DOI: 10.1111/ajt.16190

Kidney transplant in the COVID era: Cautious optimism and continued vigilance

Since early March, transplant centers throughout the country have attempted to balance the risk of coronavirus disease 2019 (COVID-19) transmission in a newly immunosuppressed transplant recipient with the concern for waitlist mortality and life years lost by remaining on dialysis. Much of the deliberation over this balance has occurred through online discussion groups where the sentiments are aligned, but the community risk, center resources, and population demographics are vastly different. Dr Massie and coauthors provide data-driven support for decision-making by modeling the benefit to harm ratio of kidney transplant under varying environmental conditions, and providing a user-friendly calculator at transplantmodels.com/covid_sim.[1]

Overall, the simulation shows that in over 70% of scenarios, immediate kidney transplant provides patients some survival benefit. Remarkably, in over one third of those scenarios a survival benefit remained despite a case fatality rate for kidney transplant recipients with COVID-19 greater than that of waitlist registrants. Scenarios that reversed this risk–benefit ratio were largely influenced by circumstances where the case fatality rate for post–kidney transplant patients drastically exceeds that of waitlist registrants. This may include hospital systems that are overwhelmed by COVID-positive patients without sufficient physical resources to create COVID-specific units, particularly when these are set in communities with high population density. Given the variation in COVID prevalence and case fatality rates around the country and the disproportionate effect on minority and impoverished communities, this tool could prove to be extremely beneficial to transplant centers and patients.

Reflecting the complex epidemiology of the COVID epidemic, the authors used 2 machine learning algorithms to inform their model, allowing the analysis to both maintain life months gained due to transplant as a priority and also stratify predictor variables by importance. The model accounts for variation in acquisition risk, which may be vastly different based on population density in the transplant referral region, ability of the patient to social distance, and home vs center-based dialysis setting. Kidney transplant in scenarios where there are high rates of community acquisition presumably confers benefit because it removes the patient from the dialysis setting and despite a suppressed immune system allows them greater opportunity to socially distance. An important consideration not in the model is the dialysis setting, which likely influences the rate of waitlist transmission.[2,3] Living donation is also not fully considered—the benefit to the recipients is clear, but the level of risk to the donor will vary by health system and community; there may not ever be an appropriate model for this. Donors should be informed of the community and hospital transmission rates, but thresholds for safety and benefit from the donor's perspective may be too complex to capture in a statistical model.

Interestingly, the most influential variable in the simulation model was posttransplant COVID case fatality rate, which is highly dependent on local resources such as efficiency of transfer processes, transplant center bed capacity, and immunosuppression protocols. Unfortunately, case fatality rate is also affected by patient demographics, with both hospitalization and mortality rates in minorities near double that of white patients. The inability to accurately estimate case fatality rates and prevalence of disease is not necessarily a limitation of the authors' work but a limitation of our ability to maintain accurate tracking of community infectious rates and account for the myriad of factors that influence disease progression in various populations. Nowhere is this more relevant than in the African American community, which is disproportionately affected by both kidney disease and COVID-19.[4] Absent reliable testing and tracking, this problem will likely worsen as air travel resumes and restrictions on businesses are lifted in various phases around the country. Accurately quantifying the prevalence of COVID in our communities as well as case fatality rates will be critical for this model to reach its full potential. Even with fully accurate epidemiologic data, the disparate effects of COVID on disenfranchised populations may take years to fully mitigate. Kidney transplant clearly provides a public health benefit and the findings in the study suggests that communication between transplant centers, public health officials, and local communities is even more critical in the setting of this epidemic. Unfettered access to rapid COVID testing for both donors and recipients and coordination of this effort between organ procurement organizations is also paramount.

By all accounts the COVID epidemic will be sustained and likely punctuated by several waves of varying severity throughout the country. Dr Massie's model is a valuable tool to help transplant centers gauge the risk to their waitlist populations under what will certainly be dynamic conditions for the foreseeable future. In almost any circumstance one may argue that the benefit of kidney transplant from a deceased donor is clear, but early reports of morbidity and mortality in kidney transplant recipients with

COVID-19 demand continued vigilance and aggregation of data, particularly in those communities most impacted by kidney failure and COVID.[5-7]

KEYWORDS

editorial/personal viewpoint, infectious disease, kidney transplantation/nephrology, recipient selection, waitlist management

DISCLOSURE

The authors of this manuscript have no conflict of interests to disclose as described by the *American Journal of Transplantation*.

Lisa M. McElroy
Scott L. Sanoff
Bradley H. Collins

Duke University, Durham, North Carolina

Correspondence
Lisa M. McElroy
Email: lisamcelroymd@gmail.com

ORCID

Lisa M. McElroy https://orcid.org/0000-0003-2366-2579

REFERENCES

1. Massie AB, Boyarsky BJ, Werbel WA, et al. Identifying scenarios of benefit or harm from kidney transplantation during the COVID-19 pandemic: a stochastic simulation and machine learning study [published online ahead of print June 09, 2016]. *Am J Transplant*. 2020. https://doi.org/10.1111/ajt.16117
2. Basile C, Combe C, Pizzarelli F, et al. Recommendations for the prevention, mitigation and containment of the emerging SARS-CoV-2 (COVID-19) pandemic in haemodialysis centres. *Nephrol Dial Transplant*. 2020;35(5):737-741.
3. Kikuchi K, Nangaku M, Ryuzaki M, et al. COVID-19 in dialysis patients in Japan: current status and guidance on preventive measures. *Ther Apher Dial*. 2020. https://doi.org/10.1111/1744-9987.13531
4. Cyrus E, Clarke R, Hadley D, et al. The impact of COVID-19 on African American communities in the United States. *medRxiv*. 2020. https://doi.org/10.1101/2020.05.15.20096552
5. Akalin E, Azzi Y, Bartash R, et al. Covid-19 and kidney transplantation. *N Engl J Med*. 2020;382(25):2475-2477.
6. Nair V, Jandovitz N, Hirsch JS, et al. COVID-19 in kidney transplant recipients. *Am J Transplant*. 2020;20(7):1819-1825.
7. Banerjee D, Popoola J, Shah S, Ster IC, Quan V, Phanish M. COVID-19 infection in kidney transplant recipients. *Kidney Int*. 2020;97(6):1076-1082.