Chapter VIII

Renal Transplantation: Access and Outcomes

Transplantation has become the preferred mode of treatment for ESRD patients, partially due to an increase in kidney graft survival rates, and partially due to the improvement in quality of life incurred by transplant patients (Evans 1985). The number of cadaveric kidney transplants increased for the first time in four years in 1990, and again in 1991. The time from ESRD onset to first cadaveric transplant essentially remained constant between 1988 and 1990, but increased dramatically in 1991 (7 percent rise in mean time from ESRD to first transplant, Reference Table E.10). This probably reflects both an increase in demand and a decrease in the supply of available organs.

The USRDS patient database, based on Medicare files, contains information on all ESRD patients who have had Medicare insurance. The USRDS patient database covers at least 93 percent of renal transplants in the United States. Most of the information presented in this chapter (and all others) is derived from USRDS patient data files which are considered complete through 1991. (As explained in the Technical Notes, Chapter XV, delays in reporting have led to a conservative approach of waiting 15 months prior to inclusion of data.) Another source of information about transplantation is the HCFA Annual Facility Survey (AFS, see Chapter XI for more details). All Medicare-approved dialysis and/or transplant units are surveyed. For all practical purposes, 100 percent of the kidney transplant units in the U.S. are Medicare approved. The Facility Survey covers all kidney transplants, not just those reimbursed by Medicare. It is a source of information about dialysis and transplant patients who are not covered by Medicare and for characteristics of ESRD facilities. The survey does not include patient level information, nor any information about outcomes other than crude mortality rates, so it is primarily used for facility information.

Patient survival and renal graft survival are calculated throughout this chapter by the Kaplan-Meier (KM) technique (Kaplan and Meier). Unless noted otherwise, this chapter reports on a census of all Medicare renal transplants in the USRDS, which includes 92,000 transplants for patients alive at any time since 1977, and 71,000 between 1983 and 1991. The latter figure is used for most analyses reported in this chapter (Reference Table F.1). The year 1983 was chosen as the starting point for the analysis since almost all facets of transplantation changed with FDA approval of cyclosporine in 1983; in addition, the reporting of data improved substantially in that year.

To adjust rates in this chapter, the age, sex, race, and primary disease distributions of 1991 incident ESRD patients and 1989-91 transplant recipients are used as the reference groups for standardization of patient survival and graft survival rates, respectively (see Chapter XV for more details). If a table or figure is group specific, e.g. disease specific, it is adjusted for the remaining categories, in this case age, race and sex. As the number of older transplanted patients is limited, most analyses presented here use two age group cohorts: 20-44 years and 45-64 years. Younger transplant patients are discussed in the pediatric chapter, Chapter IX. Patients over 65 are not included due to small numbers. For the transplant analyses presented in this chapter, age standardization is not as important as it is for other analyses which include many older ESRD patients.

Patient Survival

Figure VIII-1 presents the adjusted two-year patient survival for recipients of a first cadaveric graft during 1983-90, for four major aggregations of diseases leading to chronic renal failure. Patients in each disease group demonstrate distinct improvement in two-year survival over this time period, particularly in 1983-1985, which coincides with the introduction of cyclosporine. Diabetic patients' two-year survival is uniformly lower than for the

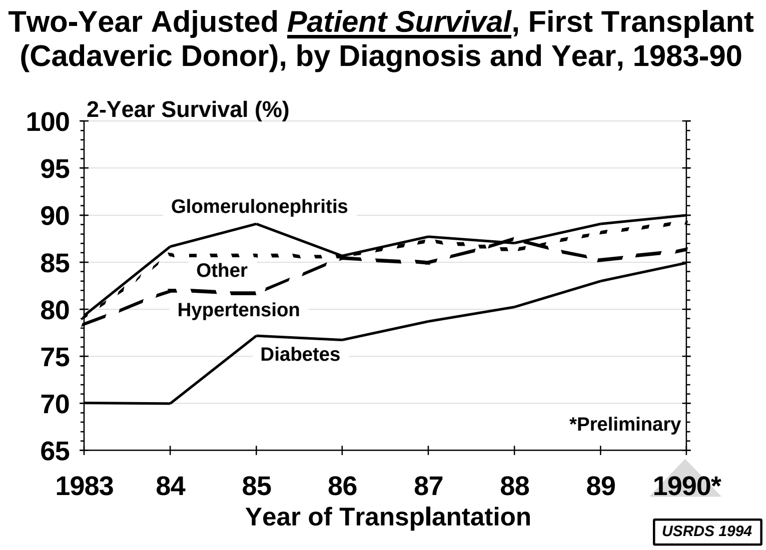

Figure VIII-1

Two-year Kaplan-Meier patient survival (percent) for ESRD patients receiving a first cadaveric transplant by diagnosis, 1983-90. Adjusted for age, race and sex to the distributions of the 1991 ESRD incident population. Medicare patients only. Data for 1990 are preliminary. Source: Reference Table E.67.

other disease groups, but approaches the level of the others by 1989-90.

Shown in Figure VIII-2 is the two-year adjusted patient survival for two age groups (20-44 years, 45-64 years) by type of kidney donated (living related, cadaveric), for adults whose first transplant was performed between 1983 and 1990. The age groups refer to the patients' age at the time of transplantation. Two-year patient survival was consistently 10 to 15 percent higher for younger living related recipients (LRD 20-44 years) and 5 to 10 percent higher for younger cadaveric recipients (CAD 20-44 years) than for older cadaveric recipients (CAD 45-64 years). Patient survival estimates for older living related recipients (LRD 45-64 years) are not very consistent due to the small numbers of such recipients. In the **1993 USRDS Annual Data Report**, the estimates for these three groups were quite similar. In general, two-year patient survival was higher for younger patients regardless of donor type.

Overall, there appears to be a noticeable trend towards better patient survival commencing primarily in 1983, particularly for cadaveric recipients. This was approximately the same time that use of cyclosporine became widespread (Kahan). For younger patients receiving a first graft from a living related donor, two-year adjusted patient survival increased from 91 percent in 1983 to 96 percent in 1984 and then varied between 94 and 96

Two-Year Adjusted *<u>Patient Survival</u>*, First Transplant, by Age, Donor Type and Year, 1983-90

