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COVID-19 Outcomes in Solid Organ Transplant Recipients Who Received Tixagevimab-cilgavimab Prophylaxis and/or Bebtelovimab Treatment in a Nurse-driven Monoclonal Antibody Program During the Omicron Surge

Willa Cochran, MSN, CRNP,[1] Sonsoles Salto-Alejandre, MD,[2] Lindsay Barker, CRNP,[1] Julie Langlee, CRNP,[1] Kristin Freed, CRNP,[1] Debra Carter, CRNP,[1] Jaclyn Bannon, MHA,[1] Dillon Goddard,[1] Heba Mostafa, PhD,[3] William Werbel, MD, PhD,[3] Pali Shah, MD,[3] Dorry Segev, MD, PhD,[4] Daniel Brennan, MD,[3] and Robin Avery, MD[3]

The incidence of COVID-19 infections in solid organ transplant recipients (SOTRs) is high in the Omicron era, but optimal management is still debated. Tixagevimab/cilgavimab (T/C) received emergency use authorization (EUA) for pre-exposure prophylaxis from the US Food and Drug Administration in December 2021,[1] whereas bebtelovimab (BEB) received EUA for treatment in February 2022.[2] Emerging data suggest efficacy,[3,4] but more information is of interest.

We aim to describe COVID-19 outcomes in SOTRs at a single US center who received T/C for prophylaxis starting in January 2022 or received BEB for treatment starting in April 2022. In our region, BA.2 became dominant late March 2022 and BA.5 early July 2022.

Daily reports of positive SARS-CoV-2 tests were generated from our electronic medical record, capturing results from our health system, other hospitals, and outpatient clinics. Data on demographics and clinical outcomes were extracted from the electronic medical record. As reported,[5] a nurse practitioner and nurse-driven program arranged for BEB treatment for SOTRs who met criteria. Candidates for T/C prophylaxis were identified through screening lists, provider referrals, and nurse phone campaigns.

Of 205 SOTRs who received T/C, with a median follow-up of 13 wks, 14 (6.8%) received a single 150 mg/150 mg dose, 35 (17%) received 2 doses of 150 mg/150 mg (with altered dosing recommendations), and 156 (76%) received a single dose 300 mg/300 mg (Table 1). Of 14 who received a 150 mg/150 mg dose, 4 developed COVID-19, 1 was hospitalized, and 1 died of COVID-19. Of 35 who received 2 doses of 150 mg/150 mg, none developed COVID-19. Of 156 who received single a 300 mg/300 mg dose, 12 (7.7%) developed COVID-19 at least 14 d after T/C; 2 (1.3%) of these required hospitalization; and 1 90-y-old patient died.

In the EUA for T/C, cardiac events were reported in 0.6% of T/C versus 0.2% in the placebo group.[1] In our cohort, 5 (2.4%) with a median age 71 were hospitalized for cardiac events, with a median of 56 d after T/C

TABLE 1.

Tixagevimab-cilgavimab dosing variations

TC dose	150 mg/150 mg (N = 14)	150 mg/150 mg + 150 mg/150 mg (N = 35)	300 mg/300 mg (N = 156)
Developed COVID-19	4 (28.5%)	0	12 (7.6%)
Hospitalized	1 (7%)	0	2 (1.2%)
Died	1 (7%)	0	1 (0.6%)

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[1] *Johns Hopkins Hospital, Baltimore, MD.*

[2] *Virgen del Rocio University Hospital, Seville, Spain.*

[3] *Department of Medicine, Johns Hopkins, Baltimore, MD.*

[4] *NYU Langone Hospital, New York City, NY.*

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Correspondence: Willa Cochran, MSN, CRNP, Johns Hopkins Hospital, 600 N Wolfe St Carnegie 344F, Baltimore, MD 21287. (Wcochra1@jhu.edu).

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(range, 4–147). Only 1 event occurred within 1 mo (recurrent atrial fibrillation). The other events occurred >6 wks later (pericarditis, recurrent atrial flutter, mild/moderate cardiac allograft rejection, and complete heart block in a patient with history of left bundle branch block). The relationship of these events to T/C is unclear in a population with many comorbidities. Future studies will compare groups who did and did not receive T/C.

Regarding BEB, 213 SOTRs were diagnosed with COVID-19 between April 4, 2022, and July 9, 2022; if taking mycophenolate mofetil, patients were advised to stop (127 kidney, 30 liver, 18 lung, 27 heart, and 10 dual-organ); 145 (68.4%) were treated with BEB. Of those who received BEB, only 18 (12.4%) required hospitalization, 1 (0.7%) required mechanical ventilation, and 1 (0.7%) died.

In summary, despite large numbers of cases during the Omicron surge, SOTRs who received T/C were unlikely to contract COVID-19 and rarely required hospitalization or died. Several cardiac events were reported, but the relationship to T/C is unclear. Of those who received BEB for treatment, few required hospitalization, and only 1 (0.7%) died. These favorable outcomes underscore the importance of a systematized, nurse-led program for monoclonal antibody prophylaxis or treatment in SOTRs.

REFERENCES

1. United States Food and Drug Administration. *Emergency use authorization (EUA) for Evusheld*. 2022. Available at www.fda.gov/media/156674/download. Accessed August 19, 2022.
2. United States Food and Drug Administration. *Emergency use authorization (EUA) for bebtelovimab*. 2022. Available at www.fda.gov/media/156152/download. Accessed August 19, 2022.
3. Yetmar ZA, Beam E, O'Horo JC, et al. Outcomes of bebtelovimab and sotrovimab treatment of solid organ transplant recipients with mild-to-moderate coronavirus disease 2019 during the Omicron epoch. *Transpl Infect Dis*. 2022;24:e13901.
4. Shertel T, Lange NW, Salerno DM, et al. Bebtelovimab for treatment of COVID-19 in ambulatory solid organ transplant recipients. *Transplantation*. 2022;106:e463–e464.
5. Cochran W, Langlee J, Barker L, et al. Short-term outcomes in a nurse coordinator-led and nurse practitioner-led sotrovimab initiative for solid organ transplant recipients during the Omicron surge. *Transplantation*. 2022;106:e424–e425.