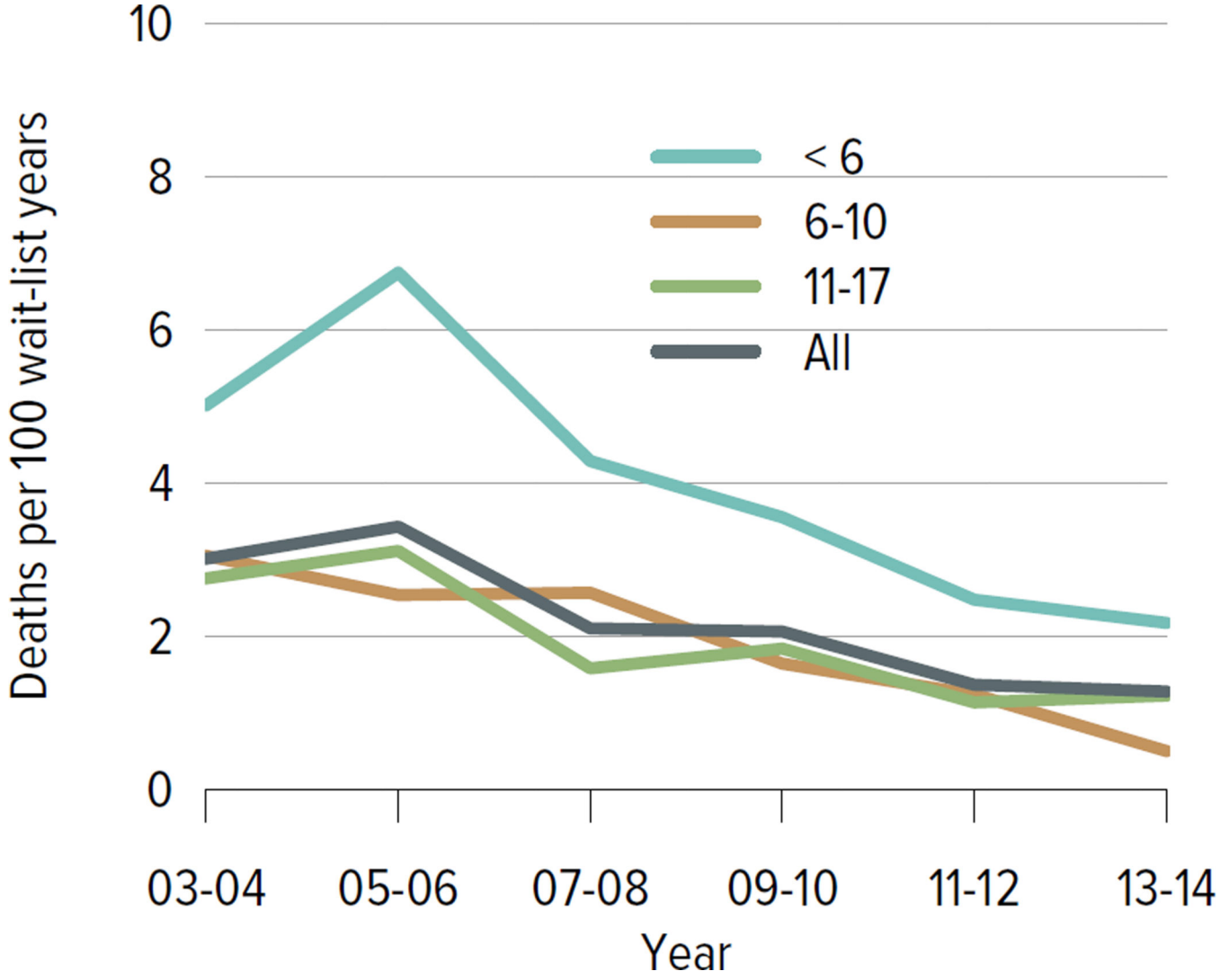

Figure KI 6.6. Pretransplant mortality rates among pediatric kidney transplant candidates

Mortality rates are computed as the number of deaths per 100 patient-years of waiting in the given year. Individual listings are counted separately. Age is determined at the later of listing date or January 1 of the given year.

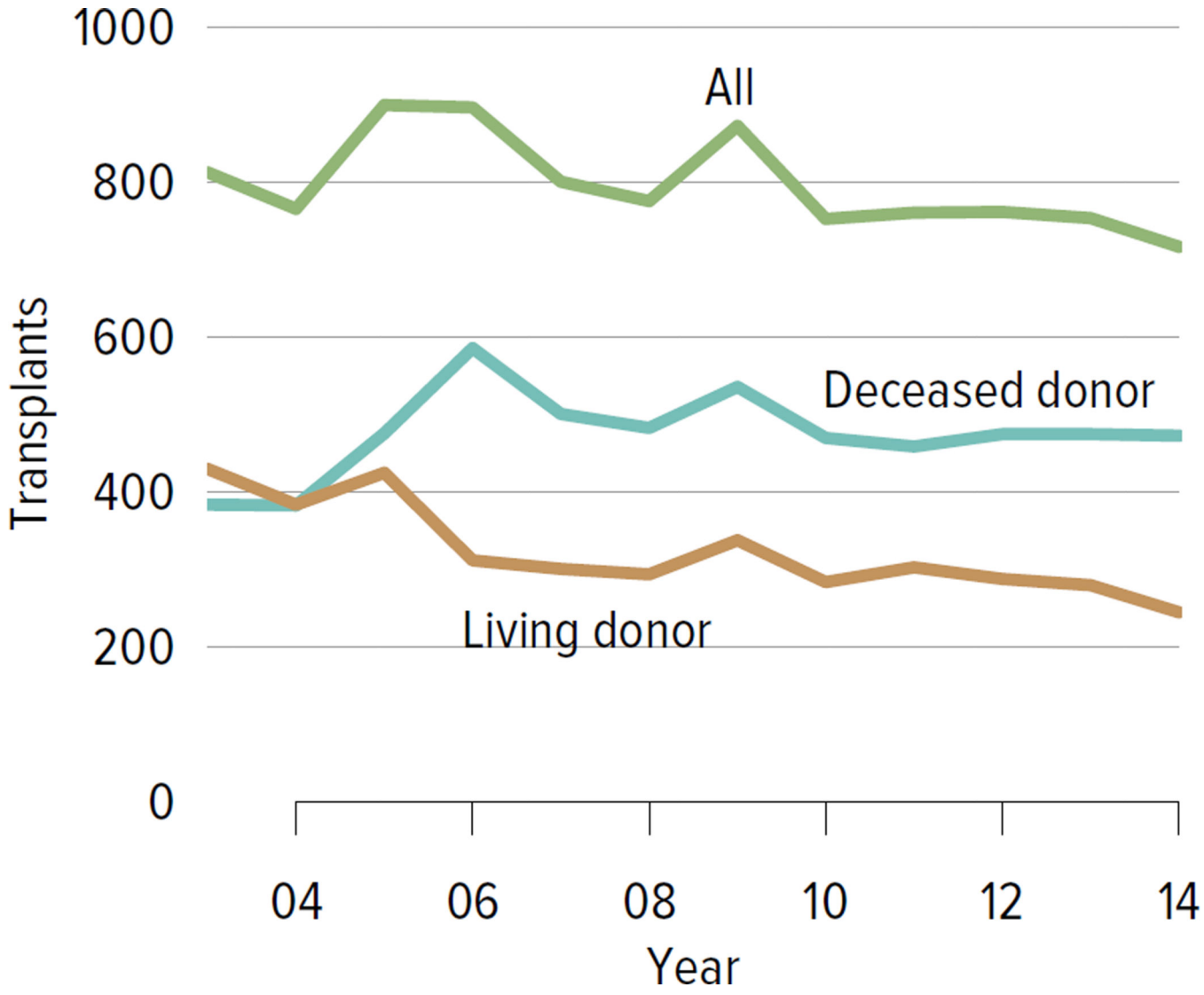

Figure KI 6.7. Pediatric kidney transplants, by donor type
All pediatric kidney transplant recipients, including retransplant, and multi-organ recipients.

