analysis of atrial fibrillation, the nonsignificant interaction and underpowering of the trial preclude conclusions about these results. We agree that further research into the relationship between atrial fibrillation and the response to intravenous alteplase — along with the potential associations between these factors and hemorrhage — is warranted.

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Long-Term Survival after Kidney Transplantation

TO THE EDITOR: Hariharan et al. (Aug. 19 issue)[1] report on the improvements in long-term allograft survival after kidney transplantation in the United States since the mid-1990s, despite unfavorable changes in donor and recipient characteristics. We corroborated this trend statistically in a European analysis of 108,787 kidney transplantations performed between 1986 and 2015, while accounting for these changing demographic characteristics (Fig. 1).[2]

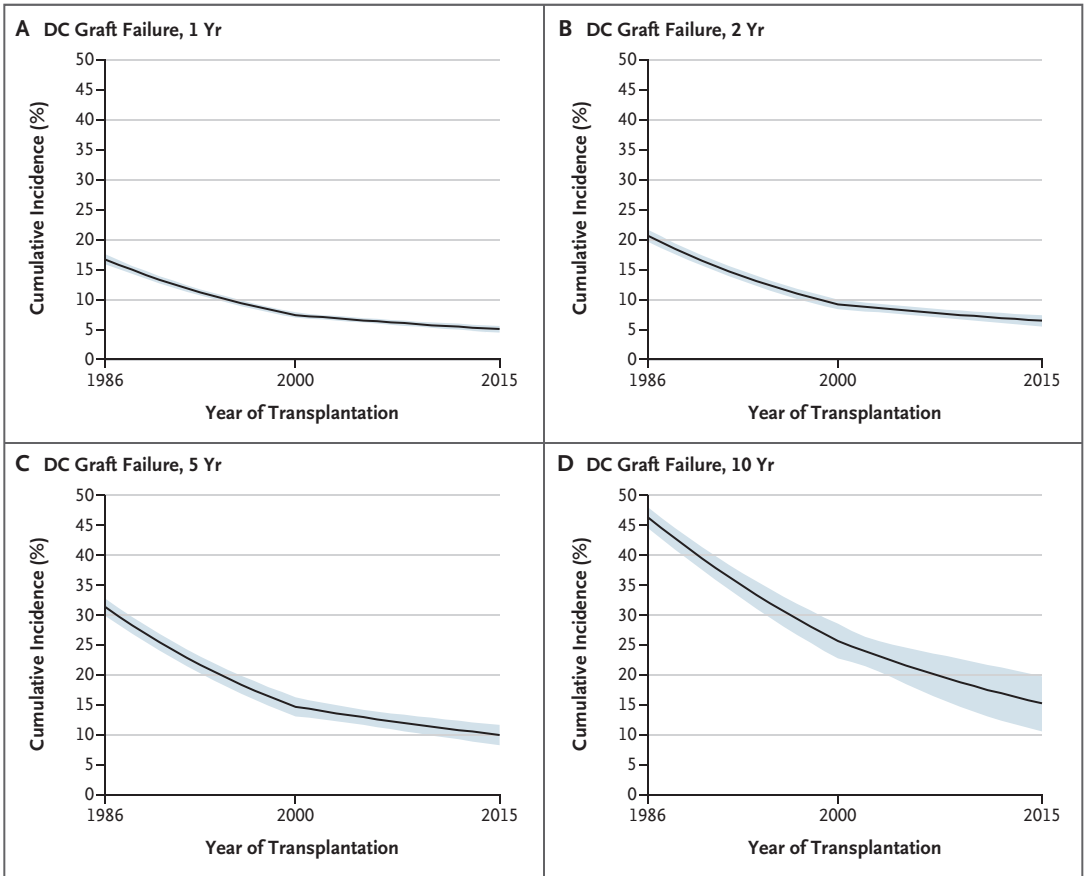

Figure 1. Historical Evolution of Short- and Long-Term Kidney Allograft Survival in Europe.

