Prioritizing COVID-19 Vaccination in Dialysis

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Nearly 800,000 patients in the United States have end-stage kidney disease, with more than 550,000 receiving maintenance dialysis (1). Compared to the general population, dialysis patients incur a greater burden of illness, with more comorbid conditions, including diabetes mellitus, hypertension, intrinsic pulmonary disease, cardiovascular and cerebrovascular disease, obesity, and frailty. Individuals dependent on maintenance dialysis are extremely vulnerable to the effects of infection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the virus that causes Coronavirus Disease 2019 (COVID-19), with COVID-associated mortality likely exceeding 20% (2).

In October 2020, the National Academy of Medicine released its plan for vaccination against COVID-19 (3), prioritizing vaccination of healthcare workers, followed by older individuals and those with chronic medical conditions. On December 1, 2020, the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention voted to recommend that both healthcare workers and residents of long-term care facilities be first in line for any coronavirus vaccines (4), with the lone dissenting voter expressing concerns that vaccines had not been tested in a long-term care population. The members of the American Society of Nephrology (ASN) COVID-19 Outpatient Dialysis Subcommittee support these recommendations, stressing that: 1) dialysis facility staff must be included with other healthcare workers as priority vaccine recipients, and 2) patients on dialysis should be the next priority after long-term care facility residents, reflecting their limited ability to physically distance, heightened vulnerability to infection, and poor outcomes if infected (2, 5). This is consistent with the position statement of the UK kidney community released on December 4, 2020, indicating highest priority for vaccination for those patients treated by dialysis (6).

With the recognition that physical distancing is not feasible for patients on dialysis, this prioritization not only benefits these individual patients but also myriad personnel who encounter them frequently, including transportation providers and family members who transport patients to and from dialysis facilities and the greater network of healthcare providers who care for these patients in ambulatory and inpatient settings.

While dialysis facilities have performed well in the pandemic, with few described cases of transmission within the facility, hemodialysis facilities remain high-risk settings. We contend that strategic prioritization of patients on dialysis for COVID-19 vaccination will increase safety in dialysis facilities, reducing the risk of infection among patients who are obligatorily congregated during relatively prolonged hemodialysis sessions alongside dialysis workers. While better able to physically distance, home dialysis patients share several risk factors for infection with in-center patients, including frequent healthcare encounters. With clear-eyed recognition of the hazards of the mandatory congregate hemodialysis setting, the dialysis community has modeled excellent practices regarding 2 of the "3 Ws" of "wearing masks," "washing hands," and "watching your distance." The latter remains a challenge while caring for patients congregated within a dialysis facility. From the outset of the pandemic, dialysis facilities rapidly adopted universal intake screenings for fever, symptoms, and exposure(s) to COVID-19. For patients who were identified as having symptoms potentially consistent with COVID-19 and for dialysis patients with COVID-19, dialysis facilities implemented rigorous protocols, including proactive cohorting to provide dialysis separately to patients who were either positive for COVID-19 or under investigation for COVID-19. This often involved creating separate "COVID shifts" or dedicating facilities entirely to the care of hemodialysis patients with COVID-19 (7). These tactics have been largely successful at preventing spread within dialysis facilities.

The best way to maximize dialysis patient safety is to limit exposures to risk. For other infectious diseases, this has been accomplished through proactive campaigns within dialysis facilities to increase patient and staff vaccination rates, including for influenza and hepatitis B viruses, as well as mandatory reporting of dialysis facility staff influenza vaccination in the quality incentive program (8). These lessons, including a focus on both patient and staff vaccination, can be extended to COVID-19, where, to maximize safety, both dialysis staff and dialysis patients must be high priority for vaccination. Patient vaccination will have downstream benefits beyond those to the individual, reflecting that dialysis patients often travel in groups to dialysis units, frequently reside in long-term care facilities, and may have large familial-social networks engaged in their care. Staff vaccination has similar benefits, recognizing that many dialysis staff work at multiple dialysis facilities and hospitals, increasing the number of potential exposures should they have COVID-19.

Prior to the pandemic, maintenance dialysis patients had an annual mortality rate of 18% to 20%, primarily attributable to cardiovascular disease and infectious causes. Per the United States Renal Data System, all-cause mortality has increased dramatically since March 2020, the onset of the COVID-19 pandemic in the United States. For patients receiving maintenance dialysis, mortality was 37% greater during April 2020 compared to the same calendar-weeks of 2017 to 2019; similarly, mortality was also 16% higher in weeks 18 to 27 of 2020 (roughly late April to June). This upsurge of mortality was ascribed to documented SARS-CoV-2 infections, undocumented viral infections, and decreased access to necessary non-dialysis-related medical care (1).