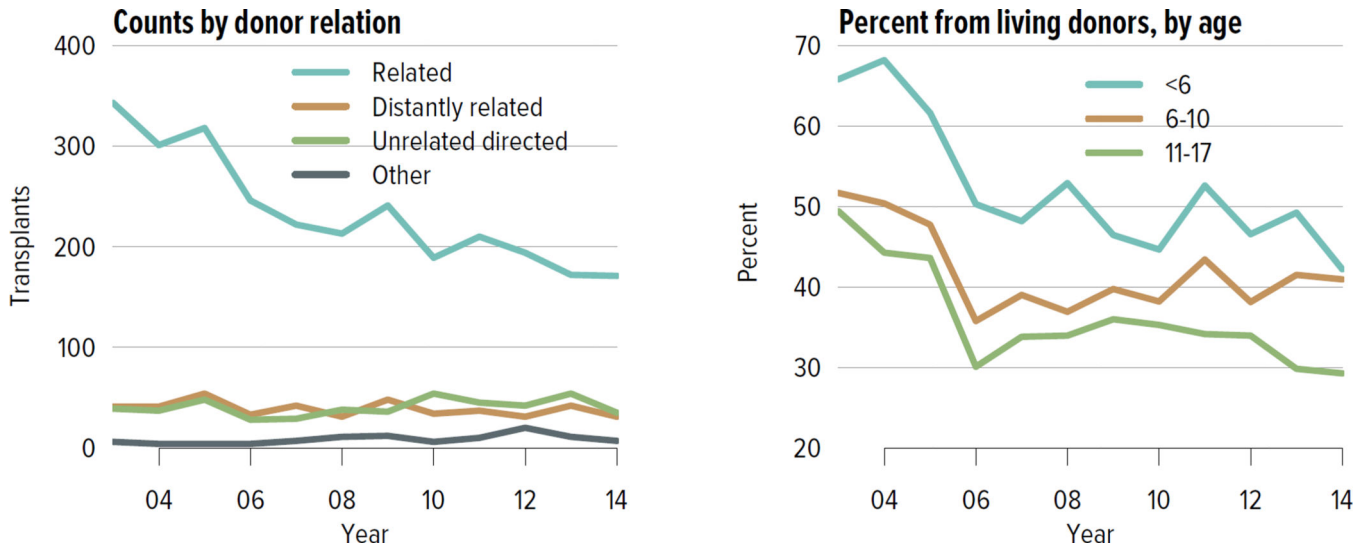

Figure KI 6.8. Pediatric kidney transplants from living donors

Relationship of living donor to recipient is as indicated on the OPTN Living Donor Registration Form.

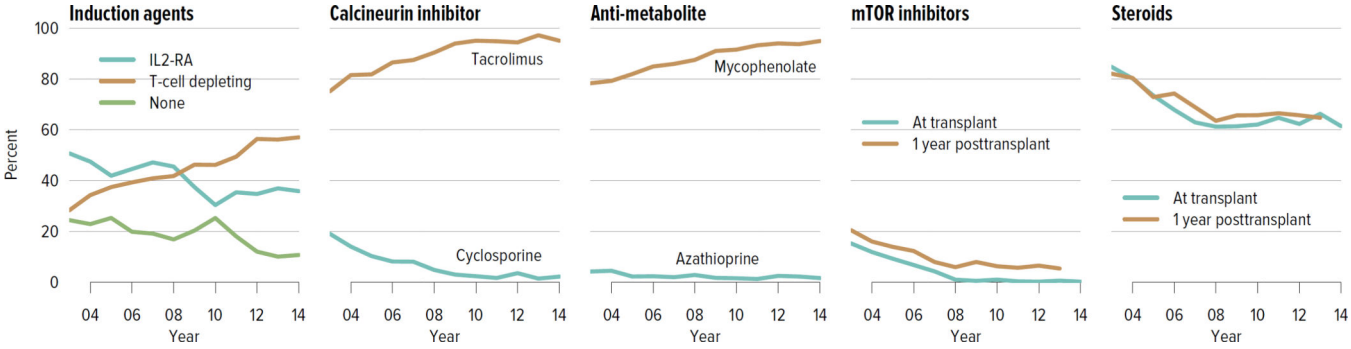

Figure KI 6.9. Immunosuppression in pediatric kidney transplant recipients

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.

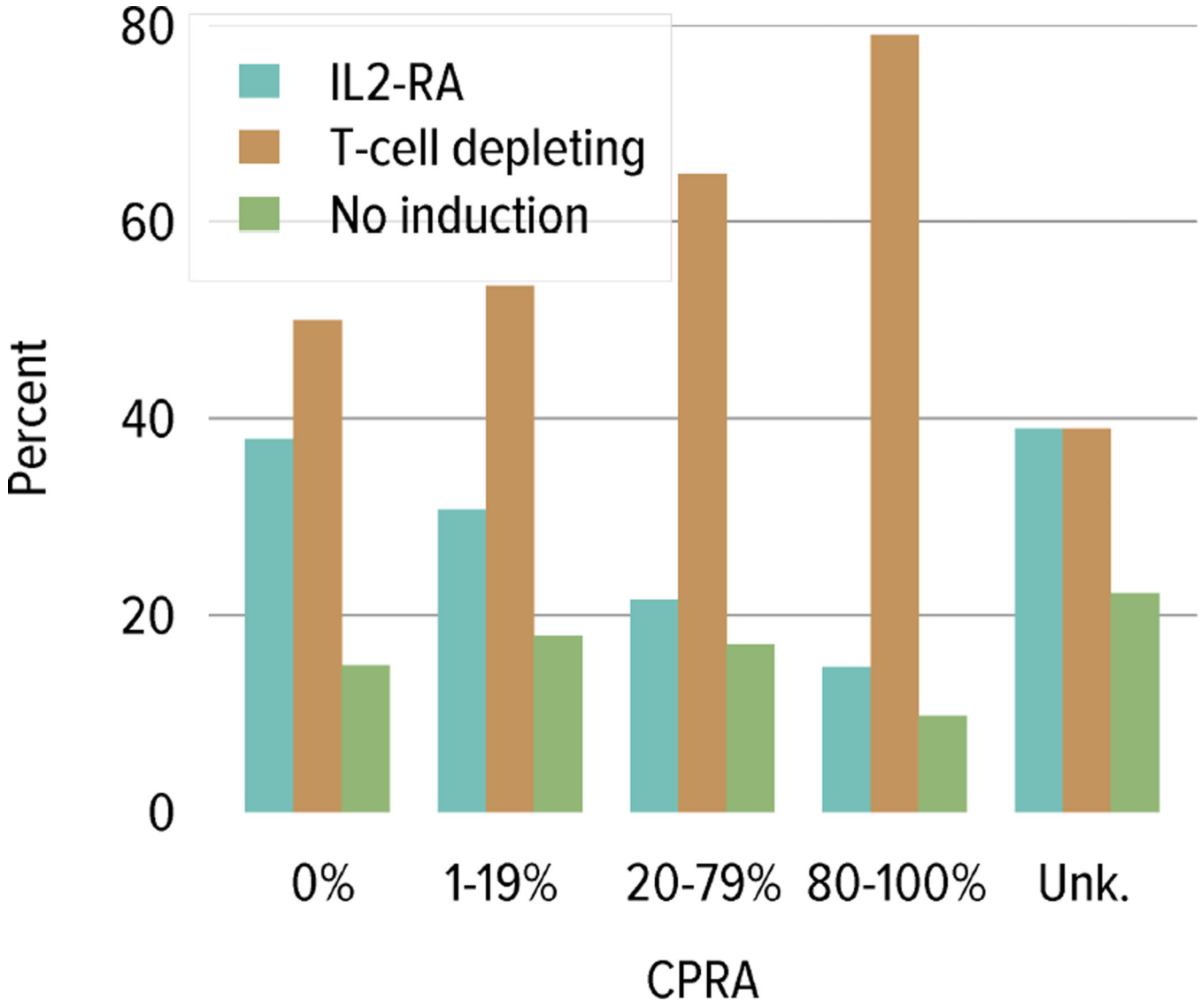

Figure KI 6.10. Induction use by CPRA among pediatric kidney transplant recipients, 2010–2014
IL2-RA, interleukin-2 receptor antagonist.