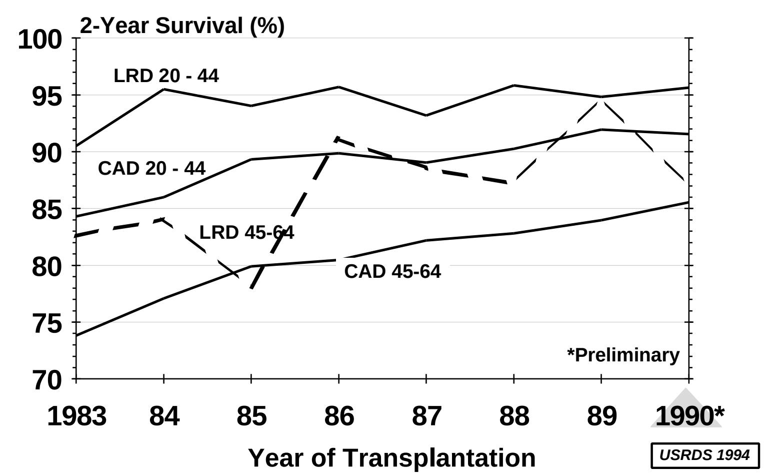

Figure VIII-2

Two-year Kaplan-Meier patient survival (percent) for ESRD patients receiving a first transplant by donor type (living related, cadaver) and age, adjusted for race, sex and primary disease to the distributions of the 1991 ESRD incident population, 1983-90. Medicare patients only. Data for 1990 are preliminary. Average n per year: LRD 20-44, 1023; CAD 20-44, 2756; LRD 45+, 283; CAD 45+, 1938 (Small sample size contributes to variability in figure.) Source: Reference Tables E.67 and E.71.

percent from 1985 to 1990 (Reference Table E.71). Ninety-six percent two-year patient survival translates to an expected remaining lifetime of over 40 years, assuming an exponential actuarial survival curve (see Chapter XV for the method of calculating expected life). Two-year adjusted patient survival for 45-64 year old persons who received a cadaveric graft increased from 74 percent in 1983 to 86 percent in 1990 (Reference Table E.67). More detailed transplant patient survival information is presented in the Reference Tables, Section E.

Patient survival and quality of life for transplant recipients are clearly better than for patients on dialysis therapy (see Chapter VI and related research: Held, Garcia, et al. 1990 and Julius). Since there is selection by both patients and health care providers as to who receives a renal transplant, it is not proper to ascribe patient survival and quality of life improvements solely to the transplant modality without additional information on patient case-mix severity prior to transplant. The impact of case-mix severity indicators on access to renal transplantation has been examined (Gaylin).

Kidney Graft Survival

In the **1994 USRDS Annual Data Report**, a change has been made in the method for reporting graft survival. In previous reports, graft survival was estimated using unadjusted survival rates. For this report a decision was made to adjust the graft survival rates for differences in patient age, sex, race and primary disease distributions to the 1991 distributions to standardize the rates. Since the average age of transplant patients has been increasing and since other factors have changed across years (e.g., more diabetics), these adjusted rates will allow for better comparisons between current years and earlier years.

Living Related Graft Survival

Figure VIII-3 shows adjusted Kaplan-Meier (KM) graft survival rates up to five years post-transplant for living related donor transplants performed between 1983 and 1991. To improve stability, results have been averaged in two-year groups (1984-85, 1986-87, etc.). Results for grafts transplanted in 1991 should be considered preliminary. One-year adjusted graft survival rates, averaged over two years for stability, ranged from 87 to 91 percent. The lowest graft survival rate average, 87 percent, was for the 1984-85 cohort. The adjusted, averaged graft survival increased monotonically with the year of transplantation. The three-year adjusted, averaged post-transplant survival estimates for the 1984-85, 1986-87 and 1988-89 cohorts exhibited a steady improvement from a low of 75 percent (1984-85) to a high of 81 percent (1988-89).

Cadaveric Graft Survival

Adjusted and averaged graft survival for first cadaveric donor transplants with up to five years of follow-up is shown in Figure VIII-4. Just as was the case for living related transplants, the adjusted, averaged graft survival for cadaveric grafts improved over time. The trend over time in graft survival is improving, whether the one-year, two-year or three-year survival rates are compared.

First Living Related *Graft Survival*, Adjusted, by Year, 1984-91

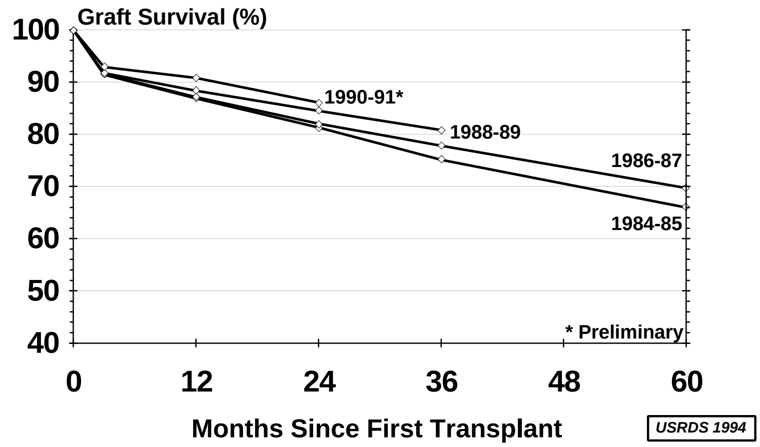

Figure VIII-3

Kaplan-Meier kidney graft survival (percent) for first living related transplant recipients, by time since transplant and year of transplantation, 1984-91. Adjusted for age, race, sex and primary disease to the distributions of 1989-91 transplant recipients. Patients in Puerto Rico and U.S. Territories are included. Medicare patients only. Survival data for 1991 are preliminary. Source: Reference Tables G.29-G.34.

For the one-year rates, the adjusted, averaged graft survival rate increased from 72 percent to 77 percent. (The preliminary 1990-91 rate was even higher: 82 percent). The two-year rates increased from 65 to 71 percent, and the three-year rates improved from 59 to 66 percent. The use of adjusted rates as opposed to crude rates used in prior Annual Data Reports, has yielded a better comparison of the improvement in graft survival. An examination of the **1993 USRDS Annual Data Report** shows that the unadjusted rates were not so obviously improving.

Trends in two-year adjusted cadaveric graft survival from 1983 to 1990 by diagnosis are shown in Figure VIII-5. There was a general improvement in graft survival for patients with all represented diagnoses. Most of the improvement occurred in the early period (1983-85), although there was also sharp improvement in graft survival for 1988-89. The graft survival for diabetes patients surpassed that for glomerulonephritis and hypertension patients between 1988 and 1989. An examination of the slope of the graft survival curves for both cadaveric (Figure VIII-4) and living related donor transplantation (Figure VIII-3) suggests that the improvements in graft survival have been spread across all transplant cohort groups throughout the years.

