

# Dialysis Staff–Reported Impact of COVID-19 on Early Kidney Transplant Steps



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Received 28 July 2021; revised 13 December 2021; accepted 3 January 2022; published online 7 January 2022

*Kidney Int Rep* (2022) 7, 904–907; <https://doi.org/10.1016/j.ekir.2022.01.007>

KEYWORDS: COVID-19; dialysis; ESKD; kidney; referral; transplant

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**COVID-19** has influenced multiple aspects of kidney transplantation, the preferred treatment for most patients with end-stage kidney disease (ESKD). Patients with ESKD and transplant recipients are vulnerable to severe COVID-19 illness given the high prevalence of comorbidities and immunosuppression in these populations.<sup>1</sup> Vast disruptions to kidney transplant operations were reported early in the pandemic, with 72% of US transplant centers reporting temporary suspension of living donor kidney transplant activity and 84% of centers reporting some or major restrictions to deceased donor kidney transplants in a national survey in March 2020.<sup>2,3</sup> Furthermore, analyses of Scientific Registry of Transplant Recipients data from March 2020 to April 2020 revealed considerable declines in waitlist registrations and expected kidney transplant rates, in addition to higher rates of inactivation on the kidney transplant waiting list.<sup>4</sup> Notably, states with higher per capita confirmed COVID-19 cases witnessed greater declines in waitlist registrations and deceased donor kidney transplant rates.<sup>4</sup> Although rates of deceased donor kidney transplants had recovered to prepandemic estimates by June 2020, a sustained decrease in living donor kidney transplant volume was observed.<sup>5,6</sup> Moreover, the impact of this initial delay on patients upstream in the kidney transplant process remains unknown.

For patients with ESKD pursuing kidney transplantation, there is a complex multistep and multi-system process between ESKD diagnosis and receipt of a kidney transplant. Dialysis facilities are instrumental in facilitating timely access to kidney

transplantation, particularly in earlier stages of the transplant process.<sup>7</sup> Critical steps in the transplant process occur in dialysis settings, including transplant education and referral for transplant evaluation. Changes in rates of kidney transplant referrals and evaluations because of COVID-19 are difficult to observe, largely because of the lack of national data collection on these steps. Although the impact of COVID-19 on kidney transplantation seems to be significant for transplant centers, the effects of the pandemic on transplant steps occurring at the dialysis facility level are unknown.

Despite the Southeastern United States, including Georgia, North Carolina, and South Carolina, having some of the highest rates of ESKD nationally, rates of kidney transplantation in the Southeast remain lower than the national average.<sup>8</sup> Early in the COVID-19 pandemic, transplant centers in the Southeast responded by restricting or halting organ transplant activities, especially for living donor transplantation.<sup>3</sup> It is unknown whether resulting delays in access to early steps in the kidney transplant process will exacerbate existing disparities in care, especially coupled with lower rates of COVID-19 vaccination in the Southeast.<sup>9</sup> Widespread delays in overall health care access in the Southeast region have been previously documented, with 1 survey describing approximately 40% of respondents having missed or delayed an appointment since March 2020.<sup>10</sup> Greater perception of personal risk of COVID-19 diagnosis and mortality was associated with missed appointments, which will likely continue to play a role in disruption of care as more transmissible variants emerge throughout the United States.

Understanding how dialysis centers shifted their transplant referrals during the early pandemic will inform our knowledge of the extent to which kidney transplant care was similarly interrupted at this time. We analyzed cross-sectional survey data to determine the early impact of the COVID-19 pandemic on kidney transplant access from a dialysis facility perspective in the Southeast, including Georgia, North Carolina, and South Carolina. As the impact of COVID-19 on kidney transplantation rates persists beyond the early stages of the pandemic,<sup>3,S2</sup> and the United States experiences a resurgence in COVID-19 in late 2021,<sup>S3</sup> these findings can also be helpful as we move forward to help maximize kidney transplantation rates despite the lasting impact of the pandemic.