The success of a proposed conjoint strategy of immunizing patients receiving dialysis and associated healthcare workers depends on the immune response of patients on dialysis to vaccines. This is an area of some uncertainty; although data suggest that many dialysis patients do respond to vaccines, patients receiving maintenance dialysis are variably and somewhat unpredictably immunosuppressed. Anergy during tuberculous antigen testing and suboptimal antibody titer generation following a hepatitis B vaccination series or vaccination against influenza viruses are well-documented displays of suboptimally functioning immune systems. T cell and antigen-presenting cell dysfunction are also central to the vulnerability of patients on dialysis. Further, many patients with chronic kidney disease, including those treated with dialysis, are prescribed immunosuppressive medications.

Patients receiving maintenance dialysis have not been enrolled widely in COVID-19 vaccination trials. Initial vaccines will incorporate two technologies. The mRNA vaccines, including those produced by Pfizer and Moderna, instruct patients' own bodies to manufacture a spike protein that is found on the surface of SARS-CoV-2 that the body then recognizes as foreign and generates an immune response. The goal is for this immune response to be durable. Critically, there is no live or attenuated virus incorporated in this technology, and symptoms associated with vaccination reflect upregulation of the immune response (9). In contrast, other vaccines, such as that from AstraZeneca/Oxford, are more traditional, using a modified adenovirus vector to deliver a COVID-19 spike protein to patients in order to trigger an immune response and antibody development. While there is no reason to expect that vaccine safety for either of these vaccine technologies will differ between dialysis patients and the general population, efficacy remains unknown, and studies are urgently required in dialysis and immunocompromised populations.

Vaccination logistics are critical for dialysis-dependent patients and dialysis staff, and the earliest available mRNA vaccines require ultra-cold storage and repeat vaccination after 3 to 4 weeks. The choice of vaccine for patients receiving dialysis may be critical, with advantages associated with vaccines that only require conventional storage possibly outweighing possible increased efficacy. Critically though, dialysis facilities are uniquely positioned to administer vaccines to this highly vulnerable population at a three- to four-week interval, given the numerous and repeated contacts (thrice weekly for in-center patients and monthly for home patients).

Dialysis facilities are proficient at tracking vaccine administration and infection. Most facilities operate with robust electronic health records, and all are familiar with data reporting to various federal and state monitoring databases. Critically, for patients treated with hemodialysis, where bloodstream access is easy, quality improvement protocols could be implemented to assess vaccine response via serologic testing, with widespread dissemination of results to inform national vaccination strategies. Ultimately, through public data sharing, confidence regarding the safety and efficacy of COVID-19 vaccines would be engendered (10).

As expected, patients receiving dialysis are already presenting their individual preferences and beliefs to their care providers. In this way, they are exactly the same as the general population, only with disproportionately high burdens of fear and anxiety by comparison. Many are eager to be first in line for vaccination, whereas others will wait for safety data to emerge. A minority will likely re-

fuse vaccination, irrespective of such results, with public health needs invariably colliding with the need to maintain patient autonomy. In this situation, it is critical that dialysis facility staff, including the nephrologists, nurses, social workers, and other clinicians who have established relationships with these patients, work with patients to overcome fears and trepidation regarding vaccination. A challenging discussion lies ahead regarding the possibility of mandating vaccination for patients and staff at dialysis facilities.

In sum, patients on dialysis, particularly those receiving maintenance in-center hemodialysis, represent a relatively large population of vulnerable individuals who are obligated to congregate multiple times per week and are at high risk of death should they develop COVID-19. These patients and the healthcare workers who care for them are a priority for immunization. Critically, the immune responses to immunization against SARS-CoV-2 are unknown due to lack of trial data, and, in the absence of rigorous current data, monitoring plans need to be put into place with minimal barriers to evaluate vaccine safety and efficacy. Finally, dialysis providers and the public health community will need to work together to address potential logistic barriers to vaccine administration in dialysis facilities in order to maximize the uptake of vaccines in this vulnerable population. ■

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Dropping eGFR Race Factor

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Some 64 of 2069 patients (3.1%) would have their eGFR moved below the 20 mL/min/1.73 m^2 criterion for being added to the transplant list.