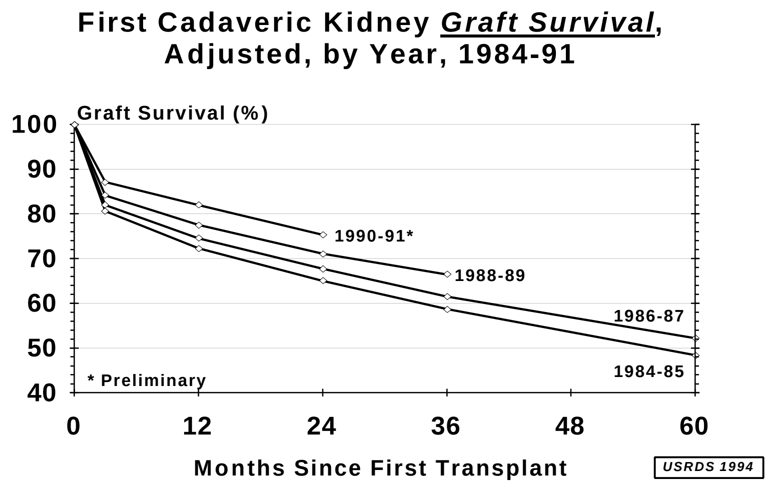

Figure VIII-4

Kaplan-Meier kidney graft survival (percent), first cadaveric transplant recipients, by time since transplant and year of transplantation, 1984-91. Adjusted for age, race, sex and primary disease to the distributions of 1989-91 transplant recipients. Patients in Puerto Rico and U.S. Territories are included. Medicare patients only. Survival data for 1991 are preliminary. Source: Reference Tables G.35-G.40.

Trends in Cadaveric Graft Loss

Figures VIII-6 and VIII-7 are also based on adjusted graft survival rates. In the **1993 USRDS Annual Data Report**, the comparable figures were based on

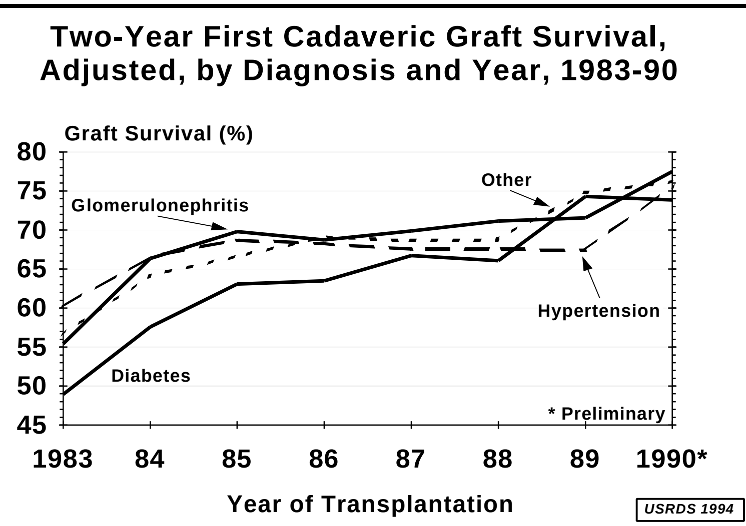

Figure VIII-5

Two-year Kaplan-Meier graft survival (percent), first cadaveric transplant recipients by diagnosis and year of transplantation, 1983-90. Adjusted for age, race and sex to the distributions of 1989-91 transplant recipients. Patients in Puerto Rico and U.S. Territories are included. Medicare patients only. Survival data for 1990 are preliminary. Source: Reference Table G.37.

Monthly Rate of First Cadaveric Transplant Graft Loss, 0-3 Months Post Transplant by Year, 1983-91

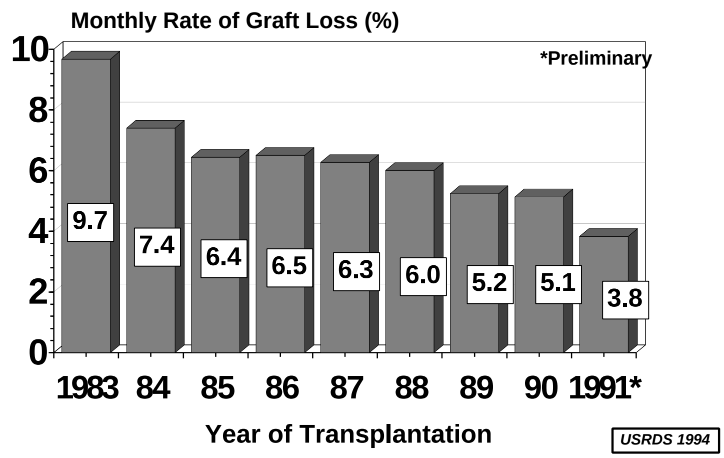

Figure VIII-6

Monthly Rate of first cadaveric graft loss (percent) for 0-3 months, by time since first transplant, and year of transplantation, 1983-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Data for 1991 are preliminary. Source: Reference Tables G.35-G.40.

unadjusted rates. Analyses were performed using both adjusted and unadjusted rates to ensure that results were not caused by the change in adjustment methodology.

Figure VIII-6 shows an examination of rates of graft loss for first cadaveric

Monthly Rate of First Cadaveric Transplant Graft Loss by Year and Time Since Transplant, 1983-91

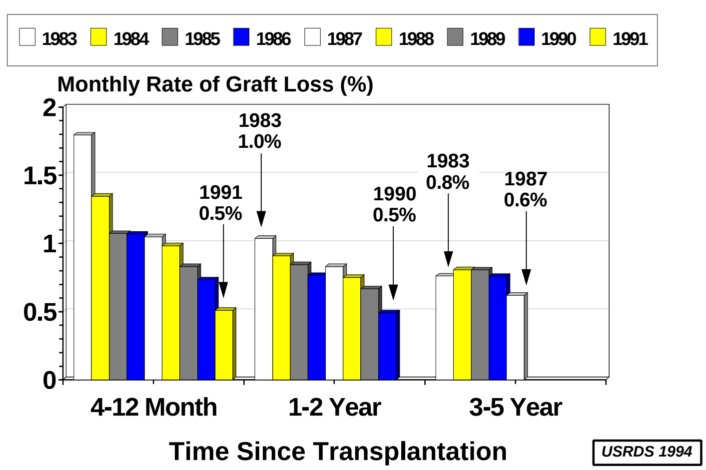

Figure VIII-7

Monthly rate of first cadaveric graft loss (percent) for 3-60 months, by time since first transplantation and year of transplantation, 1983-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Reference Tables G.35-G.40.

grafts during the first three months after transplantation by year of transplantation (1983-91). These results are an expansion of the results in the initial segment of Figure VIII-4. Between 1983 and 1990 there has been continuing improvement in graft survival in the first three months post transplant, with the largest change reported between 1983 and 1984. In this period, monthly graft loss rates decreased by over twenty percent (from 9.7 percent failure per month to 7.4 percent per month). The loss rate dropped slowly between 1985 and 1988 after a 13 percent reduction from 1984 to 1985. Between 1988 and 1989 another substantial (13 percent) decrease in rate of graft loss was seen. To ensure that the improvement was not spurious due to the decision to present data with age, sex, race, and disease adjustments, the change in graft loss rate was also calculated using non-adjusted survival rates (not reported in this ADR). Identical results were observed using both adjusted and unadjusted rates. The preliminary rate for 1991 shows a decline of 25 percent from the 1990 rate. If the more complete rate for 1991 does not change significantly from the preliminary data, another major improvement in short term graft survival has occurred. Note that the preliminary 1990 rate from the 1993 USRDS Annual Report differs from the 1990 value presented here by only 0.1. In future years, monthly rates of graft loss will continue to be monitored to determine if they continue to decrease.

