Heart transplant outcomes in the US are generally improving but are still far from ideal. One-year survival percentages after heart transplantation are estimated to be 85% to 90% in the US, and this number has been relatively stable for the last decade despite a number of substantial advances in the field. A large number of donor and recipient clinical variables are commonly cited as the predominant factors associated with suboptimal waitlist and posttransplant outcomes. However, there is increasing concern in the literature that regional factors unassociated with donor and transplant recipient characteristics may also play a role. For example, donor organ availability has been reported to vary between regions. In addition, travel times, which directly impact organ ischemic times, also vary greatly. Regional socioeconomic factors, such as health care access and variations in health care practice patterns, may have associations with some transplant outcomes. What is not clear is the cumulative extent of these associations, particularly in comparison with what we know established clinical factors carry.

In the context of this background, the study by Akintoye et al used data from the United Network for Organ Sharing database to investigate state and regional differences in adult transplant outcomes. Data between 2011 and 2016 involving 15,036 transplant candidates were analyzed, and only patients listed at status 1A were included in the analysis. The authors evaluated waitlist mortality, transplant rate, and risk-adjusted 1-year graft survival, which are the 3 most important measures by which transplant centers are evaluated. The study’s risk adjustment method used the well-established Scientific Registry of Transplant Recipients graft survival model to account for donor and patient clinical factors associated with survival. Overall, they found marked differences in transplant performance between individual states across the US, most notably in terms of waitlist mortality and risk-adjusted 1-year graft survival. Waitlist mortality rates ranged from 1.0 death per 1000 waitlist person-days to 7.8 deaths per 1000 waitlist person-days between the best and worst performing US states. This gap was observed despite identifying and accounting for only minor differences in baseline donor and recipient clinical factors. In addition, while the differences in transplant outcomes between US states appeared to cluster according to Organ Procurement and Transplantation Network regions, regional performance only modestly explained the differences in the performance of individual states. The authors estimated that only 39% of the difference in individual state performance was explained by the difference in the performance of their respective regions with regard to measures such as posttransplant survival. Waitlist mortality appeared to be associated with waitlist activity, as transplant centers and regions with the most active waitlists had markedly lower waitlist mortality. Similar results were found for survival. Notably, the risk-adjusted 1-year graft survival between the best and worst performing states was up to 5%, and it did not appear to be associated simply with patient acuity factors.

The Akintoye et al study has a few potentially broad implications. First, it should not be overlooked that the authors also identified within this data set that less than 2% of patients on a transplant waitlist changed transplant centers before death or transplantation. This observation suggests that, for the most part, patients lack choices regarding where to go for heart transplantation. The number of centers in the US that offer heart transplantation is limited, and access to centers is often predetermined by insurance restrictions, geographic barriers, socioeconomic limitations, and the severity of an individual patient’s illness. Therefore, the study highlights the need for increased work to improve transplant equity in the US so that, regardless of

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where patients go, they will have access to the best potential outcome. Second, the regionalization of important transplant outcomes without, on the surface, much difference in terms of patient clinical characteristics suggests that underlying regional factors unassociated with only donors and recipients are not to be ignored, as the effect size identified in this work is quite notable. While these factors are not delineated in the study and remain murky overall, the findings should prompt researchers in the field to explore the reasons why transplant centers vary widely in performance and to create steps to help standardize center performance. Third, some, but not all, of the differences in performance between states were eliminated by evaluating outcomes regionally. This finding may create an opportunity to look at the methods by which transplant centers are judged and compared, particularly if some outcomes are associated with regional factors that may not be entirely within the control of the transplant centers themselves.

There are a few major limitations in this study worth highlighting. Notably, although the authors attempted to account for all factors associated with patient survival by using a retrospective database with a fixed number of collected variables, some residual confounding may be present. However, their findings are consistent with similar work that has explored geographic outcomes in the pediatric heart transplant arena. In addition, the US organ allocation system changed entirely in 2018, with the predominant aim of reducing waitlist mortality. This change resulted in a marked shift in many US transplant center practice patterns. While the Akintoye et al study does involve a contemporary patient population and while the US heart transplantation infrastructure and geography remain relatively unchanged, it has yet to be seen whether the study’s findings will remain true in future analyses after the recent allocation system has been in use for several years.