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Brief Report

# Vaccines, Antibodies and Donors: Varying Attitudes and Policies Surrounding COVID-19 and Heart Transplantation

ERSILIA M. DeFilippis, MD,[1] LARRY A. ALLEN, MD, MHS,[2] ANKEET S. BHATT, MD, MBA,[3] SUSAN JOSEPH, MD,[4] MICHELLE KITTLESON, MD, PhD,[5] ORLY VARDENY, PharmD, MS,[6] MARK H. DRAZNER, MD,MSC,[7] AND ANURADHA LALA, MD[8]

*New York, New York; AuroraColorado; Boston, Massachusetts; Baltimore, Maryland; Los Angeles, California; Minneapolis, Minnesota; and Dallas, Texas*

**ABSTRACT**

**Introduction:** There are varied opinions in the United States regarding many aspects of care related to COVID-19. The purpose of this study was to examine the opinions of health care personnel and the policies of heart transplant centers concerning practices for the prevention and treatment of COVID-19 in donors and recipients of heart transplants.

**Methods:** Two anonymous, electronic web-based surveys were developed: 1 was administered to health care personnel through a mailing list maintained by the Heart Failure Society of America (HFSA); another was administered to U.S. medical adult and pediatric heart transplant (HT) program directors. Individual and group e-mails were sent with an embedded link to the respective surveys in February 2022.

**Results:** A total of 176 individuals (8.6%) responded to the survey administered through the HFSA. Of medical directors of transplant programs, 78 (54% response rate) completed a separate survey on their centers' policies. Although 95% (n = 167) of individuals indicated vaccination against COVID-19 should be required prior to HT, only 67% (n = 52) of centers mandated that practice. Similarly, 61% of individuals thought vaccination should be required prior to HT for caregivers, but only 13% of transplant centers mandated caregiver vaccination. Of the centers, 63% reported considering donors despite histories of recent COVID-19 infection (within 3 months), and 47% considered donors with current positive polymerase chain reaction tests. Regarding post-transplant care, only 22% of programs routinely measured antibodies to COVID-19, and 71% used tixagevimab/cilgavimab (Evusheld) for pre-exposure prophylaxis.

**Conclusions:** There were significant differences between individual preferences and centers' practices with respect to COVID-19 management of candidates for and recipients of HT. Additionally, there was wide variation in policies among centers, reflecting the need for further study to inform consistent guidance and recommendations across centers to optimize equitable care for this high-risk patient population. (*J Cardiac Fail 2022;00:1–6*)

**Key Words:** heart transplantation, vaccination, COVID-19, donor.

*From the [1]Division of Cardiology, Columbia University Irving Medical Center, New York, New York; [2]Division of Cardiology, University of Colorado School of Medicine, Aurora, Colorado; [3]Division of Cardiovascular Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts; [4]Department of Cardiology, University of Maryland Medical Center, Baltimore, Maryland; [5]Department of Cardiology, Smidt Heart Institute, Cedars-Sinai Medical Center, Los Angeles, California; [6]Center for Care Delivery and Outcomes Research, Minneapolis VA Health Care System, and University of Minnesota, Minneapolis, Minnesota; [7]Division of Cardiology, University of Texas Southwestern Medical Center, Dallas, Texas and [8]Zena and Michael A. Wiener Cardiovascular Institute & Department of Population Health Science, Icahn School of Medicine at Mount Sinai, New York, New York.*

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Reprint requests: Anuradha Lala, MD. The Zena and Michael A. Wiener Cardiovascular Institute, and Department of Population Health Science & Policy, Icahn School of Medicine at Mount Sinai, One Gustave Levy Place, Box 1030, New York, New York 10029. E-mail: anu.lala@mountsinai.org

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Patients with heart failure (HF) awaiting or having received heart transplantation (HT) are vulnerable to adverse outcomes resulting from coronavirus disease-2019 (COVID-19).[1,2] COVID-19 vaccination is effective in mitigating risk of severe disease and mortality, prompting widespread efforts for implementation, particularly in this high-risk cohort.[3] Still, considerable uncertainty exists regarding optimal strategies for prevention and treatment of COVID-19 in HT candidates and recipients. The purpose of this study was to examine opinions of health-care-related personnel and transplant center policies about practices for the prevention and treatment of COVID-19 in HT donors and recipients, with a particular focus on the role of vaccination.