Figure VIII-7 shows the rate of graft loss in longer follow-up periods. The monthly rate of graft loss during the four- to twelve-month post-transplant period has consistently decreased (Dunn). In 1983, 1.8 percent of grafts failed per month; by 1990, monthly graft loss at four to twelve months post-transplant was only 39 percent of the 1983 level. The preliminary 1991 monthly graft loss rate exhibited a substantial decline from the 1990 rate of 0.7 percent per month.

There has been substantial improvement in graft survival during the one-to-two years post-transplant period, but not as much improvement as seen in graft survival in the first year. Approximately 7,000 cadaveric kidneys are transplanted in a year. A monthly graft loss rate of 1.0 (1983 in Figure VIII-7) is equivalent to a 11.4 percent yearly graft loss rate ((0.99^{12}) X 100%) during the second year post-transplant. A monthly graft loss rate of 0.5 (1990 in Figure VIII-7) is equivalent to a 5.8 percent yearly graft loss rate ((0.995^{12}) X 100%) during the second year post-transplant. The difference translates to nearly 400 additional grafts functioning at 24 months after transplantation given 7,000 grafts are functioning after one year. If more complete data for 1991 yield similar estimates to the 1989 rates, there still would be more than 200 additional functioning grafts at 24 months when compared to 1983 results.

The data at the far right in Figure VIII-7 show minimal change in the monthly rate of graft loss seen three to five years following transplantation for transplants performed between 1983 and 1986. This suggests that the improvement in graft survival for transplants in the 1983-86 period has been restricted to the first two years following transplant (Cook). Since 1987, however, there has been a substantial improvement in the five-year graft loss rate, which decreased from 0.8 to 0.6 percent of grafts failed per month in 1986. That is, the estimated loss rate has decreased by 25 percent between 1986 and 1987 cohorts. This change will require close monitoring in the future to see if a new trend is beginning or if 1987 is anomalous due to the inclusion of the 1991 preliminary values, or for some other reason. This change was also observed using the non-adjusted survival rates. The data necessary to calculate graft survival at three to five years post-transplant for transplants performed after 1987 are not yet available.

Kidney Transplantation and HLA A, B, DR Matches

The relationship of human leukocyte antigens (HLA) to the survival of renal transplants has been a topic of analysis and discussion since the discovery of HLA in the 1960s. The connection between the six possible match/mismatch sites from the three HLA loci (A, B, and DR) and transplant survival has not been conclusively and non-controversially established (Gjertson and Held, Kahan et al. 1990). Kaplan-Meier estimated graft survival for different levels of HLA mismatches are presented in the Reference Tables, Section G. Separate estimates of graft survival by year of transplantation, donor source (cadaveric or living related donor), and HLA mismatches are presented for one, two, three, and five years of follow-up.

The mean number of total HLA A, B, and DR mismatches (0-6) by donor type and transplant number during 1984-91 is presented in Figure VIII-8. For all four groups the mean number of mismatches does not vary greatly over time. Not surprisingly, the mean number of mismatches for cadaveric grafts was higher than for living related grafts.

Among patients with cadaveric grafts, first transplants had 0.30 more mismatches, on average, than repeat transplants. The high anti HLA antibody sensitization of potential repeat recipients may provide an explanation for the lower likelihood of mismatches in repeat recipients (Busson). There was no observable difference in the mean number of mismatches between first and repeat transplants from living related donors.

There was no discernible time trend from 1984 through 1991 in mean mismatches for first cadaveric donor grafts and only a slight decline in the mean mismatches for repeat cadaveric grafts. There was an apparent increase in mismatches from 1984 to 1985 for all donor types and transplant numbers. Results, not shown, suggest that this change was consistent across all three HLA (A, B, DR) loci. There was a much more noticeable time trend in mean mismatches among living related donors, both first and repeat, increasing from nearly 1.7 in 1984 to 2.2 (29 percent increase) in 1991.

Mean HLA A, B, DR Mismatches, by Donor Type, Transplant Number and Year, 1984-91

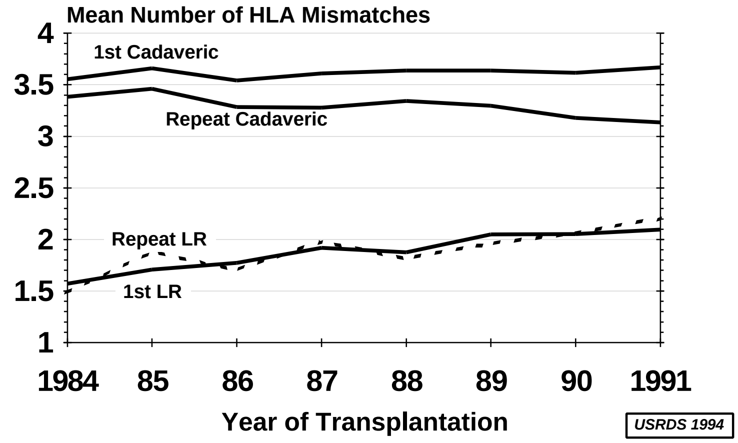

Figure VIII-8

Mean number of total HLA A, B, DR mismatches (0-6 possible), by donor type and transplant number, 1984-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patient transplants only. Source: Reference Table F.23.

Mean HLA A, B, DR Mismatches for First Cadaveric Transplants, by Recipient Race and Year, 1984-91

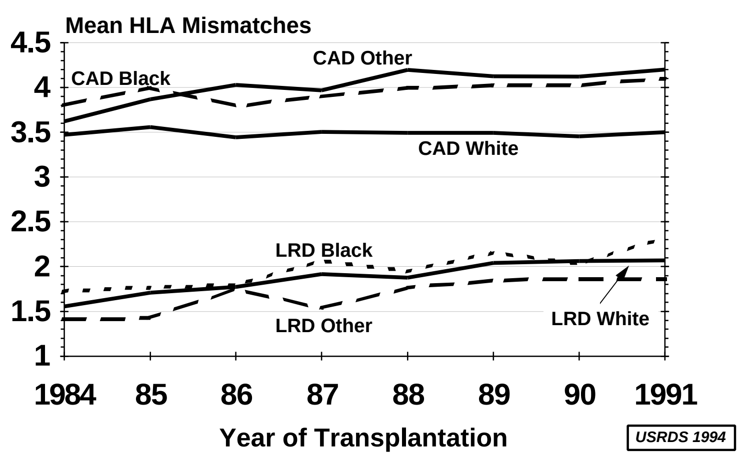

Figure VIII-9

Mean number of HLA A, B, DR mismatches (0-6 possible) by race, first cadaveric transplants only, 1984-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patient transplants only. Source: Reference Table F.24.