The cumulative incidence of death-censored (DC) kidney allograft failure is shown at 1 year, 2 years, 5 years, and 10 years for a recipient 48 years of age who underwent a first transplantation with a kidney from a donor with 2.48 HLA mismatches who died at 45 years of age (as calculated with the use of the Cox model, without center stratification). Areas shaded in blue represent 95% confidence intervals.

In the wake of new immunosuppressive regimens, short-term graft failure rates have declined substantially,[2] but this improvement has been decelerating since 2000. Despite the narrowing margin for further improvement, this decline indicates the continued need for innovation. In contrast, long-term allograft failure rates have continued to decline steadily since 2000, despite the absence of new and inventive targeted therapies.[2] With the many challenges involved in improving allograft longevity becoming better understood and overcome, the field of kidney transplantation is truly undergoing a quiet revolution.[3]

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Table 1. Racial and Socioeconomic Disparities in Post-Transplantation Outcomes over Time among Recipients of Kidneys from Deceased Donors in the United States.*

Variable	Hazard Ratio (95% CI)	
	Black (vs. Non-Black)	Medicaid (vs. Non-Medicaid)
Death-censored graft failure		
2000–2003	1.65 (1.56–1.68)	1.12 (1.04–1.21)
2004–2007	1.54 (1.48–1.60)	1.09 (1.02–1.16)
2008–2011	1.50 (1.44–1.57)	1.11 (1.02–1.20)
2012–2015	1.48 (1.41–1.56)	1.06 (0.96–1.18)
Recipient death		
2000–2003	1.02 (0.98–1.07)	1.11 (1.02–1.21)
2004–2007	0.98 (0.94–1.02)	1.08 (1.00–1.17)
2008–2011	0.92 (0.88–0.96)	1.00 (0.90–1.11)
2012–2015	0.92 (0.87–0.97)	1.01 (0.89–1.16)
Death or graft failure		
2000–2003	1.32 (1.28–1.36)	1.15 (1.09–1.22)
2004–2007	1.25 (1.21–1.28)	1.13 (1.07–1.19)
2008–2011	1.18 (1.14–1.22)	1.09 (1.02–1.16)
2012–2015	1.18 (1.13–1.23)	1.08 (0.99–1.17)

* Cox proportional-hazards models were adjusted for donors according to age, hypertension, diabetes, terminal creatinine level, race (Black vs. non-Black), and sex and for recipients according to age, sex, previous transplantation status, high panel reactive antibody status (any waiting list panel-reactive antibody status >80% vs. status of ≤80%), dialysis time (categorical), number of HLA mismatches, race (only in Medicaid vs. non-Medicaid models), and insurance type (only in Black vs. non-Black models). Data are from the Organ Procurement and Transplantation Network Standard Analysis Files. CI denotes confidence interval.

No potential conflict of interest relevant to this letter was reported.

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2. Coemans M, Süsal C, Döhler B, et al. Analyses of the short- and long-term graft survival after kidney transplantation in Europe between 1986 and 2015. Kidney Int 2018;94:964-73.
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TO THE EDITOR: In their review, Hariharan and colleagues outline secular improvements in patient and allograft survival after kidney transplantation. However, it is important to note that these improvements have not been accompanied by a reduction in disparities after transplantation over this period. It is well known that race and socioeconomic status affect access to the waiting list, likelihood of transplantation, and post-transplantation outcomes.[1-4]

Data from the Organ Procurement and Transplantation Network show that among recipients of kidneys from deceased donors in the United States, Black recipients have a significantly higher rate of death-censored graft failure than non-Black recipients, regardless of the era in which transplantation occurred (Table 1). Despite this trend, Black recipients have a lower risk of death after transplantation, which suggests selection bias in access to the procedure (i.e., increased selectivity in which Black patients receive a transplant). A similar pattern, albeit much weaker, is seen among recipients for whom Medicaid is the primary payer (Table 1). Although improvements in early and late post-transplantation outcomes are laudable, enthusiasm for these gains should be tempered by our failure to ensure that all patients enjoy equal access to the waiting list and outcomes after transplantation.

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No potential conflict of interest relevant to this letter was reported.