## Methods

Two anonymous, voluntary, cross-sectional, web-based surveys were conducted in February 2022 to assess HT center policies and individual views regarding COVID-19 vaccination prior to HT, COVID-positive donors, and post-transplant management. The survey, administered through a mailing list maintained by the Heart Failure Society of America (HFSA), sought to capture opinions of clinicians caring for HT recipients. The second survey assessed center-specific policies; questions were administered to medical adult and pediatric HT program directors identified through the Scientific Registry of Transplant Recipients.

In addition to personal and HFSA broadcast e-mails, social media platforms with an embedded survey link were used to improve survey participation. Completing multiple surveys from the same device was prohibited. Survey results were anonymized; however, demographic characteristics were collected, including professional role, self-identified gender, race and ethnicity, and years of training. The Institutional Review Board at Mount Sinai Medical Center approved this study.

## Results

### Survey Respondents

Respondents to the HFSA survey amounted to 176 individuals (8.6%), of whom the majority were cardiologists (74%). Of 144 medical HT program directors, 78 (54%) completed the center policy survey. Represented programs were diverse with respect to geography and transplant volume (Table 1).

### COVID-19 Vaccination

The majority of individuals believed COVID-19 vaccination should be required prior to HT listing: 95% (n = 167) (Fig. 1A). Nearly two-thirds (61%) believed vaccination should also be required for caregivers. However, COVID-19 vaccination was required for listing at only 67% (n = 52) of centers surveyed. Medical and religious exemptions were permitted at 60% and 19% of centers, respectively (Fig. 1B). Caregiver vaccination was required at 13% (n = 10) of centers. Noncardiac organ transplants were performed at 95% of HT centers, but only 61% had consistent vaccination policies across organs (Fig. 2).

The minimum vaccine requirement prior to HT varied. Of HFSA respondents, 74% (n = 130) believed an initial primary series should be required, whereas 50% of surveyed HT centers reported $\geq$ 1 dose was sufficient. Both groups acknowledged that the urgency of HT could influence these policies.

### Transplant Listing for Candidates With COVID-19 Infection

Timing and readiness for HT following a positive SARS CoV-2 test ranged across centers from 14 days to 6 weeks. There were variations in additional requirements, including absence of symptoms (49%) and negative repeat polymerase chain reaction (PCR) testing (51%).

### Inclusion of COVID-19-Positive Donors

A majority of surveyed individuals (76%, n = 134) and centers (63%, n = 49) reported willingness to consider donors despite recent history of COVID-19 infection (within 3 months) but negative nasopharyngeal PCR, with 48% (n = 84) individuals and 47% (n = 37) centers willing to accept donors with positive nasopharyngeal PCR for SARS CoV-2 (provided negative bronchoalveolar lavage (Fig. 2). Other stipulations varied, including assessment of PCR cycle length, donor symptoms, normal chest imaging, recipient vaccination status, and recipient administration of monoclonal antibody post-transplant.

### Post-Transplant Care

For patients who have received recent transplants ($<$ 1 year), 53% centers recommended repeat vaccination (ie, booster dose) 3 months after HT, although 26% endorsed administration as early as 1 month and 7% as soon as 2 weeks post-HT. For remote ($>$ 1 year post-transplant) recipients, 81% of centers recommended a 4th dose routinely.

Routine measurement of COVID-19 antibodies was reported by 22% of centers and was used to inform the timing of booster administration and referral for pre-exposure monoclonal antibody infusion.

Most programs (71%, n = 51) reported using tixagevimab/cilgavimab (Evusheld) for pre-exposure