Figure VIII-9 presents mean HLA A, B, and DR mismatches (0-6) for first cadaveric grafts by recipient race and donor type for transplants performed between 1984 and 1991. White recipients of cadaveric grafts had consistently lower mean mismatches than black recipients or other racial groups. Across time racial differences in mean mismatches moved in a near parallel fashion. However there is evidence that since 1986, non-white recipients of cadaveric grafts had increasingly more mismatches than whites. The lower level of mismatches for white recipients is consistent with the observation that most donors were white (88 percent of 1991 donors whose race was known; see Reference Table F.36). White phenotypes, therefore, are more common in the donor pool. For all racial groups there is a slight increase across time in the mean number of mismatches that occurred with living related donors. For transplant patients with living related donors, the differences between the racial groups are too small to be significant.

Figure VIII-10 illustrates that the growth in the number of cadaveric transplants with no HLA (A, B, DR) mismatches between 1984 and 1991 has been rapid. This trend may be due in part to the UNOS requirement (1987-88) that six-match antigen organs be shared. Over time the percent with no mismatches has almost uniformly increased, with a slight anomaly in 1987. There was an overall increase of 188 percent from a low of 1.6 percent in 1984 to a high of 4.6 percent in 1990.

ABO Blood Type and Renal Transplantation

Access to transplantation differs by "ABO" blood types, and patients with "O" blood types typically have the

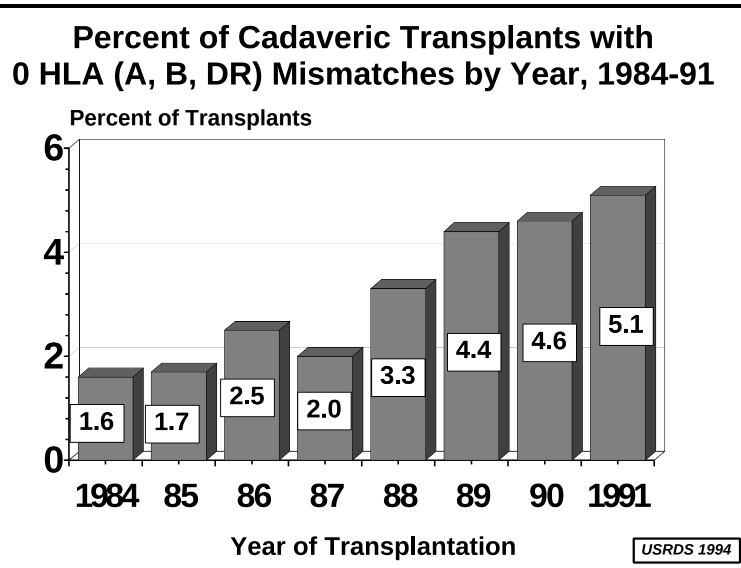

Figure VIII-10

Percent of cadaveric transplants with 0 HLA (A, B, DR) mismatches by year, 1984-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Reference Table F.23.

longest waiting time for a cadaveric graft (Port 1991). Shown in Figure VIII-11 is the distribution of ABO blood types for recipients of cadaveric grafts in 1991. White recipients were most commonly of blood types O (45 percent) and A (42 percent). Blacks and recipients of other races are commonly of type O, less commonly of type A and with a higher percent of the rarer type B and type AB than whites.

Figure VIII-12 shows that the trend in the percent of type O cadaveric kidneys going to non-type O recipients decreased from a 1985 high of 13 percent to only four percent in 1988. Since 1988 the percent has gradually increased, reaching six percent by 1991. The use of type O organs for other blood type recipients contributed to the added waiting times for O recipients to receive a cadaveric graft.

Supply of Kidneys for Transplantation

The supply of cadaveric kidneys remains of considerable concern (National Kidney Foundation). Shown in Figure VIII-13 are the cadaveric kidney donation (see following note) rates per million population for whites, blacks, Asian/Pacific Islanders, and Native Americans. Note: the rates presented in Figure VIII-11 are not quite donation rates, as they were calculated for each racial group by dividing the average number of donated organs actually used (rather than the total number donated in 1990 and 1991) by the United States 1990 census population count of that racial group. The result is expressed per million population per year. In 1990-91, white cadaveric kidneys were donated and used at the rate of 28 grafts per million

Distribution of ABO Blood Types for Cadaveric Transplant Recipients by Race, 1991

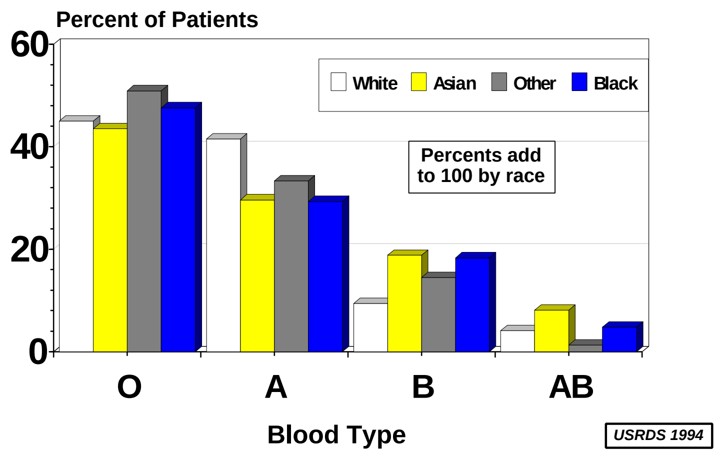

Figure VIII-11

The distribution of patient ABO blood types for cadaveric transplant recipients by race, 1991. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Reference Table F.41.

The Percent of "O" Blood Type Organs (CAD) Going to Non-"O" Recipients, 1985-91

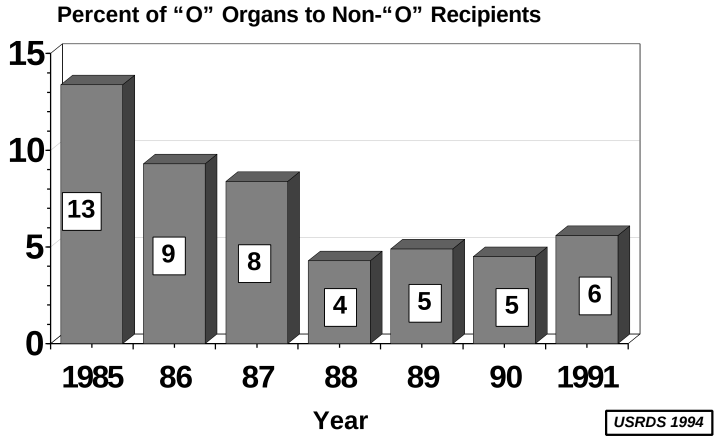

Figure VIII-12

Percent of "O" blood type organs for cadaveric donors going to non-"O" recipients. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Special analysis.

population, black kidneys at a rate of 21 per million, Asian/Pacific Islanders at a rate of 13 per million and Native Americans at a rate of 12 per million population per year.