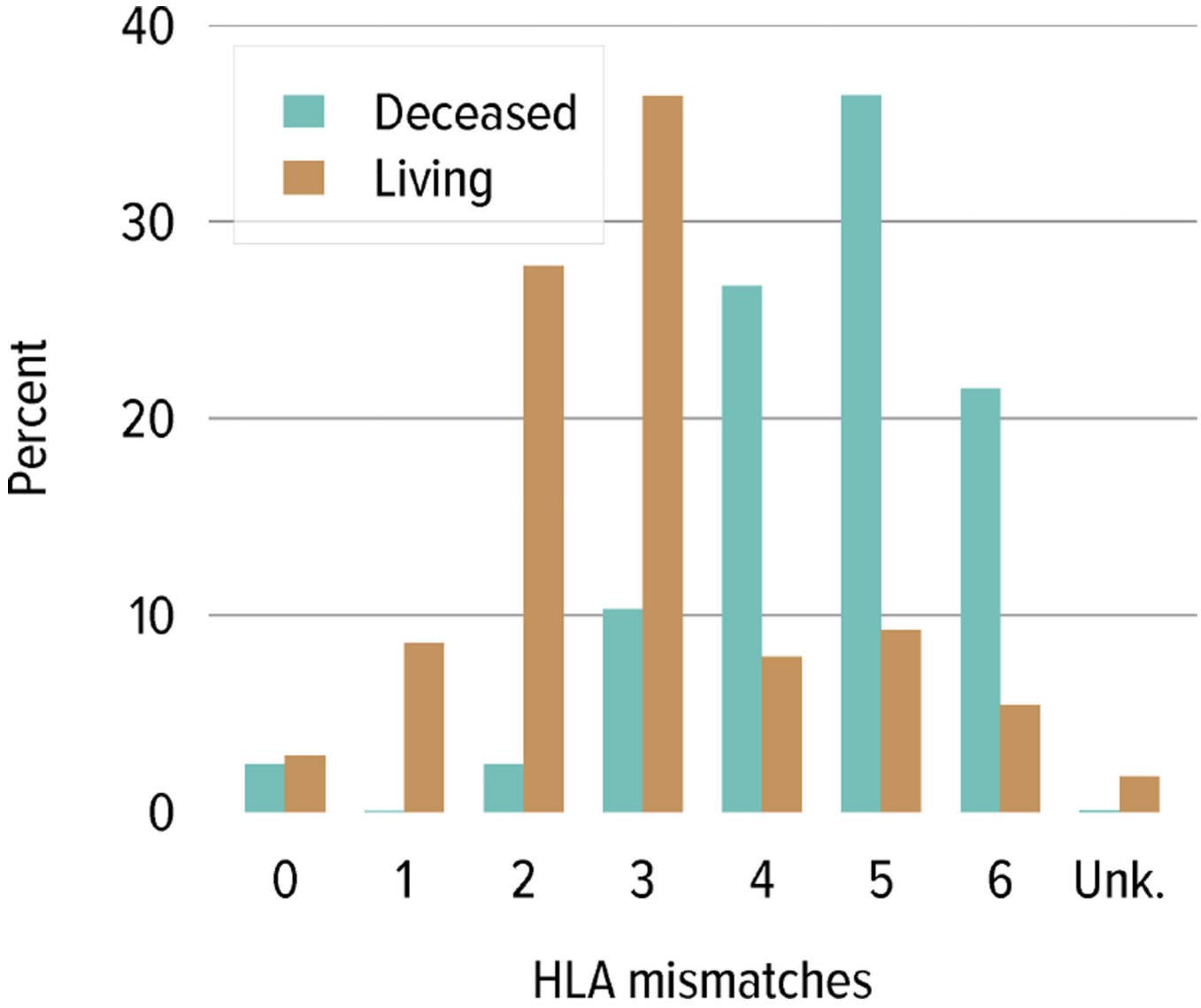

Figure KI 6.11. Total HLA A, B, and DR mismatches among pediatric kidney transplant recipients, 2010–2014

Donor and recipient antigen matching is based on OPTN antigen values and split equivalences policy as of 2014.

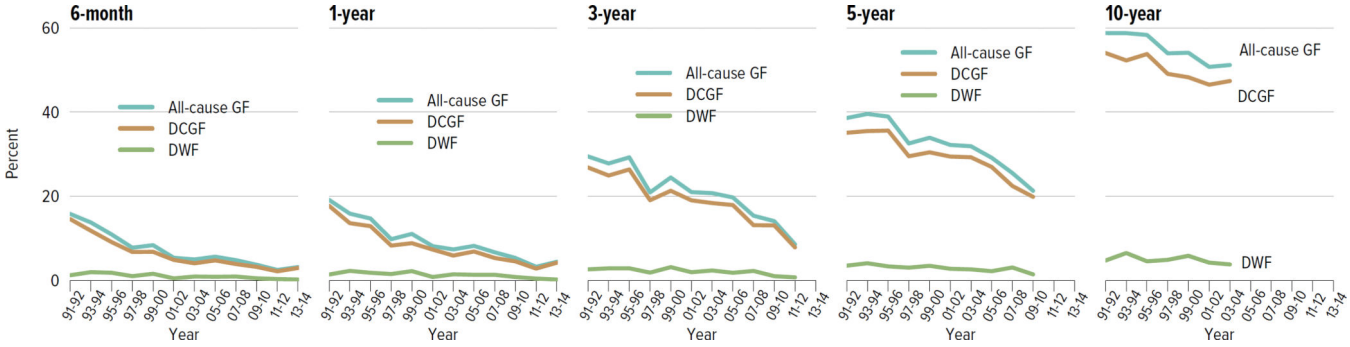

Figure KI 6.12. Outcomes among pediatric kidney-alone transplant recipients: deceased donor

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.

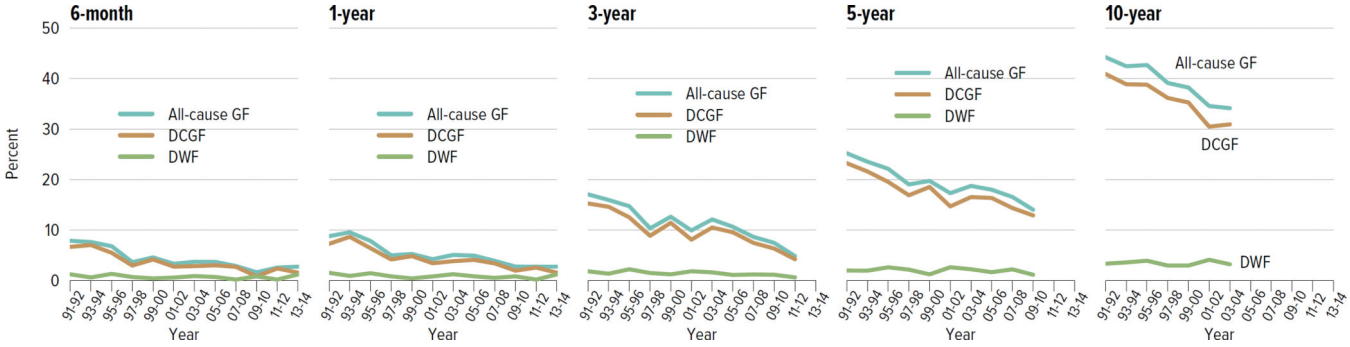

Figure KI 6.13. Outcomes among pediatric kidney-alone transplant recipients: living donor

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.