**Table 1.** Respondents' Characteristics

| Respondents' Characteristics | HFSA Members (n = 168)* | Heart Transplant Program Medical Directors (n = 70)† |
|---|---|---|
| Sex | | |
| Female | 102 (60.7) | 28 (40.0) |
| Male | 66 (39.3) | 40 (57.1) |
| Other | 0 (0.0) | 2 (2.9) |
| Race | | |
| White or Caucasian | 126 (75.0) | 43 (61.4) |
| Black or African American | 4 (2.4) | 3 (4.3) |
| Asian or Asian American | 30 (17.9) | 18 (25.7) |
| American Indian or Alaska Native | 0 (0.0) | 0 (0.0) |
| Native Hawaiian or other Pacific Islander | 0 (0.0) | 0 (0.0) |
| Other | 4 (2.4) | 3 (4.3) |
| Prefer not to answer | 4 (2.4) | 3 (4.3) |
| Ethnicity | | |
| Hispanic or Latino | 6 (3.6) | 7 (10.0) |
| Not Hispanic or Latino | 156 (92.3) | 59 (84.3) |
| Prefer not to answer | 6 (3.6) | 4 (5.7) |
| Specialty | | |
| Cardiologist | 124 (73.8) | 70 (100) |
| Surgeon | 6 (3.6) | |
| Advanced Practice Provider | 17 (10.1) | |
| Transplant Coordinator | 2 (1.2) | |
| Pharmacist | 11 (6.6) | |
| Other | 8 (4.8) | |
| Years in Practice | | |
| 0–5 | 50 (29.8) | – |
| 6–10 | 32 (19.1) | |
| 11–15 | 28 (16.7) | |
| >15 | 58 (34.5) | |
| Geographic Location | | |
| Northeast | 34 (20.2) | 15 (21.4) |
| Northwest | 12 (7.1) | 5 (7.1) |
| North Midwest | 37 (22.0) | 8 (11.4) |
| Great Lakes | 17 (10.1) | 3 (4.3) |
| Mid-Atlantic | 9 (5.4) | 6 (8.6) |
| Southwest | 24 (14.3) | 15 (21.4) |
| South Midwest | 18 (10.7) | 7 (10.0) |
| Southeast | 17 (10.1) | 11 (15.7) |
| Type of program | – | |
| Adult | | 57 (81.4) |
| Pediatric | | 13 (18.6) |
| Annual Transplant Volume | | |
| <20 | 35 (20.8) | 22 (31.4) |
| 20–39 | 60 (35.7) | 20 (28.6) |
| 40–59 | 44 (26.2) | 19 (27.1) |
| 60–79 | 13 (7.7) | 4 (5.7) |
| 80 or more | 16 (9.5) | 5 (7.1) |

*Of the 176 individuals, 8 did not respond to the demographic questions.
†Of the 78 centers, 8 did not answer the demographic questions.

prophylaxis among HT recipients, with 62% of centers using it for patients < 1 year post-HT (18% during an index HT admission), and 37% for patients with recently treated antibody-mediated rejection. Tixagevimab/cilgavimab was also used for unvaccinated patients (n = 1), patients with prior COVID infection (n = 1), with recent acute cellular rejection (n = 1), without measurable antibody titers despite completion of a vaccine series (n = 4), those receiving belatacept (n = 1), and those above a specific age without coronary allograft vasculopathy (n = 3).

Regarding oral outpatient therapies for COVID-19 infection, most centers reported preference for sotrovimab (58%, n = 42) and remdesivir (58%, n = 42), but nirmaltrelvir/ritonavir (26%, n = 19) and molnupiravir (19%, n = 14) were also used.

#### Pediatric Programs

When analysis was limited to pediatric programs alone (n = 13) (response rate: 46%), only 3 centers required COVID-19 vaccination prior to listing, and none required caregiver vaccination. Eight centers (62%) considered donors despite history of COVID-19 infection within 3 months, including 7 (54%) who reported consideration of donors with positive PCR. Four centers (31%) administered tixagevimab/cilgavimab to patients in the emergency use authorization age range.