Access to Kidney Transplantation

The methods for treatment of chronic

Cadaveric Organs Transplanted Per U.S. Population by Donor Race, 1990-91

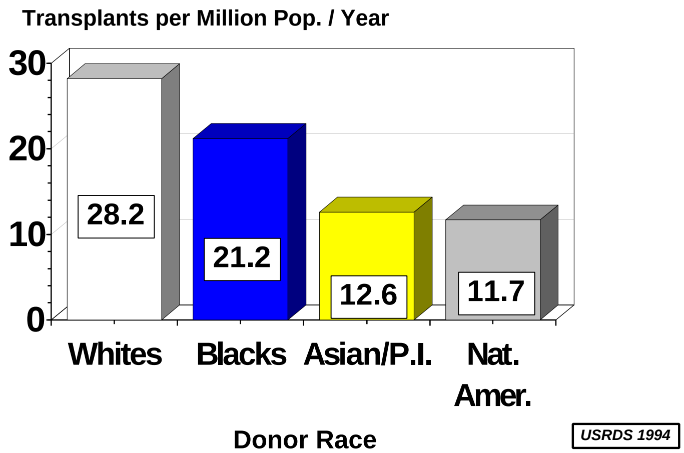

Figure VIII-13

Number of cadaveric organs transplanted per million U.S. population by race, averaged over the years 1990-91. Populations of Puerto Rico and U.S. Territories are not included in the denominator. Source: Reference Tables F.27 and J.6 and special analysis.

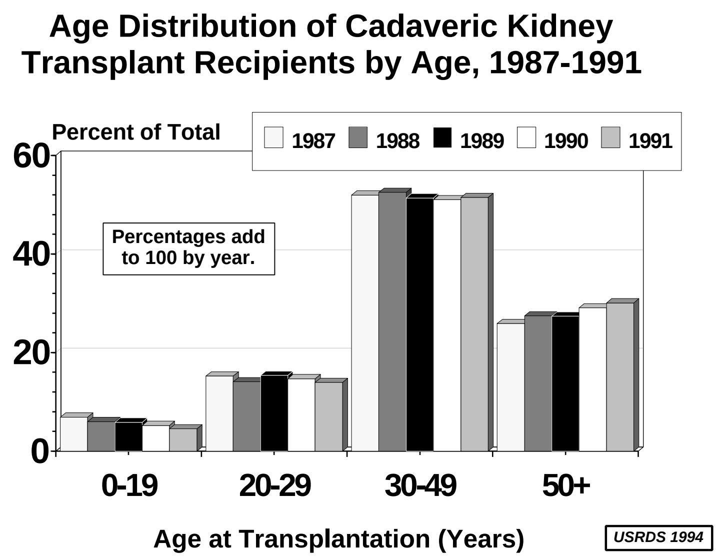

Figure VIII-14

Age distribution of cadaveric kidney transplant recipients at transplant, 1987-1991. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Special analysis.

kidney failure were discussed in Chapter V. There continues to be concern over choosing the appropriate modality of care for patients. The profiles of who does and who does not receive a particular modality of care provide useful indicators of how the allocation system is functioning (Gaylin, Held 1988 and Webb). Since there is high demand for a limited number of available cadaveric organs, interest in the demographics of kidney transplant recipients is high.

Figure VIII-14 shows the age distribution (in percent) of transplant patients who received a cadaveric graft. The percent of all cadaveric transplants going to the youngest cohort (0-19 years) declined between 1987 and 1991, while the percent of total cadaveric transplants going to the oldest cohort (50+ years) increased. The percent of patients in the remaining cohorts (20-29 and 30-49 years of age) exhibited slight declines. The percent of grafts going to the oldest cohort increased from 25.9 to 30.1 percent, or a rise of 16 percent in the five years, while the percent going to the youngest cohort declined from 6.9 to 4.5 percent, or a drop of 35 percent. There is a clear trend toward allocation of more cadaveric grafts towards elderly compared to younger patients.

Figure VIII-15 shows the transplant rate per 100 dialysis patient years at risk. The rates are inversely correlated with age, i.e., as the age decreases the transplantation rate increases. All of the rates were increasing between 1982 and 1986, when there was a clear peak in the number of cadaveric grafts transplanted (Reference Table F.1). Since 1986, the rates have been decreasing with the exception of the rate for the oldest

Cadaveric Transplant Rate* by Year and Age, 1982-91

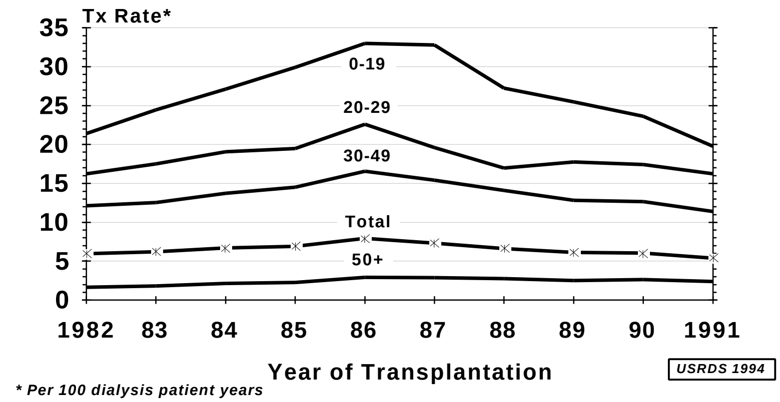

Figure VIII-15

Cadaveric transplant rate per 100 dialysis patient years at risk by year of transplant and age at transplant, 1982-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Source: Special analysis.

cohort, which has remained relatively constant. The overall rate has fallen from 7.9 to 5.4 transplants per 100 dialysis patient years at risk, or a decline of 32 percent. An examination of Reference Table F.1 shows that the number of transplants in 1990 and 1991 is higher than in 1986, so the number of dialysis patient years at risk has increased faster than the number of cadaveric transplants.