The *JAMA* research letter found that in its sample of 9522 Black adults, the removal of race would result in a median decrease in eGFR of 14.1 mL/min/1.73 m^2. "Removing race may increase the prevalence of CKD among Black adults from 14.9% to 18.4%. Concurrently, 29.1% of Black adults with existing CKD may be reclassified to more severe stages of disease, with significant clinical and pharmacological implications," the authors write. And although the reclassification would make more patients eligible to receive a transplant, it would also disqualify more people from being eligible to donate a kidney.

In an editorial accompanying the research letter, Norris et al. (3) state that extrapolating this 14.9% to 18.4% increase in prevalence "could possibly indicate an estimated 1 million Black adults having a new diagnosis of CKD."

Mendu, who is a member of the ASN-NKF task force, said she was surprised at the size of the effects: "The argument we have heard from many is that this isn't a big deal and it is not really going to affect many people whether we use [the race multiplier] or don't use it. What both papers show is that it is affecting a lot of the patients it is being applied to, so it can't be ignored."

According to the *JAMA* research letter, "Removal of race adjustment may increase CKD diagnoses among Black adults and enhance access to specialist care, medical nutrition therapy, kidney disease education, and kidney transplantation, while potentially excluding kidney donors and prompting drug contraindications or dose reductions for individuals reclassified to advanced stages of CKD."

The accompanying editorial notes that reclassifying patients to CKD stage 4 would make "patients no longer eligible for certain treatments (e.g., metformin and sodium glucose transporter-2 inhibitors)" and would thus involve a trade-off between "the potential benefits of significantly slowing CKD progression among potentially a million or more individuals vs. the loss of treatment among a much smaller group of individuals in the late stages of disease (who might inevitably progress toward kidney failure)."

The *JAMA* research letter notes: "This potential for benefits and harms must be interpreted in light of persistent disparities in care, documented biases of eGFR without race, and the historical misuse of race as a biological variable to further racism."

Neil R. Powe, MD, MPH, MBA, a co-author of the *JAMA* letter, said a careful examination of the data in the articles indicates that healthcare "disparities are driven by other factors than the equation and that the equation has become a scapegoat. We need to concentrate on the real drivers of disparities to make change."

Powe is professor of medicine at the University of California, San Francisco, and co-chair of the ASN-NKF task force on race and GFR estimation.

"Clinicians must recognize that regardless of race, eGFR is an imprecise measure at the patient level," the *JGIM* authors note. "The risk of underestimation versus overestimation must be recognized and mitigated by the use of biomarkers such as cystatin C that can estimate GFR without the use of race." They add, "many African-Americans face the challenge of more rapid acceleration to ESRD compared with other racial groups, so on average, they would likely benefit from earlier counseling and preparation for renal replacement therapy as well as earlier nephrology and transplant referral."

The ASN-NKF task force is hosting online forums to solicit input: Jan. 15, 6–8 p.m. ET, focused on input from clinicians, scientists, and other health professionals; and Jan. 22, 6–8 p.m. ET, focused on patients, family members, and other public stakeholders. ■

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Immunosuppression

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sporine-based immunosuppression, 8.3% vs. 6.6%.

Compared to TMG/ALEM plus triple maintenance, steroid-sparing immunosuppressive regimens were associated with a lower risk of acute rejection in older adults: adjusted odds ratio 0.52 with TMG/ALEM plus steroid avoidance and 0.55 with IL2rAb plus steroid avoidance. Compared to the reference regimen, risk of death-censored graft failure was higher for older adults receiving tacrolimus plus antimetabolite avoidance, adjusted hazard ratio (HR) 1.78; mTORi-based immunosuppression, HR 2.14; and cyclosporine-based regimens, HR 1.78. In both age groups, mTORi- and cyclosporine-based regimens were associated with higher mortality: HR 1.24 and 1.37 in older recipients and 1.35 and 1.24 in younger recipients, respectively.

The new study provides insights into trends in immunosuppressive regimens for older adult kidney recipients, including associations with clinical outcomes. "These data support the move to further personalize the immunosuppressive regimen according to recipient and donor characteristics and limit exposure to more intense immunosuppressive regimens," the researchers write [Lentine KL, et al. Immunosuppression regimen use and outcomes in older and younger adult kidney transplant recipients: A National Registry analysis. *Transplantation*, published online ahead of print November 18, 2020. doi: 10.1097/TP.0000000000003547; https://journals.lww.com/transplantjournal/Abstract/9000/Immunosuppression_Regimen_Use_and_Outcomes_in.95464.aspx]. ■