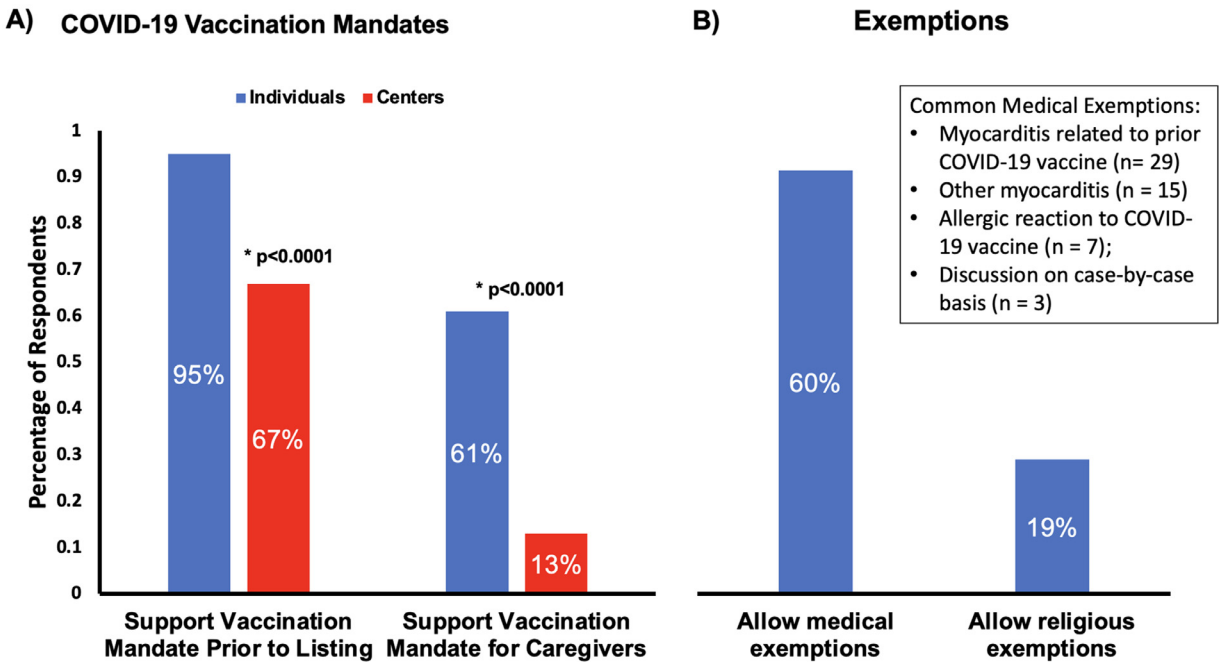


**Fig. 1.** Personal views and center policies surrounding vaccination against COVID-19. A, Individual and program-director responses regarding vaccination mandates against COVID-19 are depicted. B, The proportion of centers allowing medical and religious exemptions are shown.

## Discussion

We report the results of a comprehensive survey aimed at understanding individual attitudes and program policies regarding pre- and post-HT care in terms of COVID-19. Key findings include: (1) although 95% of individuals believe COVID-19 vaccination should be required prior to HT, only 66% of centers required it; (2) 61% of individuals believe vaccination should be required for caregivers prior to transplantation, but only 13% of transplant centers have adopted this policy; (3) program practices