A visual depiction of the rate at which race and sex cohorts received

First Cadaveric Transplant Rate (Age 20-44) by Year, Recipient Sex and Race, 1983-91

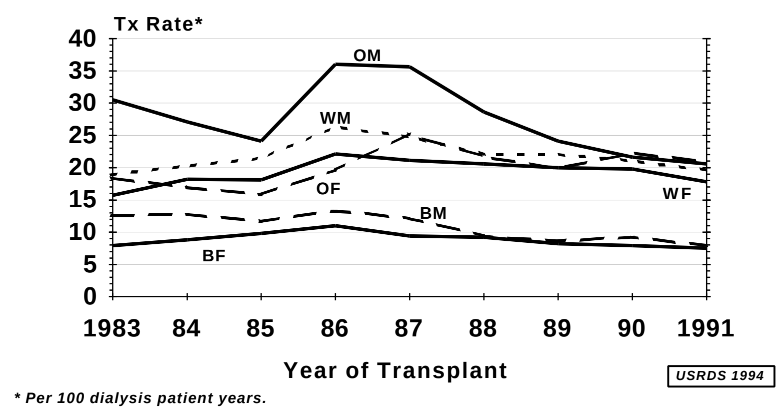

Figure VIII-16

First cadaveric transplant rate (per 100 dialysis patient years), by recipient race and sex, ages 20-44, 1983-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Note: W=White, B=Black, O=Other; M=Male, and F=Female. Source: Special analysis.

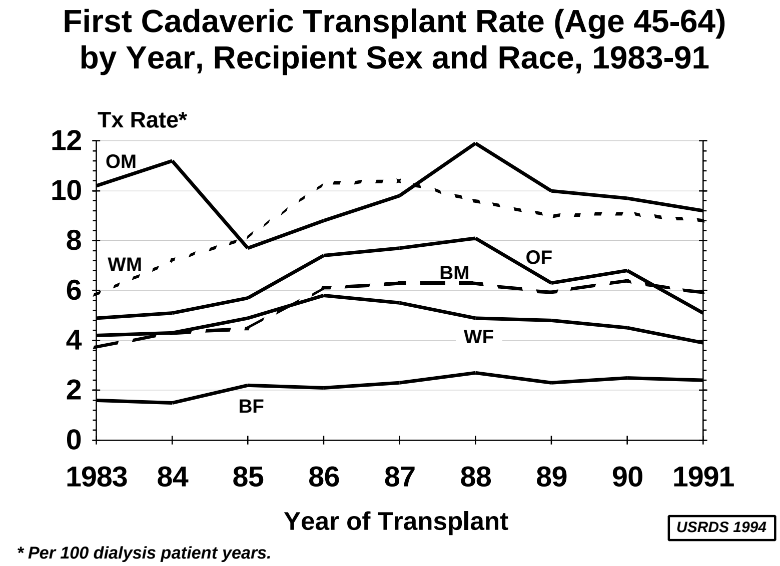

Figure VIII-17

First cadaveric transplant rate (per 100 dialysis patient years), by recipient race and sex, ages 45-64, 1983-91. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Note: W=White, B=Black, O=Other; M=Male, and F=Female. Source: Special analysis.

kidney transplants is presented in Figures VIII-16 for patients 20-44 years of age and in VIII-17 for patients 45-64 years of age. These results illustrate the magnitude of and the trends in the transplantation rate, which is the number of patients receiving a transplant per 100 dialysis patient years.

In the estimated rate of transplantation, both the numerator and the denominator represent the aggregation of information over a calendar year. The numerator is the number of transplants performed during a calendar year and the denominator (scaled to 100 patient years) is the sum of patient days at risk for dialysis during the same calendar year. This transplant rate can be interpreted as the percent of dialysis patients of a particular race, sex, and age who received a cadaveric transplant during that calendar year.

Figures VIII-16 and VIII-17 show the following:

- Younger black patients (20-44 years old) had consistently lower transplant rates over time than whites and other races after controlling for sex. The rates for younger black males and females converge in the late 1980s.
- For older blacks (45-64 years old, Figure VIII-15), the picture is not as consistent. The black male transplant rate is higher than the white female rate after 1986, while the black female rate is consistently the lowest rate. Black females in the 45-64 age group had a transplant rate less than half that of black males and white females of the same age.
- Older (45-64) patients had a markedly lower rate of transplantation than younger patients (20-44). Note the

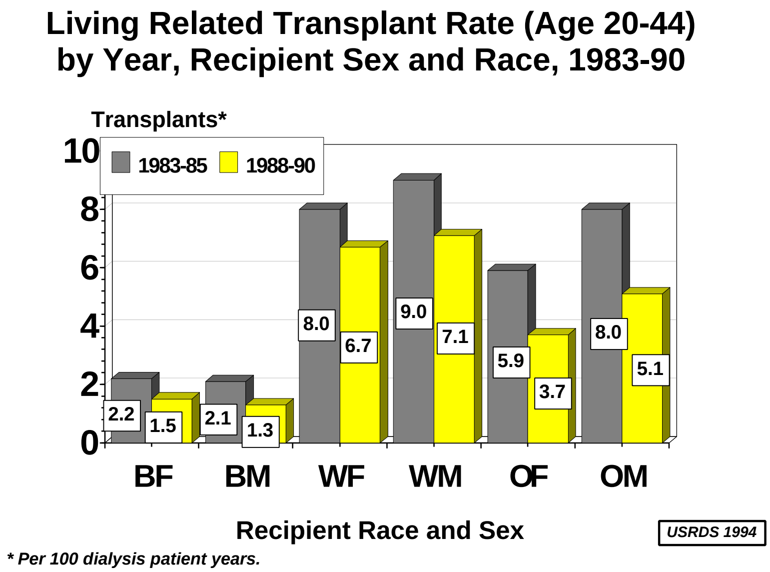

Figure VIII-18

Living related transplant rate (per 100 dialysis patient years), by recipient race and sex, ages 20-44, averaged over two three-year cohorts, 1983-90. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Note: W=White, B=Black, O=Other; M=Male, and F=Female. Source: Special analysis.

difference in the scale in Figures VIII-16 and VIII-17.

- White and "other race" males generally had the highest transplant rates in the earlier years. For younger patients only, the transplant rate for white and "other race" females nearly converged with the rate for white and "other race" males by 1989.
- For patients in the younger age group (20-44 years) the transplant rate peaked in 1986 and 1987, with substantial declines since then. This trend may be a result of a lack of increase in the supply of cadaveric grafts combined with increasing demand, or because of a change in the allocation system (Webb).
- For patients in the older age group of 45-64 years, the transplant rate definitely stopped increasing after 1986. The post-1987 decline observed among younger patients was not as evident among older dialysis patients, although the decline is somewhat evident for older females.

Figures VIII-18 and VIII-19 present similar information for living related kidney transplants for younger (age 20-44 years) and older (age 45-64 years) patients, respectively. Values for the first three years under consideration (1983-85) and the last three stable years (1988-1990) have been averaged, as only a relatively small number of transplants are living related, particularly in the older group. The figures clearly illustrate the following:

- In almost all races, in both time periods, and in both age cohorts, the transplant rate is higher for males than for females.
- The exceptions are young blacks in both time periods and young whites in the later period (1988-1990) where parity has almost been achieved.
- The difference between male and female rates has declined across time in almost all of the cohorts.
- The rate for whites and other races is consistently higher than the rate for blacks.
- With the exception of the rate for older males and females of other races in the early period, the rate for whites is higher than that for all comparable cohorts.
- The transplant rate has declined for all cohorts except older white males, for whom the rate remained constant, and older white females, for whom there was an increase in the transplant rate.

