Association of Race and Risk of Graft Loss among Kidney Transplant Recipients in the US Military Health System

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Racial disparities in kidney transplant outcomes are well documented and are attributed to biologic differences (*e.g.*, gene variants in APOL1), immunologic factors, and other barriers, including lower socioeconomic status (SES), nonadherence to immunosuppressive medications, reduced access to care, and policies related to the kidney allocation system. Although recent findings of reduced disparities in graft survival are encouraging (1), achieving broad-based equity in health outcomes is still a work in progress. To evaluate the impact of universal access to care on graft outcomes, including lifelong coverage of immunosuppressive therapy (IST), we assessed differences in graft survival between black and white transplant recipients in the US Military Health System (MHS), a universal health care system model. We hypothesized that racial disparities in graft loss would be attenuated in the MHS, in which there are minimal barriers to access to care regardless of SES.

We conducted a retrospective cohort study using the US Renal Data System database. We identified 449 MHS patients (black patients, $n=205$; white patients, $n=196$) first transplanted from January 1, 1995 to January 1, 2018, out of 276,564 transplant patients in the United States, followed until June 1, 2018. We examined the time to first graft loss (overall and death-censored) using Kaplan–Meier and Cox regression analyses, adjusted for demographic, clinical, and socioeconomic characteristics. We further examined graft loss accounting for death as a competing event in competing risk regression.

In unadjusted analyses, there were no significant differences in sex, donor, and recipient age between MHS black and white transplant recipients (mean recipient age 48±13 versus 48±14 years, respectively; $P=0.98$). Black transplant recipients had longer dialysis vintage than white transplant recipients. A greater percentage of black recipients had deceased donor transplants, extended criteria donor kidneys, and five or six HLA mismatches compared with white recipients. MHS black patients had comparable education levels, ZIP code–level median household incomes, and employment status compared with MHS white patients. Kaplan–Meier analyses showed that at 10 years post-transplant, black patients experienced significantly lower overall graft survival compared with white patients (0.56 versus 0.70; log-rank $P=0.03$). Death-censored graft survival at 10 years was also significantly lower among black versus white patients (0.68 versus 0.81; log-rank $P=0.02$). In adjusted Cox analyses, however, the risk of overall graft loss among MHS black versus white patients was nonsignificant (hazard ratio [HR], 0.89; 95% confidence interval [95% CI], 0.35 to 2.21; $P=0.80$). Adjusted competing risk regression also demonstrated nonsignificant association between MHS black and white patients (subdistribution HR, 0.51; 95% CI, 0.11 to 2.26; $P=0.37$).

In the wider non-MHS cohort, black recipients had a significantly increased risk of overall graft loss compared with white recipients (adjusted HR, 1.08; 95% CI, 1.05 to 1.11; $P<0.001$). Of note, the unadjusted 10-year overall graft survival was similar between MHS black patients and non-MHS white patients (0.56 versus 0.55; see Figure 1).

We found that MHS black patients were more likely to have clinical factors that placed them at risk for premature graft loss, compared with white patients. This is reflected in lower graft survival among MHS black versus white patients in unadjusted analyses. Analyses accounting for these clinical factors and other demographic and socioeconomic factors showed that MHS black patients experienced similar risk of graft loss compared with white patients, in both Cox and competing risk regressions. In contrast, in the general (non-MHS) transplant population, racial disparities in graft loss persisted even after accounting for these variables.

The effect of social determinants of health on graft survival are well documented (2) and may have partly contributed to parity in the adjusted risk of graft loss between MHS black and white patients. MHS black patients had similar SES compared with MHS white patients and a higher SES than their black counterparts in the general transplant population. MHS beneficiaries enjoy comprehensive health care benefits in an integrated system, and universal access to care likely played a role to include lifelong coverage of IST with no out-of-pocket expenses, which would improve transplant outcomes and medication adherence (3). A survey study showed that 95% of transplant recipients in the MHS had excellent IST adherence (4). Although universal health coverage has a strong equalizing effect, it does not eliminate racial disparities in access to care. Chakkera *et al.* (5) reported that black race was associated with an estimated 30% higher risk for graft loss compared with white race in kidney transplant

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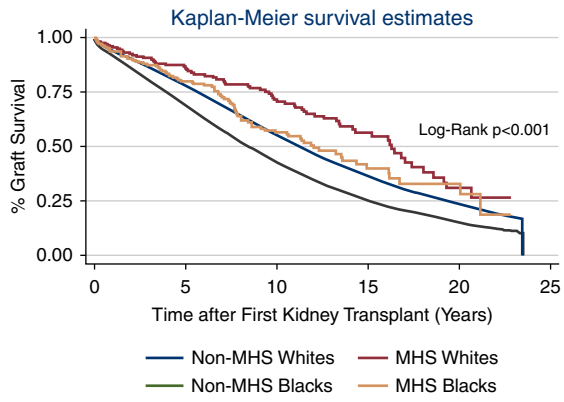

Figure 1. | Time to overall graft loss by race and military health system status. Median follow-up duration was 6.1 years (interquartile range 2.8–10.4 years). MHS, military health system.

recipients in the Department of Veterans Affairs (VA), a universal access health care system with prescription drug coverage. This difference in transplant outcome between MHS and VA patients could be partly owing to dissimilarity in comorbidities and SES factors. There could also be favorable factors among MHS black patients to include higher adherence to therapy, and family and social support.

In adjusted analyses, MHS black transplant recipients did not have a higher risk of overall graft loss compared with their white counterparts, a finding that differs from the broader transplant population. Our findings support lifelong IST coverage as recently introduced in the US Senate and House of Representatives under the legislation Comprehensive Immunosuppressive Drug Coverage for Kidney Transplant Patients Act of 2019.

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