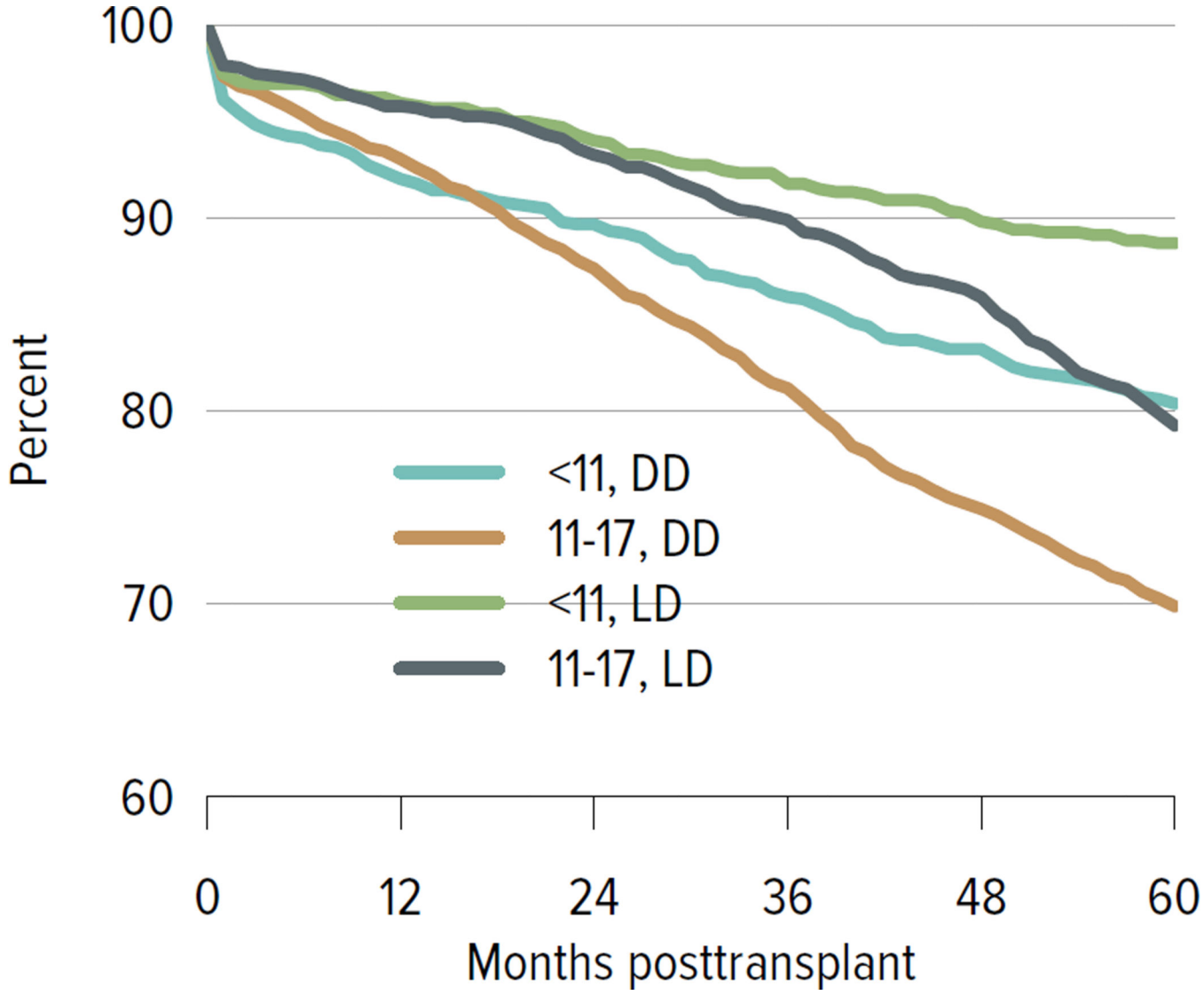

Figure KI 6.14. Graft survival among pediatric kidney transplant recipients, by age and donor type, 2005–2009

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

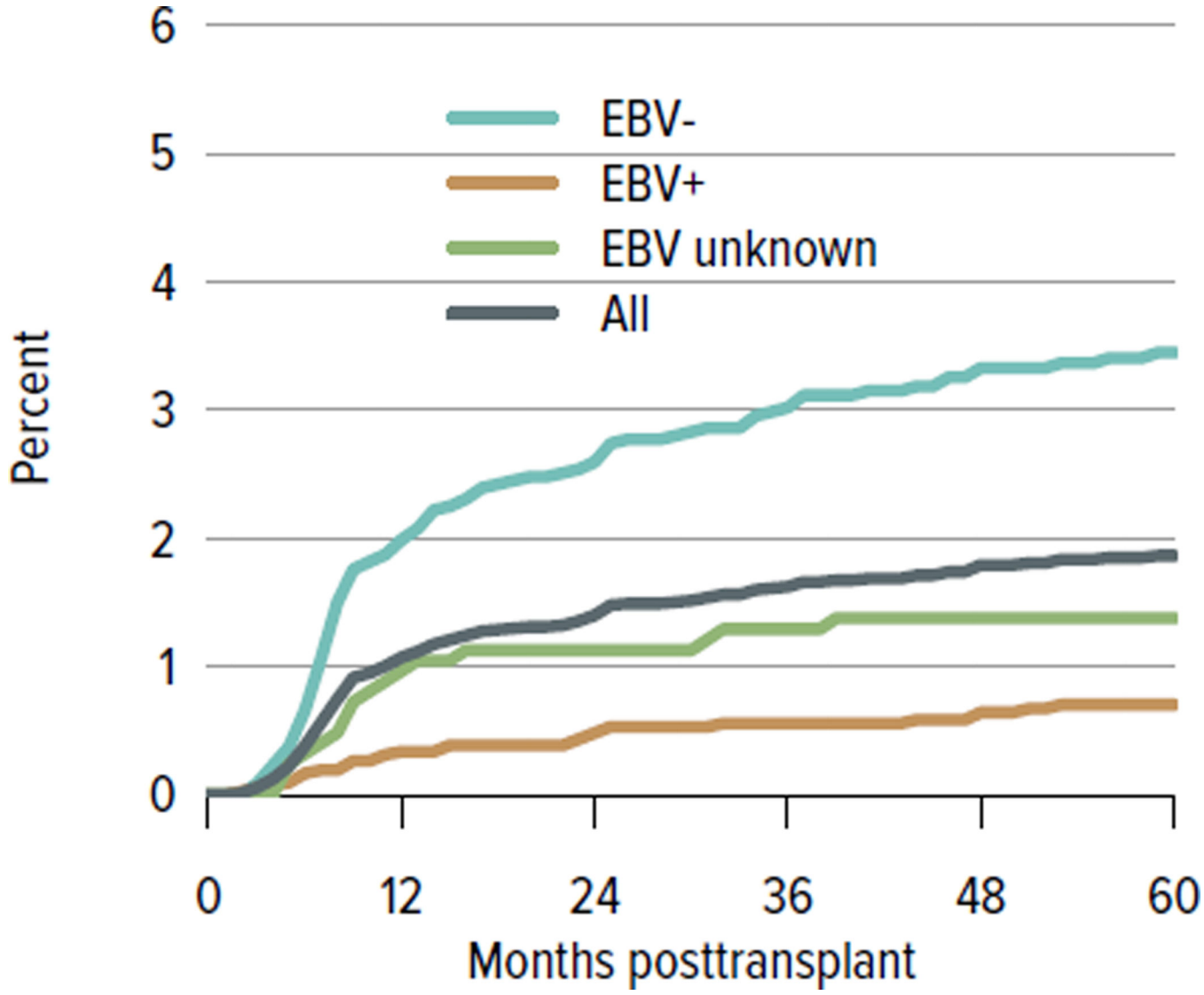

Figure KI 6.15. Incidence of PTLD among pediatric kidney transplant recipients, by recipient EBV status at transplant, 2002–2012

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.