## RESULTS

Surveys were disseminated in April 2020 among staff from 651 dialysis facilities in the tri-state. A total of 352 responses were received (57.1% of 616 recipients of the survey). After removal of 62 responses from staff at overlapping facilities, responses were merged with Dialysis Facility Report data by Centers for Medicare & Medicaid Services Certification Number. Centers for Medicare & Medicaid Service Certification Number identifiers could not be recovered for 9 facilities, and 1 facility was not recorded in the Dialysis Facility Report, leaving a total of 280 unique dialysis facilities in the study sample (Supplementary Methods). A total of 81 of these facilities (28.9%) were missing baseline patient-level characteristics.

Among 280 respondents, there were 111 (39.6%) social workers, 65 (23.2%) clinic managers/facility administrators, 16 (5.7%) charge nurses, 4 (1.4%) dietitians, and 2 (0.7%) home therapy managers. An additional 21 (7.5%) staff had dual clinic manager and charge nurse roles. A total of 61 respondents (21.8%) were missing data on their clinical or administrative roles.

The mean age of patients across the facilities was 62.4 years (95% CI: 61.7–63.2). On average, 51.5% (95% CI: 47.9–55.1) of the patients were classified as African American, 46.3% as White, and 2.8% (95% CI: 2.1–3.4) as Hispanic. Among the 280 dialysis facilities, 52.5% were located in Georgia, 21.1% in South Carolina, and 26.4% in North Carolina. Most of the facilities (88.9%) were for profit (Table 1).

A total of 81 respondents (28.9% of 280) disclosed that transplant referrals were affected by COVID-19, and 169 (60.4%) described transplant evaluations as affected (Table 2). In describing barriers to quality improvement activities because of COVID-19, the most

**Table 1.** Selected patient- and dialysis facility-level characteristics, DFR data, 2018 (*N* = 280 facilities)

Selected characteristics <sup>a</sup>	Facility and patient findings
Facilities, <i>N</i>	280
Total number of prevalent patients, <i>N</i> <sup>b</sup>	23,036
Patient characteristics <sup>c,d</sup>	—
Age in yr, mean (95% CI) <sup>e</sup>	62.4 (61.7–63.2)
% Female sex, mean (95% CI)	44.9 (43.2–46.6)
Race/ethnicity, mean (95% CI)	—
% African American	51.5 (47.9–55.1)
% White	46.3 (42.8–49.9)
% Hispanic	2.8 (2.1–3.4)
Primary cause of ESKD, mean (95% CI)	—
% Diabetes	42.3 (40.0–44.6)
% Hypertension	39.3 (36.6–42.0)
% Glomerulonephritis	7.0 (5.9–8.0)
% Other/missing cause	11.5 (9.7–13.2)
Comorbidities, mean (95% CI) <sup>c</sup>	—
% Atherosclerotic heart disease	10.5 (8.7–12.2)
% Cancer	7.3 (6.2–8.3)
% Congestive heart failure	29.2 (27.2–31.2)
% Chronic obstructive pulmonary disease	9.4 (8.3–10.6)
% Cardiovascular disease, transient ischemic attack, cerebrovascular accident	9.8 (8.7–10.9)
% Diabetes	63.9 (62.0–65.7)
% History of hypertension	90.3 (88.9–91.8)
% Peripheral vascular disease	7.9 (6.3–9.6)
% Smoker	8.2 (7.1–9.4)
% Alcohol dependent	1.8 (1.3–2.2)
% Inability to ambulate	7.1 (6.0–8.3)
Mean number of comorbidities (95% CI) <sup>e</sup>	3.1 (3.0–3.2)
Primary insurance type, mean (95% CI)	—
% Medicaid only	8.2 (7.0–9.4)
% Employer only	13.4 (12.0–14.7)
% Uninsured	8.4 (7.3–9.5)
% Currently employed, mean (95% CI)	23.0 (20.0–25.9)
% No pre-ESKD nephrologist care, mean (95% CI)	16.3 (14.0–18.5)
% Patients not informed of transplant options, mean (95% CI)	2.5 (1.9–3.0)
Dialysis facility characteristics <sup>b</sup>	—
State, <i>N</i> (%)	—
Georgia	147 (52.5)
North Carolina	74 (26.4)
South Carolina	59 (21.1)
For profit, <i>n</i> (%)	249 (88.9)
Patients per facility, mean (95% CI)	82.9 (77.7–88.1)
Staff positions, mean (95% CI)	15.2 (14.2–16.2)
Patient to social worker ratio, mean (95% CI) <sup>f,g</sup>	92.3 (87.8–96.8)
Dialysis facility performance measures, mean (95% CI)	—
Standardized hospitalized ratio, 2015–2018 <sup>h</sup>	1.0 (0.97–1.0)
Standardized mortality ratio, 2015–2018 <sup>g</sup>	1.0 (0.98–1.0)