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TO THE EDITOR: Hariharan et al. cite alarmingly high mortality rates among kidney transplant recipients who contracted coronavirus disease 2019 (Covid-19). We offer perspective in order to prevent deterrence among clinicians who refer patients for transplantation.

The authors cite mortality of 13 to 32% among transplant recipients. To contextualize the data, these rates, which reflect in-hospital mortality, are similar to those among hospitalized patients from the general population.[1] Moreover, case–control studies have repeatedly failed to show a significant difference in mortality between these two patient populations.[2,3]

The authors also list "immunosuppression" as "putting many transplant recipients at grave risk." Although it has been suggested that contracting Covid-19 early during the post-transplantation period may be correlated with higher mortality owing to induction therapy,[4] such a correlation was not reported in a large multicenter cohort study (in which only 9% of participants received induction therapy).[5]

The pandemic is particularly dangerous for transplant recipients largely because of their inherent coexisting conditions and demographic profile rather than because of the transplantation procedure itself and the subsequent immunosuppression. Clinicians should not be deterred from offering this therapy to patients.

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No potential conflict of interest relevant to this letter was reported.

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THE AUTHORS REPLY: Coemans et al. validate improvements in long-term survival after kidney transplantation after adjusting for various demographic characteristics. We believe that the observed deceleration in improvements at 1 year (noted in their figure) can be attributed to high survival rates at 1 year, with minimal room for further enhancement, a gratifying trend also noted in survival at 2 and 5 years.

We agree with Husain that there continues to be disparity in access to transplantation among Black persons, as well as impaired allograft outcomes. However, as shown in their data, there were declines in death-censored graft failure and recipient death among Black patients from the 2000–2003 period through the 2012–2015 era. These improvements have been reported by others[1] and are consistent with the theme of our review, which described improvements in long-term survival over a period of 25 years. However, long-term graft survival among Black recipients remains lower than that among non-Black recipients. We highlight the importance of the effect of race and socioeconomic factors on both outcomes and access to transplantation in Figure 1 of our article and in the Supplementary Appendix, available with the full text of our article at NEJM.org, in the section titled Access to Transplantation.

We agree with Fenig et al. that the Covid-19 pandemic should not deter clinicians from referring patients for transplantation. As patient advocates and stewards of donated organs, and in recognition of the danger of Covid-19 infection in patients with immunosuppression who have undergone transplantation, we believe that vaccination against Covid-19 should be mandatory for transplantation candidates, with the exception of those who are in urgent need of an organ.[2] A third dose of vaccine and a booster may be effective in raising antibody levels in transplant recipients.[3] We also strongly recommend vaccination of caregivers and close contacts of transplant recipients. It has also been suggested that vaccinated transplant candidates with evidence of good humoral response could receive an organ from select donors who had Covid-19.[4]

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Since publication of their article, the authors report no further potential conflict of interest.

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CORRECTION

Antibody Persistence through 6 Months after the Second Dose of mRNA-1273 Vaccine for Covid-19 (N Engl J Med 2021;384:2259-2261). An error in the calculation of the live-virus neutralization titers on day 209 resulted in a small change in overall neutralization titers and decay rates. The final sentence of the second paragraph (page 2259) should have begun, "On the more sensitive live-virus focus-reduction neutralization mNeonGreen test,[4] all the participants had detectable activity, with ID_{50} GMTs of 361 (95% CI, 258 to 504) . . . ," rather than ". . . GMTs of 406 (95% CI, 286 to 578). . . ." In the same sentence, the first P value should have been 0.03, rather than 0.02, and the second should have been 0.005, rather than 0.004. The second sentence of the third paragraph (page 2259) should have begun, "The neutralizing antibody half-life estimates in the two models were 69 days (95% CI, 61 to 76) and 173 days (95% CI, 144 to 225) for pseudovirus neutralization and 66 days (95% CI, 59 to 72) and 182 days (95% CI, 153 to 254) for live-virus neutralization," rather than ". . . 68 days (95% CI, 61 to 75) and 202 days (95% CI, 159 to 272). . . ." Figure 1C was also affected, as was the Supplementary Appendix. The article is correct and the Supplementary Appendix has been replaced at NEJM.org.