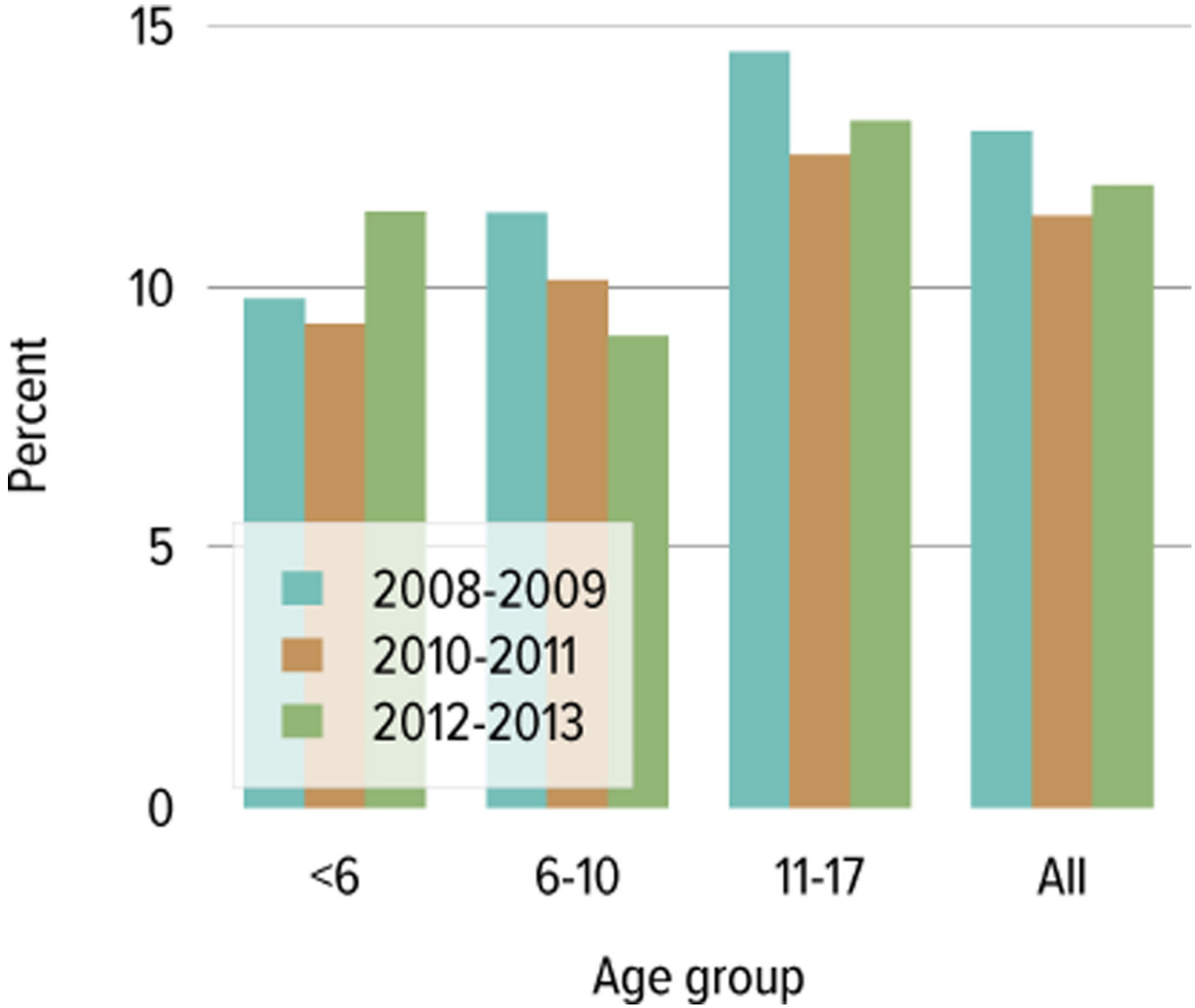

Figure KI 6.16. Incidence of acute rejection in year 1 posttransplant among pediatric kidney transplant recipients, by age

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

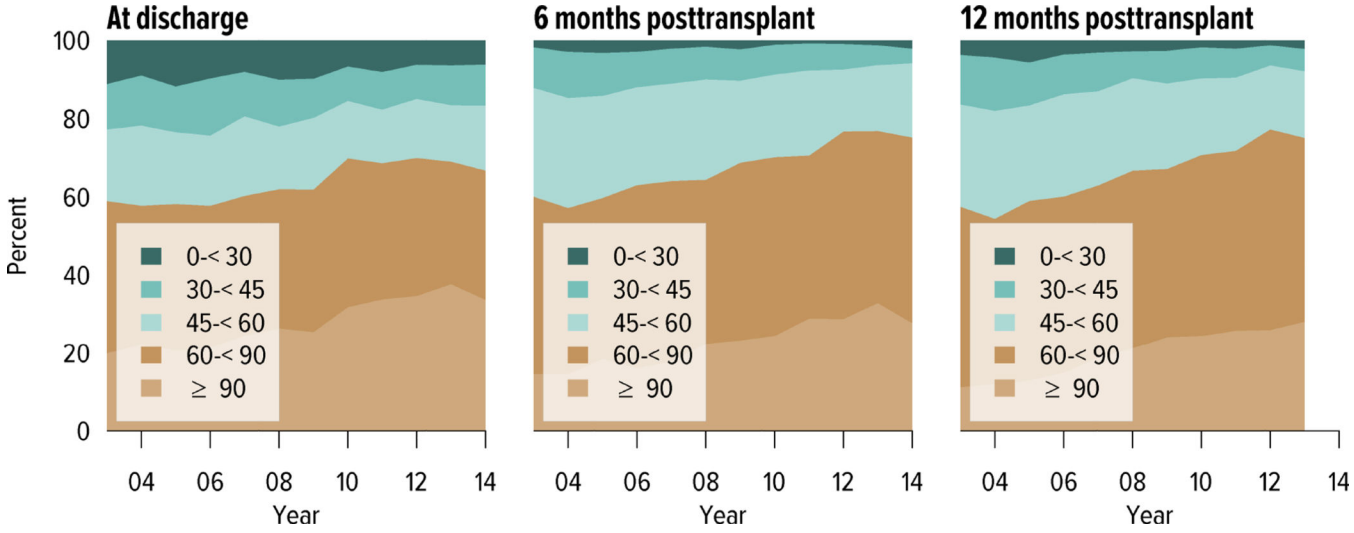

Figure KI 6.17. Distribution of eGFR at discharge and at 6 and 12 months posttransplant, among pediatric kidney-alone transplant recipients

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

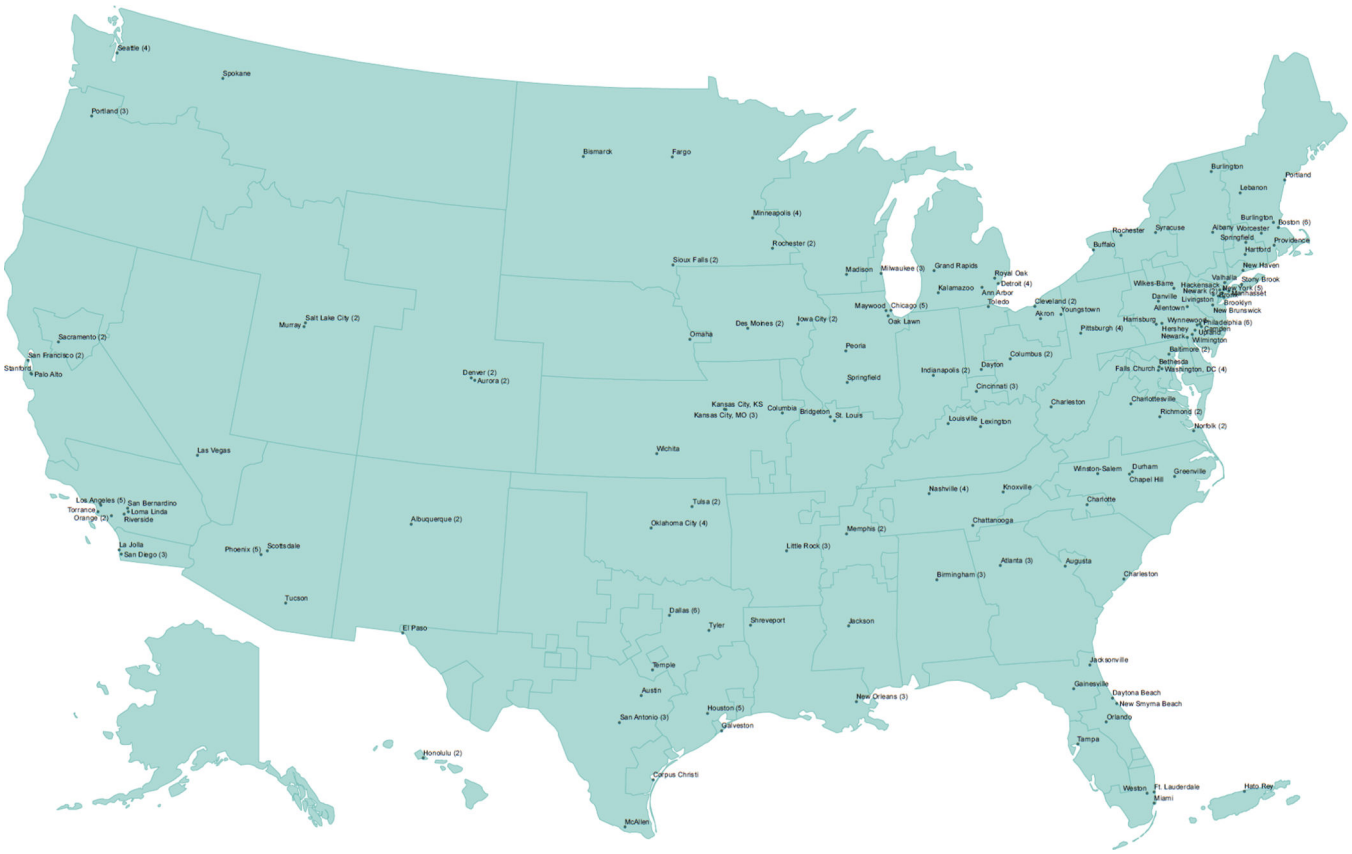

Figure KI 7.1. Centers performing adult transplants or listing active adult kidney candidates, within DSAs, 2012–2014