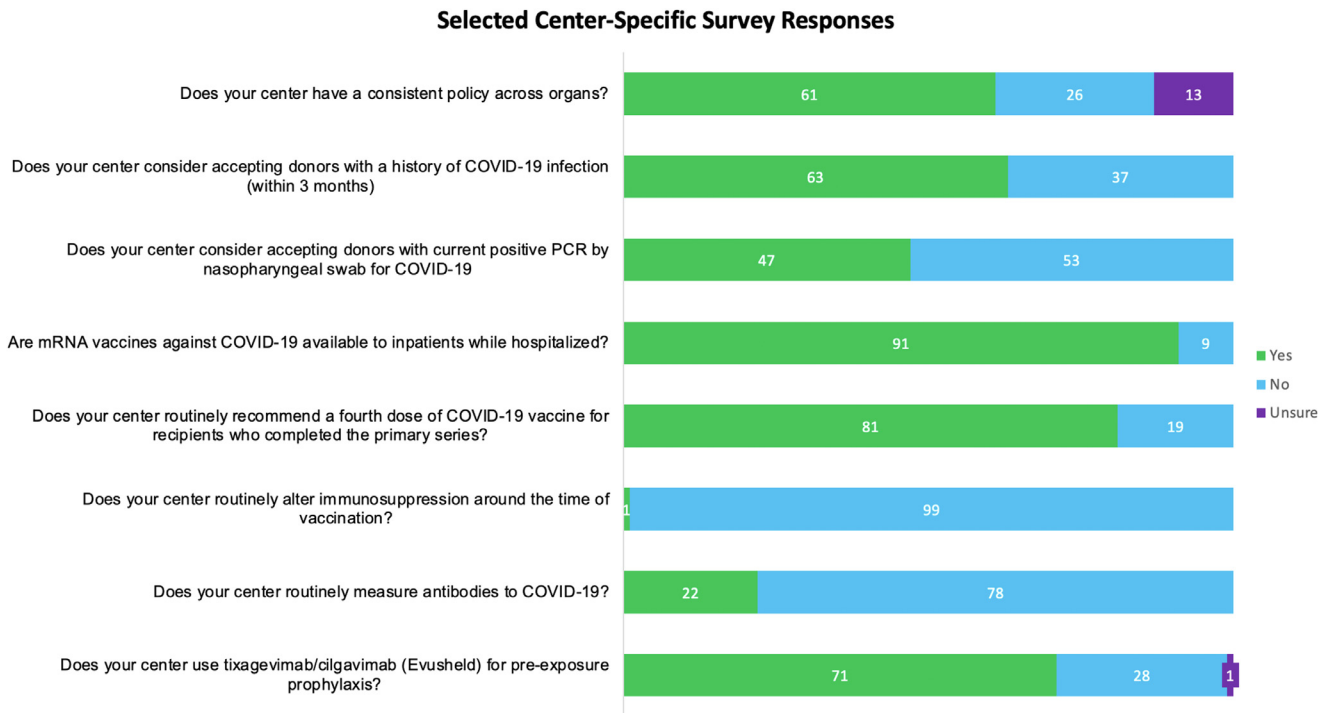


**Fig. 2.** Selected centers' policies pertaining to COVID-19 and heart transplantation. Responses to selected survey questions are shown.

varied widely regarding consideration of donors with current or prior history of COVID-19; (4) post-transplant management varies widely. Our findings highlight the marked variability in COVID-19 policies and opinions in this high-risk patient population and represent a call to action to develop structured processes and consensus regarding delivery of equitable and consistent care for COVID-19 in candidates for and recipients of HT.

#### COVID-19 Vaccine Mandates

HT clinicians are stewards of a scarce resource and must also ensure that vulnerable groups are not disadvantaged or excluded.[4] This responsibility extends to patients and donors and their families. Although 95% of individual respondents favored mandated vaccination prior to HT, vaccine mandates have been highly controversial and politicized. Selected states have introduced legislation that, if approved, would make refusal of transplant to unvaccinated patients illegal. Such legislation may partially explain the discrepancy between individual attitudes and center policies.

#### Active or Recent COVID-19: Implications for Donor Use and Recipient Readiness

Early in the COVID-19 pandemic, donor testing was often not feasible, and donors with active COVID-19 infection were generally declined.[5] However, as an increasing proportion of potential donors have contracted COVID-19, and the understanding of COVID-19 evolved, this practice was reconsidered in some centers. A recent Organ Procurement Transplant Network statement offered further guidance for consideration of SARS-CoV-2-positive donors,[6] noting that only 3 donor-derived COVID-19 infections have been reported, all in lung-transplant recipients.[6] Aligned with these observations, nearly two-thirds of transplant centers would consider donors with histories of recent COVID-19 infection, and nearly half would consider donors despite a positive nasopharyngeal PCR swab. Further studies are needed regarding the long-term outcomes for recipients of COVID-19-positive donors.

#### Managing COVID-19 Risk After Heart Transplantation

In a pre-exposure prophylaxis trial of nearly 5200 patients, of whom 196 were immunocompromised, treatment was associated with prevention of symptomatic COVID-19. There was a higher incidence of serious adverse cardiac events in the antibody group than in the placebo group (0.6% vs 0.2%).[7] Given that 3/4 of HT centers reported using tixagevimab/cilgavimab (Evusheld), more data are needed regarding its safety and efficacy in this population.

Most centers do not routinely measure COVID-19 antibodies in HT recipients. Antibody testing theoretically would reveal which HT patients remain at risk and may benefit from additional vaccination or immunoprophylactic therapies, but neither medical societies nor the U.S. Food and Drug Administration recommend this practice.[8] The American Society of Transplantation recommended antispike seronegativity to guide use of monoclonal antibody pre-exposure prophylaxis, but specific guidance regarding timing and choice of assay and interpretation of results are lacking.[8]

#### Pediatric Considerations

Pediatric candidates for HT and recipients require special considerations. As of June 2022, COVID-19 vaccines have been approved for children as young as 6 months of age although vaccination has not become widespread among this age group. Still, no programs surveyed required vaccination for caregivers who would qualify for vaccination.

#### Limitations

This study has several limitations, including the potential for selection and responder bias; participants were recruited via e-mail and social media platforms, and not all HT centers were represented. Views of individual clinicians and centers' policies may change over time or be inadequately assessed by categorical answer choices.

## Conclusions

There were significant differences between individual preferences and centers' practices with respect to COVID-19 management of HT candidates and recipients. The marked variability in policies and practices highlights the need for consistent recommendations and consensus within the community to allow for equitable care of this high-risk population.

## Acknowledgments

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