Kidney Transplant Rates by Network

Transplantation access can be examined on a geographic basis by calculating and comparing transplant rates across Network geographic areas. Shown in Figures VIII-20 and VIII-21 are the transplant rates for black and white 20-44 year old patients during 1989-91 by ESRD Network. The rate is measured as the number of first cadaveric transplants per 100 dialysis patient years, for never transplanted dialysis patients in that race and age group who are resident in that Network. The two figures are on the same scale and clearly demonstrate that access to

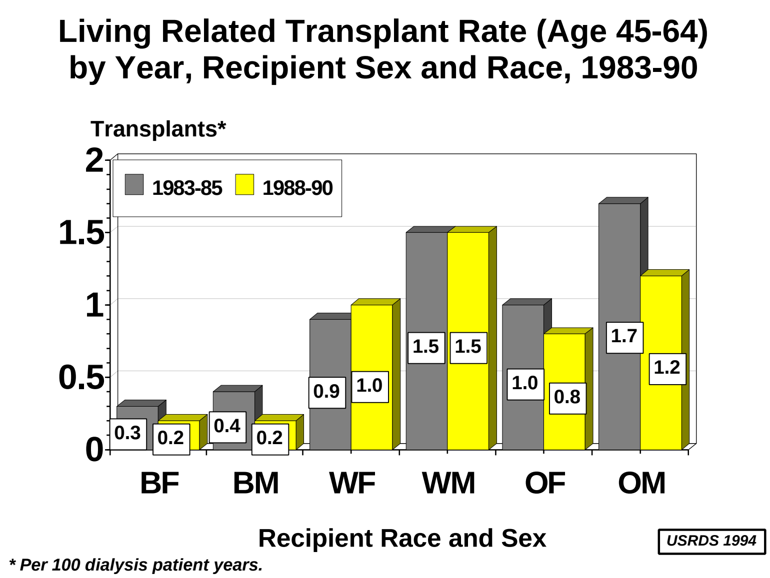

Figure VIII-19

Living related transplant rate (per 100 dialysis patient years), by recipient race and sex, ages 45-64, averaged over two three-year cohorts, 1983-90. Patients in Puerto Rico and the U.S. Territories are included. Medicare patients only. Note: W=White, B=Black, O=Other; M=Male, and F=Female. Source: Special analysis.

First Cadaveric Transplant Rate by Network for *Black* Patients, (Age 20-44) 1989-91

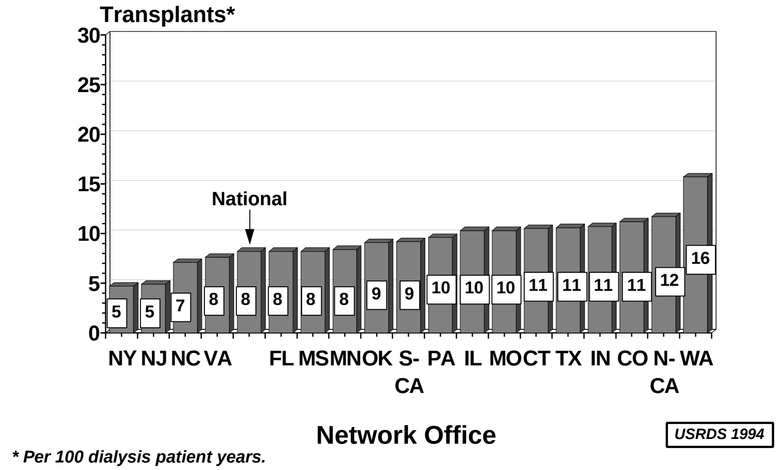

Figure VIII-20

First cadaveric transplant rate per 100 dialysis patient years, for black patients, ages 20-44, by Network, 1989-91. See Figure III-7 for Network key. Medicare patients only, includes transplants in Puerto Rico and U.S. Territories. Source: Reference Table F.57.

transplantation differs by race and Network. There are large differences between the lowest and the highest transplant rates, by race, across Networks within each figure, and across figures.

The rate for blacks 20-44 years of age varied from 5 (NJ) to 16 (WA) transplants per 100 dialysis patient years; whites 20-44 years of age ranged from 12 (NJ) to 28 (MO) transplants per 100 dialysis patient years. Notice that the New York Network and the New Jersey Network, which report data for New Jersey, Puerto Rico, and the U.S. Virgin Islands, reported the lowest transplantation rate for both race groups.

These data are presented to foster future discussions about access to the preferred method of treatment, and are not intended to incriminate anyone or any Network. It is not the purpose of this analysis to indicate what is optimal, or even what is adverse, about the results reported. Local areas may have extenuating circumstances not apparent when presenting national data. Selection of the optimal modality of care for a patient is a complex question best left to patients, their physicians, and families. Even so, a national perspective can be useful in identifying potential problems deserving further analysis and review.

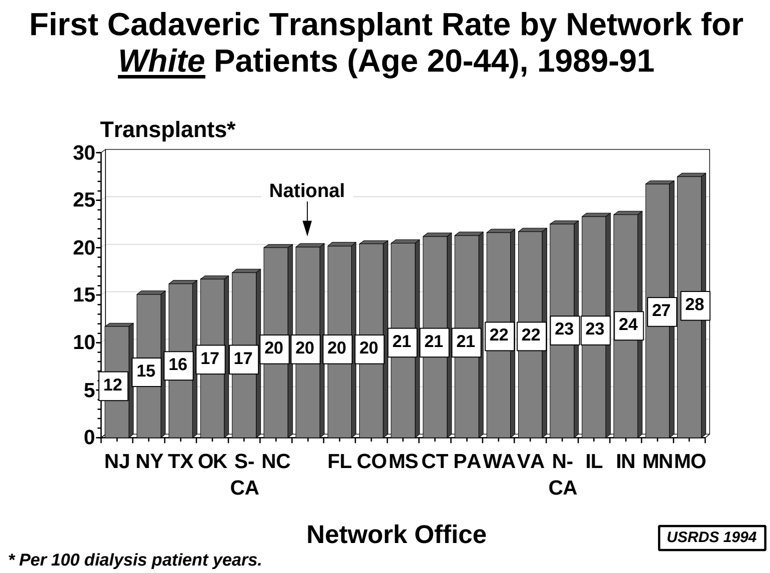

Figure VIII-21

First cadaveric transplant rate per 100 dialysis patient years, for white patients, ages 20-44, by Network, 1989-91. See Figure II-6 for Network key. Medicare patients only, includes transplants in Puerto Rico and U.S. Territories. Source: Reference Table F.57.

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