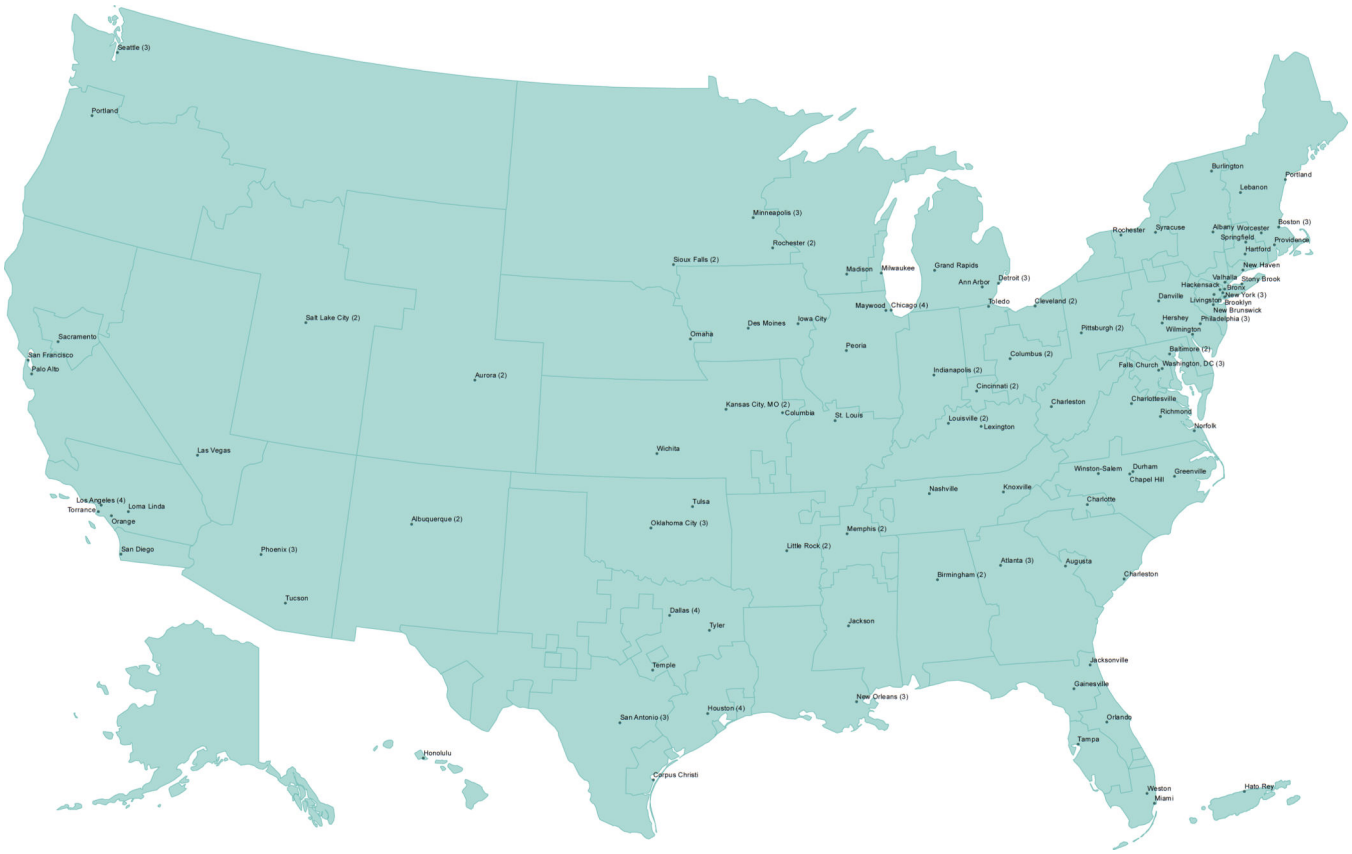

Figure KI 7.2. Centers performing pediatric transplants or listing active pediatric kidney candidates, within DSAs, 2012–2014

Table KI 1.1
Reasons for inactive status among adult kidney transplant listings, 2014

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

	Inactive 7 days after listing		Active at listing, inactive on Dec 31	
Reasons for inactive status	**N**	**%**	**N**	**%**
Candidate work-up incomplete	8,539	73.0	5,884	31.0
Insurance issues	1,024	8.8	1,711	9.0
Too sick	800	6.8	6,972	36.8
Weight inappropriate	521	4.5	1,019	5.4
Too well	389	3.3	925	4.9
Candidate choice	164	1.4	1,016	5.4
Transplant pending	84	0.7	53	0.3
Candidate for LD transplant only	72	0.6	11	0.1
Inappropriate substance abuse	35	0.3	232	1.2
Medical non-compliance	34	0.3	651	3.4
Unknown	33	0.3	113	0.6
Candidate could not be contacted	2	0.0	366	1.9
Removal pending data correction	1	0.0	0	0.0
Physician/surgeon unavailable	1	0.0	10	0.1

LD, living donor.

Table KI 1.2

Characteristics of adults on the kidney transplant waiting list on December 31, 2004 and December 31, 2014

Candidates waiting for transplant on December 31, 2004, and December 31, 2014, regardless of first listing date; active/inactive status is on this date, and multiple listings are not counted.

		2004		2014	
		N	%	N	%
Age	18–34	7,422	12.9	9,177	9.3
	35–49	18,534	32.2	25,558	25.8
	50–64	23,711	41.1	43,282	43.7
	≥65	7,956	13.8	20,939	21.2
Sex	Female	24,306	42.2	39,754	40.2
	Male	33,317	57.8	59,202	59.8
Race	White	22,908	39.8	35,942	36.3
	Black	20,479	35.5	34,007	34.4
	Hispanic	9,288	16.1	19,222	19.4
	Asian	4,125	7.2	8,242	8.3
	Other/unknown	823	1.4	1,543	1.6
Citizenship	US citizen	54,323	94.3	90,523	91.5
	Non-citizen resident	2,699	4.7	2,762	2.8
	Non-citizen non-resident	492	0.9	361	0.4
	Other/unknown	109	0.2	5,310	5.4
Primary diagnosis	Diabetes	17,136	29.7	35,138	35.5
	Hypertension	14,338	24.9	24,117	24.4
	GN	8,994	15.6	13,825	14.0
	CKD	4,680	8.1	7,998	8.1
	Other	12,475	21.6	17,878	18.1
Diabetes (any source)		21,538	37.4	44,868	45.3
Kidney transplant history	First transplant	47,741	82.9	85,288	86.2

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		2004		2014	
		N	%	N	%
	Retransplant	9,882	17.1	13,668	13.8
Blood type	A	16,123	28.0	28,340	28.6
	B	9,624	16.7	16,035	16.2
	AB	1,559	2.7	2,796	2.8
	O	30,317	52.6	51,785	52.3
PRA/CPRA	< 1%	28,649	49.7	60,469	61.1
	1–< 20%	11,225	19.5	8,410	8.5
	20–< 80%	8,378	14.5	14,760	14.9
	80–< 98%	4,215	7.3	6,013	6.1
	98–100%	3,677	6.4	8,590	8.7
	Unknown	1,479	2.6	714	0.7
Waiting time	< 1 year	19,760	34.3	27,068	27.4
	1–< 2 years	12,911	22.4	21,811	22.0
	2–< 3 years	8,869	15.4	16,139	16.3
	3–< 4 years	5,909	10.3	11,336	11.5
	4–< 5 years	3,878	6.7	8,066	8.2
	≥ 5 years	6,296	10.9	14,536	14.7
Will accept ECD or KDPI >85% kidney		24,754	43.0	50,925	51.5
Multi-organ	Kidney alone	54,977	95.4	95,953	97.0
	Kidney-pancreas	2,328	4.0	1,979	2.0
	Kidney-liver	259	0.4	844	0.9
	Kidney-heart	54	0.1	165	0.2
	Other	5	0.0	15	0.0
All candidates		57,623	100.0	98,956	100.0

CKD, cystic kidney disease; GN, glomerulonephritis; KDPI, kidney donor profile index.

Table KI 1.3
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.