ESKD, end-stage kidney disease; DFR, Dialysis Facility Report.

<sup>a</sup>Calculated from DFR data for 2018, unless noted otherwise.

<sup>b</sup>Estimated point prevalence as of December 31, 2018.

<sup>c</sup>Patient characteristics were evaluated at baseline using Centers for Medicare & Medicaid Services Medical Evidence (2728) forms collected in 2018.

<sup>d</sup>Missing data for 81 facilities.

<sup>e</sup>Estimates are means of mean values.

<sup>f</sup>Calculated as the sum of the number of full-time social workers + 0.5 \* number of part-time social workers divided by the total number of prevalent patients per facility; calculated only among facilities with at least 1 social worker.

<sup>g</sup>Missing data for 4 facilities.

<sup>h</sup>Missing data for 6 facilities.

prominent concerns were “dependent institutions (e.g., vascular access surgery clinic, transplant center, home dialysis training program) not operating as usual” (48.6%), an “overwhelmed healthcare system” (33.6%), and transportation issues (26.8%) (Supplementary Figure S1).

Facilities with staff-reported disruptions to referrals, on average, had more patients (mean = 83.8, 95% CI: 76.4–91.2) compared with facilities without staff-reported disruptions to referrals (mean = 82.5, 95% CI: 75.7–89.2) and higher patient to social worker ratios (mean = 95.2, 95% CI: 87.5–102.8), compared with facilities without such disruptions (mean = 91.2, 95% CI: 85.6–96.7), though these differences were not statistically significant. A lower mean percentage of Hispanic patients was observed among facilities with staff-reported disruptions to transplant referrals compared with those not reporting disruptions (mean = 1.8%, 95% CI: 0.9–2.8 and mean = 3.2%, 95% CI: 2.3–4.0). Facilities were otherwise comparable with regard to patient and facility characteristics (Supplementary Tables S1 and S2).

## DISCUSSION

Our findings provide evidence that kidney transplantation has been substantially affected by the COVID-19 pandemic, even upstream in the transplant process at the dialysis facility level. We report that approximately 30% of dialysis facilities experienced disruptions in referrals to transplant centers and approximately 60% of dialysis facilities reported that transplant evaluations were affected by COVID-19 in 3 Southeastern states, where kidney transplant rates remain among the lowest in the nation.<sup>8,S4</sup> Especially during early stages of the pandemic, suspension or postponement of transplant activities has occurred for many reasons<sup>2–4</sup>; however, based on our results, we report that changes in dialysis facility referral for transplant may have also contributed to reduced rates of transplant during that time. Access to kidney transplantation depends on cooperation between multiple health systems; many patients rely on dialysis facility staff to refer them for transplant evaluation, provide transplant education, and help them navigate the complicated process and various medical appointments. Research has previously identified the importance of an interdisciplinary team effort to help patients obtain kidney transplants and address barriers to transplant.<sup>S5,S6</sup> With widespread delays reported in overall health care access in the Southeast United States, including an estimate of approximately 40% of patients missing or delaying appointments since the pandemic began in March 2020, it is critical that

patients can discuss transplant questions and barriers early on in the process to weigh their care options with a multidisciplinary team of providers. Given the goal of increasing access to kidney transplant as detailed in the Executive Order on the Advancing American Kidney Health Initiative,<sup>S7</sup> the effects of COVID-19 on early steps in the kidney transplant process and the potential to exacerbate disparities in access to kidney transplantation require continued investigation.