	2012	2013	2014
Patients at start of year	88,753	92,669	96,691
Patients added during year	30,345	31,598	31,288
Patients removed during year	26,388	27,522	29,023
Patients at end of year	92,710	96,745	98,956
Removal reason			
Deceased donor transplant	11,032	11,278	11,594
Living donor transplant	4,935	5,100	5,082
Transplant (type unspecified)	56	54	56
Patient died	4,736	4,752	4,931
Patient refused transplant	443	455	483
Improved, transplant not needed	157	194	197
Too sick for transplant	2,511	2,886	3,384
Other	2,518	2,803	3,296

Table KI 3.1

Living kidney donor deaths, 2010–2014

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

	Days after donation		
Cause	**0–30**	**31–90**	**91–365**
Suicide	1	1	4
Accident/homicide	0	0	5
Medical	3	2	1
Cancer	0	0	1
Unknown	0	1	1
TOTAL	4	4	12

Table KI 4.1

Characteristics of adult kidney transplant recipients, 2014

Adult kidney transplant recipients, including retransplants.

		Deceased		Living		All	
		N	%	N	%	N	%
Age	18–34	1,202	10.2	1,035	19.6	2,237	13.1
	35–49	3,141	26.6	1,590	30.1	4,731	27.7
	50–64	4,902	41.5	1,913	36.2	6,815	39.9
	≥65	2,562	21.7	753	14.2	3,315	19.4
Sex	Female	4,606	39.0	1,970	37.2	6,576	38.5
	Male	7,201	61.0	3,321	62.8	10,522	61.5
Race	White	5,144	43.6	3,523	66.6	8,667	50.7
	Black	3,660	31.0	690	13.0	4,350	25.4
	Hispanic	1,940	16.4	743	14.0	2,683	15.7
	Asian	876	7.4	294	5.6	1,170	6.8
	Other/unknown	187	1.6	41	0.8	228	1.3
Primary diagnosis	Diabetes	3,741	31.7	1,156	21.8	4,897	28.6
	Hypertension	2,844	24.1	892	16.9	3,736	21.9
	GN	1,887	16.0	1,326	25.1	3,213	18.8
	CKD	1,201	10.2	868	16.4	2,069	12.1
	Other	2,134	18.1	1,049	19.8	3,183	18.6
Blood type	A	4,339	36.7	2,042	38.6	6,381	37.3
	B	1,546	13.1	729	13.8	2,275	13.3
	AB	580	4.9	213	4.0	793	4.6
	O	5,342	45.2	2,307	43.6	7,649	44.7
PRA/CPRA	< 1%	7,284	61.7	3,843	72.6	11,127	65.1
	1–< 20%	941	8.0	431	8.1	1,372	8.0
	20–< 80%	1,734	14.7	718	13.6	2,452	14.3

		Deceased		Living		All	
		N	%	N	%	N	%
	80–< 98%	1,337	11.3	195	3.7	1,532	9.0
	98–100%	510	4.3	95	1.8	605	3.5
	Unknown	1	0.0	9	0.2	10	0.1
History of RRT	Preemptive transplant	1,246	10.6	1,670	31.6	2,916	17.1
	< 1 year	926	7.8	1,181	22.3	2,107	12.3
	< 3 years	2,485	21.0	1,285	24.3	3,770	22.0
	< 5 years	2,505	21.2	384	7.3	2,889	16.9
	≥5 years	4,645	39.3	771	14.6	5,416	31.7
Insurance	Private	2,883	24.4	2,990	56.5	5,873	34.3
	Medicare	8,056	68.2	1,962	37.1	10,018	58.6
	Medicaid	536	4.5	199	3.8	735	4.3
	Other government	189	1.6	59	1.1	248	1.5
	Other/unknown	143	1.2	81	1.5	224	1.3
HLA mismatches	0	878	7.4	357	6.7	1,235	7.2
	1	107	0.9	261	4.9	368	2.2
	2	535	4.5	722	13.6	1,257	7.4
	3	1,490	12.6	1,230	23.2	2,720	15.9
	4	3,170	26.8	889	16.8	4,059	23.7
	5	3,674	31.1	1,137	21.5	4,811	28.1
	6	1,889	16.0	599	11.3	2,488	14.6
	Unknown	64	0.5	96	1.8	160	0.9
Kidney transplant history	First transplant	10,379	87.9	4,707	89.0	15,086	88.2
	Retransplant	1,428	12.1	584	11.0	2,012	11.8
DCD status *	DBD	9,791	82.9				
	DCD	2,016	17.1				
KDPI *	≤20%	2,529	21.4				

		Deceased		Living		All	
		N	%	N	%	N	%
	21–34%	1,842	15.6				
	35–85%	6,116	51.8				
	> 85%	965	8.2				
	Unknown	355	3.0				
All recipients		11,807	100.0				

CKD, cystic kidney disease; DCD, donation after circulatory death; GN, glomerulonephritis; KDPI, kidney donor profile index; RRT, renal replacement therapy.

*DCD status and KDPI scores apply to deceased donor transplants only.

Table KI 4.2
Top 15 medications filled by adult kidney transplant recipients, 2010

Adult kidney transplant recipients, 2010, who were matched to the IMS Health pharmacy claims database and had at least one medication filled during year 1 or year 2 posttransplant. Immunosuppression data may differ from data reported to OPTN due to different patient subsets and data sources.

Medication	% in 1st yr posttransplant	Medication	% in 2nd yr posttransplant
Mycophenolate	54.0	Mycophenolate	39.9
Tacrolimus	52.8	Tacrolimus	39.7
Sulfamethoxazole-Trimethoprim	50.9	Prednisone	33.9
Prednisone	44.3	Amlodipine Besylate	19.0
Valganciclovir	42.2	Hydrocodone	18.8
Hydrocodone	32.2	Sulfamethoxazole-Trimethoprim	18.1
Oxycodone	29.9	Metoprolol Tartrate	16.9
Amlodipine Besylate	29.4	Amoxicillin	16.8
Metoprolol Tartrate	27.0	Omeprazole	14.3
Ciprofloxacin	25.6	Ciprofloxacin	13.2
Furosemide	24.6	Furosemide	13.1
Omeprazole	21.8	Azithromycin	12.7
Docusate Sodium	18.4	Oxycodone	12.0
Amoxicillin	18.3	Insulin Glargine	11.9
Clotrimazole	16.7	Simvastatin	10.9

Table KI 4.3

Adult kidney donor-recipient serology matching, 2010–2014

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 is treated as 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.

		Recipient −			Recipient +			Recipient unk.		
Donor		**D−**	**D+**	**D unk.**	**D−**	**D+**	**D unk.**	**D−**	**D+**	**D unk.**
CMV	Deceased	12.6	18.4	0.1	24.8	42.5	0.2	0.4	0.9	0.0
	Living	23.8	16.3	1.4	20.7	34.6	1.9	0.5	0.4	0.4
EBV	Deceased	0.7	8.7	0.0	4.5	71.3	0.1	0.9	13.8	0.0
	Living	1.6	6.9	1.4	5.7	64.0	5.7	0.5	5.1	9.1
HB core	Deceased	78.1	2.7	0.0	7.9	0.6	0.0	10.3	0.3	0.0
	Living	75.9	1.4	5.9	3.4	0.3	0.4	7.4	0.1	5.1
HB surface antigen	Deceased	95.6	0.0	0.1	2.4	0.0	0.0	1.8	0.0	0.0
	Living	90.1	0.2	5.9	1.4	0.0	0.1	1.9	0.0	0.4
HCV	Deceased	91.2	0.2	0.0	4.2	2.0	0.0	2.3	0.0	0.0
	Living	91.0	0.2	3.8	2.0	0.0	0.1	2.1	0.0	0.7
HIV	Deceased	90.4	0.0	0.1	0.7	0.0	0.0	8.8	0.0	0.0
	Living	85.7	0.0	5.5	0.4	0.0	0.0	3.9	0.0	4.5

CMV, cytomegalovirus; EBV, Epstein-Barr virus; HB, hepatitis B; HCV, hepatitis C virus; HIV, human immunodeficiency virus.

Table KI 6.1
Reasons for inactive status among pediatric kidney transplant listings, 2014

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

	Inactive 7 days after listing		Active at listing, inactive on Dec 31	
Reasons for inactive status	**N**	**%**	**N**	**%**
Candidate work-up incomplete	359	60.3	29	17.5
Too well	58	9.7	34	20.5
Too sick	49	8.2	46	27.7
Candidate for LD transplant only	48	8.1	2	1.2
Candidate choice	33	5.5	16	9.6
Insurance issues	16	2.7	8	4.8
Weight inappropriate	16	2.7	4	2.4
Medical non-compliance	10	1.7	22	13.3
Transplant pending	6	1.0	1	0.6
Unknown	0	0.0	2	1.2
Candidate could not be contacted	0	0.0	1	0.6
Inappropriate substance abuse	0	0.0	1	0.6

LD, living donor.

Table KI 6.2

Characteristics of pediatric candidates on the kidney transplant waiting list on December 31, 2004 and December 31, 2014

Candidates aged younger than 18 years at listing waiting for transplant on December 31, 2004, and December 31, 2014, regardless of first listing date; multiple listings are not counted. In 2014, 37.8% were adults on December 31.

		2004		2014	
		N	%	N	%
Age	< 1	4	0.3	3	0.2
	1–5	96	8.4	222	15.0
	6–10	130	11.3	188	12.7
	11–17	570	49.6	559	37.8
	≥18	349	30.4	508	34.3
Sex	Female	475	41.3	623	42.1
	Male	674	58.7	857	57.9
Race	White	458	39.9	572	38.6
	Black	327	28.5	362	24.5
	Hispanic	290	25.2	451	30.5
	Asian	51	4.4	67	4.5
	Other/unknown	23	2.0	28	1.9
Citizenship	US citizen	1,045	90.9	1,380	93.2
	Non-citizen resident	64	5.6	20	1.4
	Non-citizen non-resident	29	2.5	9	0.6
	Other/unknown	11	1.0	71	4.8
Primary diagnosis	FSGS	161	14.0	181	12.2
	GN	173	15.1	158	10.7
	CAKUT	295	25.7	483	32.6
	Other	520	45.3	658	44.5
Kidney transplant history	First transplant	779	67.8	1,076	72.7
	Retransplant	370	32.2	404	27.3

		2004		2014	
		N	%	N	%
Blood type	A	341	29.7	446	30.1
	B	180	15.7	246	16.6
	AB	31	2.7	39	2.6
	O	597	52.0	749	50.6
PRA/CPRA	< 1%	567	49.3	873	59.0
	1–< 20%	173	15.1	105	7.1
	20–< 80%	145	12.6	195	13.2
	80–< 98%	100	8.7	98	6.6
	98–100%	115	10.0	198	13.4
	Unknown	49	4.3	11	0.7
Waiting time	< 1 year	550	47.9	618	41.8
	1–< 2 years	264	23.0	292	19.7
	2–< 3 years	105	9.1	169	11.4
	3–< 4 years	57	5.0	105	7.1
	4–< 5 years	29	2.5	79	5.3
	≥ 5 years	144	12.5	217	14.7
Multi-organ	Kidney alone	1,124	97.8	1,453	98.2
	Kidney-pancreas	3	0.3	2	0.1
	Kidney-liver	15	1.3	18	1.2
	Kidney-heart	6	0.5	4	0.3
	Other	1	0.1	3	0.2
All candidates		1,149	100.0	1,480	100.0

FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis; CAKUT, congenital anomalies of the kidney and urinary tract.

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Table KI 6.3
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.

	2012	2013	2014
Patients at start of year	1,278	1,301	1,361
Patients added during year	884	907	1,002
Patients removed during year	861	844	883
Patients at end of year	1,301	1,364	1,480
Removal reason			
Deceased donor transplant	562	557	575
Living donor transplant	212	217	238
Transplant (type unspecified)	2	0	0
Patient died	22	15	22
Patient refused transplant	2	0	2
Improved, transplant not needed	8	4	2
Too sick for transplant	5	8	8
Other	48	43	36

Table KI 6.4

Characteristics of pediatric kidney transplant recipients, 2012–2014

Kidney transplant recipients, including retransplants. Diagnosis categories follow North American Pediatric Renal Trials and Collaborative Studies recommendations.

		Deceased		Living		All	
		N	%	N	%	N	%
Age	< 1	2	0.1	3	0.4	5	0.2
	1–5	287	20.2	246	30.4	533	23.9
	6–10	250	17.6	166	20.5	416	18.7
	11–17	881	62.0	395	48.8	1,276	57.2
Sex	Female	592	41.7	320	39.5	912	40.9
	Male	828	58.3	490	60.5	1,318	59.1
Race	White	555	39.1	584	72.1	1,139	51.1
	Black	343	24.2	62	7.7	405	18.2
	Hispanic	423	29.8	121	14.9	544	24.4
	Asian	63	4.4	27	3.3	90	4.0
	Other/unknown	36	2.5	16	2.0	52	2.3
Primary diagnosis	FSGS	169	11.9	81	10.0	250	11.2
	GN	167	11.8	72	8.9	239	10.7
	CAKUT	492	34.6	300	37.0	792	35.5
	Other	592	41.7	357	44.1	949	42.6
Blood type	A	454	32.0	313	38.6	767	34.4
	B	186	13.1	97	12.0	283	12.7
	AB	56	3.9	41	5.1	97	4.3
	O	724	51.0	359	44.3	1,083	48.6
PRA/CPRA	< 1%	1,074	75.6	590	72.8	1,664	74.6
	1–< 20%	115	8.1	72	8.9	187	8.4
	20–< 80%	169	11.9	86	10.6	255	11.4

		Deceased		Living		All	
		N	%	N	%	N	%
	80–< 98%	57	4.0	20	2.5	77	3.5
	98–100%	5	0.4	13	1.6	18	0.8
	Unknown	0	0.0	29	3.6	29	1.3
History of RRT	Preemptive transplant	377	26.5	313	38.6	690	30.9
	< 1 year	319	22.5	244	30.1	563	25.2
	< 3 years	453	31.9	158	19.5	611	27.4
	< 5 years	137	9.6	31	3.8	168	7.5
	≥ 5 years	134	9.4	64	7.9	198	8.9
Insurance	Private	409	28.8	485	59.9	894	40.1
	Medicare	477	33.6	162	20.0	639	28.7
	Medicaid	419	29.5	120	14.8	539	24.2
	Other government	96	6.8	23	2.8	119	5.3
	Other/unknown	19	1.3	20	2.5	39	1.7
HLA mismatches	0	43	3.0	25	3.1	68	3.0
	1	1	0.1	76	9.4	77	3.5
	2	41	2.9	215	26.5	256	11.5
	3	148	10.4	297	36.7	445	20.0
	4	395	27.8	63	7.8	458	20.5
	5	502	35.4	77	9.5	579	26.0
	6	289	20.4	40	4.9	329	14.8
	Unknown	1	0.1	17	2.1	18	0.8
Kidney transplant history	First transplant	1,298	91.4	746	92.1	2,044	91.7
	Retransplant	122	8.6	64	7.9	186	8.3
DCD status *	DBD	1,351	95.1				
	DCD	69	4.9				
KDPI *	≤ 20%	907	63.9				

		Deceased		Living		All	
		N	%	N	%	N	%
	21–34%	266	18.7				
	35–85%	220	15.5				
	> 85%	0	0.0				
	Unknown	27	1.9				
Delayed graft function	Non-DGF	1,325	93.3	777	95.9	2,102	94.3
	DGF	95	6.7	33	4.1	128	5.7
ABO compatibility	Compatible/identical	1,420	100.0	805	99.4	2,225	99.8
	Incompatible	0	0.0	5	0.6	5	0.2
All recipients		1,420	100.0	810	100.0	2,230	100.0

FSGS, focal segmental glomerulosclerosis; GN, glomerulonephritis; CAKUT, congenital anomalies of the kidney and urinary tract; RRT, renal replacement therapy; KDPI, kidney donor profile index.

*DCD status and KDPI scores apply to deceased donor transplants only.

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Pediatric kidney donor-recipient serology matching, 2010–2014

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 is treated as 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.

		Recipient −			Recipient +			Recipient unk.		
Donor		**D−**	**D+**	**D unk.**	**D−**	**D+**	**D unk.**	**D−**	**D+**	**D unk.**
CMV	Deceased	25.0	34.8	0.3	16.4	21.7	0.3	0.5	1.0	0.0
	Living	33.9	29.2	3.8	7.2	21.4	1.3	1.4	1.8	0.1
EBV	Deceased	5.1	36.9	0.2	5.8	47.1	0.1	0.5	4.3	0.0
	Living	6.7	43.1	5.3	2.9	32.5	3.1	0.6	4.2	1.5

CMV, cytomegalovirus; EBV, Epstein-Barr virus.