Although other studies have reported the impact of COVID-19 on transplant rates,<sup>4</sup> transplant outcomes,<sup>5,S8–S11</sup> and transplant center organ procurement and patient management practices,<sup>S10,S12</sup> the extent to which dialysis facilities have changed referral practices has not been reported. Dialysis staff-reported barriers, and specifically “dependent institution not operating as usual,” align with disruptions documented among kidney transplant programs during this time.<sup>S13</sup> Results from a survey among living kidney donor transplant programs in the United States revealed that 66% of surveyed programs placed their surgeries on hold in the early stages of the pandemic.<sup>S14</sup> Barriers to surgeries such as concerns for patient safety, restrictions on elective surgeries, and hospital administrative restrictions were also reported.<sup>S15</sup> These results may have a long-lasting impact on patient access to transplantation.

Patients with ESKD comprise an especially vulnerable patient population in the COVID-19 pandemic. Our results confirm a high prevalence of underlying conditions that predispose patients to the likelihood of severe COVID-19 illness.<sup>S14</sup> Furthermore, COVID-19 has revealed the vast disparities in health care access and outcomes between Black populations and other racial/ethnic populations throughout the United States. Even after adjustment for age, poverty, comorbidities, and epidemic duration, counties with higher proportions of Black residents (third vs. first quartile of percent

**Table 2.** Quality improvement activities affected by COVID-19 as reported by dialysis facility staff, from April 13, 2020, to April 17, 2020 (N = 280)

Activity	n (%)
Transplant evaluations	169 (60.4)
Hosting/supporting patient support groups	144 (51.4)
Inviting patients to QAPI meetings	141 (50.4)
Vascular access placement	123 (43.9)
Peer mentor–mentee interaction	82 (29.3)
Transplant referrals	81 (28.9)
Peer mentorship training	71 (25.4)
Home dialysis program referral	61 (21.8)
Home dialysis program training for patients	42 (15.0)
No area affected	23 (8.2)
Other	13 (4.6)

QAPI, quality assurance and performance improvement.  
One respondent per facility from 280 facilities.

of Black residents) experienced 24% higher rates of COVID-19 diagnoses.<sup>S15</sup> In addition, Black race has been independently associated with higher rates of hospital admissions during the pandemic, with Black patients having nearly twice the odds of hospitalization for COVID-19 compared with White patients, after adjustment for clinical and socioeconomic variables.<sup>S16</sup> Policies surrounding transitions to normal operations among dialysis facilities must take into account the potential for disproportionately poor outcomes among the Black ESKD population and the long-term implications of these disruptions for transplant access.

This study is not without limitations, including a moderate response rate and a small sample size. In addition, staff-reported disruptions to transplant activities may not be reflective of trends in actual kidney transplant referrals and evaluations in the early COVID-19 pandemic. We were also unable to compare results to regional transplant center closures and capacities. A final limitation is that this study occurred early in the COVID-19 pandemic. Nevertheless, as COVID-19 cases and hospitalizations rise again in late 2021 in the United States, our findings remain relevant as the impact of the pandemic on kidney transplantation will persist (or new pandemics may occur) and dialysis centers will continue to play an important role in helping patients get transplants.

## DISCLOSURE

All authors declared no competing interests.

## ACKNOWLEDGMENTS

This work was supported by the National Institute on Minority Health and Health Disparities U01MD010611 grant. The authors acknowledge IPRO ESRD Network of the South Atlantic for serving as the data coordinating center in this study. The reported data have been supplied in part by the Centers for Medicare & Medicaid Services.

## SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

**Supplementary Methods.**

**Figure S1.** Barriers to affected quality improvement activities owing to COVID-19 as reported by dialysis facility staff, from April 13, 2020, to April 17, 2020.

**Table S1.** Comparison of facilities reporting transplant referrals as affected by COVID-19 versus those not reporting transplant referrals as affected.

**Table S2.** Comparison of facilities reporting transplant evaluations as affected by COVID-19 versus those not reporting transplant evaluations as affected.

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