

Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: Association of Neutralizing Anti-spike Monoclonal Antibody Treatment with COVID-19 Hospitalization and Assessment of the Monoclonal Antibody Screening Score

Most Recent Update: September 22, 2022

Association of Neutralizing Anti-spike Monoclonal Antibody Treatment with COVID-19 Hospitalization and Assessment of the Monoclonal Antibody Screening Score

SUPPLEMENTARY APPENDIX

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SUPPLEMENTARY TABLES

Table S1. Monoclonal Antibody Screening Score (MASS) Components and Calculation.[‡]

| Patient Characteristic | Score |
|---|--------------|
| Age ≥ 65 Years | 2 |
| BMI ≥ 35 | 1 |
| Diabetes Mellitus | 2 |
| Chronic Kidney Disease (CKD 4 or 5) | 3 |
| Cardiovascular Disease in a Patient 55 Years and Older | 2 |
| Chronic Respiratory Disease in a Patient 55 Years and Older | 2 |
| Hypertension in a Patient 55 Years and Older | 1 |
| Immunocompromised Status | 4 |
| Pregnancy | 2 |
| Maximum Possible Score | 19 |

[‡]MASS ranges from 0 to 19, with higher scores indicating a greater number of risk factors for progressing to severe COVID-19 and higher prioritization for monoclonal-antibody therapy. The total score is calculated by summing scores for these individual patient characteristics.

| Table S2. Crude cumulative incidence of hospital admission according to MASS and monoclonal-antibody infusion status.‡ | | | |
|---|----------------------------------|------------------------|----------------------------------|
| Group | COVID-19 Hospitalizations | No. of Patients | Cumulative Incidence Rate |
| MASS: 0 | | | |
| Not Infused | 1,161 | 57,573 | 2.02% (1.90%, 2.13%) |
| Infused | 45 | 3,322 | 1.35% (1.01%, 1.81%) |
| MASS: 1 | | | |
| Not Infused | 732 | 15,743 | 4.65% (4.33%, 4.99%) |
| Infused | 41 | 3,280 | 1.25% (0.92%, 1.69%) |
| MASS: 2 | | | |
| Not Infused | 614 | 7,226 | 8.50% (7.88%, 9.16%) |
| Infused | 43 | 2,084 | 2.06% (1.54%, 2.77%) |
| MASS: 3 | | | |
| Not Infused | 664 | 5,409 | 12.28% (11.43%, 13.18%) |
| Infused | 47 | 2,158 | 2.18% (1.64%, 2.88%) |
| MASS: 4 | | | |
| Not Infused | 625 | 4,249 | 14.71% (13.68%, 15.81%) |
| Infused | 48 | 2,030 | 2.36% (1.79%, 3.12%) |
| MASS: 5 | | | |
| Not Infused | 822 | 3,639 | 22.59% (21.26%, 23.98%) |
| Infused | 50 | 1,703 | 2.94% (2.23%, 3.85%) |
| MASS: 6 | | | |
| Not Infused | 474 | 2,121 | 22.35% (20.63%, 24.17%) |
| Infused | 31 | 1,128 | 2.75% (1.94%, 3.87%) |
| MASS: 7 | | | |
| Not Infused | 598 | 1,809 | 33.06% (30.93%, 35.26%) |
| Infused | 48 | 830 | 5.78% (4.39%, 7.58%) |
| MASS: 8 | | | |
| Not Infused | 483 | 1,247 | 38.73% (36.07%, 41.47%) |
| Infused | 26 | 636 | 4.09% (2.80%, 5.92%) |
| MASS: 9 | | | |
| Not Infused | 259 | 650 | 39.85% (36.15%, 43.66%) |
| Infused | 30 | 329 | 9.12% (6.46%, 12.72%) |
| MASS: 10+ | | | |
| Not Infused | 605 | 1,180 | 51.27% (48.42%, 54.11%) |
| Infused | 47 | 590 | 7.97% (6.04%, 10.43%) |

‡95% confidence intervals for are calculated using Wilson confidence intervals for binomial proportions.

Table S3. Characteristics of Patients with COVID-19 According to Propensity Group.[‡]

| Variable | PS Group: 1 (N=23,788) | PS Group: 2 (N=23,787) | PS Group: 3 (N=23,787) | PS Group: 4 (N=23,787) | PS Group: 5 (N=23,787) [†] |
|---|---------------------------|---------------------------|---------------------------|---------------------------|--|
| Gender | | | | | |
| Female | 11,820 (18.9%) | 13,111 (20.9%) | 12,814 (20.4%) | 12,545 (20.0%) | 12,414 (19.8%) |
| Male | 11,955 (21.3%) | 10,671 (19.0%) | 10,973 (19.5%) | 11,240 (20.0%) | 11,373 (20.2%) |
| Age category at COVID-19 Test | | | | | |
| 18 - 39 yr | 18,782 (38.9%) | 12,152 (25.2%) | 8,603 (17.8%) | 6,656 (13.8%) | 2,072 (4.3%) |
| 40 - 59 yr | 4,847 (12.2%) | 10,411 (26.1%) | 9,450 (23.7%) | 7,456 (18.7%) | 7,727 (19.4%) |
| 60 - 69 yr | 158 (1.0%) | 1,206 (7.3%) | 3,696 (22.4%) | 4,741 (28.7%) | 6,717 (40.7%) |
| 70 - 79 yr | 0 (0.0%) | 12 (0.1%) | 1,336 (13.9%) | 3,296 (34.4%) | 4,943 (51.6%) |
| ≥ 80 yr | 1 (0.0%) | 6 (0.1%) | 702 (15.0%) | 1,638 (35.0%) | 2,328 (49.8%) |
| Race or ethnic group^a | | | | | |
| White | 18,330 (17.5%) | 20,983 (20.0%) | 21,166 (20.2%) | 21,907 (20.9%) | 22,615 (21.5%) |
| Black or African American | 1,391 (31.8%) | 939 (21.5%) | 970 (22.2%) | 659 (15.1%) | 417 (9.5%) |
| Other or Unknown Race | 4,067 (42.5%) | 1,865 (19.5%) | 1,651 (17.3%) | 1,221 (12.8%) | 755 (7.9%) |
| Hispanic or Latino | 2,309 (29.8%) | 1,793 (23.2%) | 1,516 (19.6%) | 1,302 (16.8%) | 817 (10.6%) |
| Not Hispanic or Latino | 19,578 (18.3%) | 21,302 (19.9%) | 21,695 (20.2%) | 21,993 (20.5%) | 22,632 (21.1%) |
| BMI Classification | | | | | |
| Underweight or Normal Weight | 7,309 (27.6%) | 5,231 (19.8%) | 5,768 (21.8%) | 4,676 (17.7%) | 3,454 (13.1%) |
| Overweight | 4,220 (13.5%) | 7,400 (23.7%) | 6,534 (21.0%) | 7,028 (22.5%) | 5,987 (19.2%) |
| Class 1 Obesity | 2,206 (9.3%) | 5,569 (23.4%) | 4,758 (20.0%) | 5,699 (23.9%) | 5,583 (23.4%) |
| Class 2 Obesity | 126 (1.0%) | 2,098 (16.7%) | 2,970 (23.7%) | 3,155 (25.1%) | 4,207 (33.5%) |
| Class 3 Obesity | 62 (0.6%) | 1,213 (11.6%) | 2,313 (22.1%) | 2,547 (24.4%) | 4,311 (41.3%) |
| Hospital Location According to State^b | | | | | |
| Arizona | 2,325 (16.4%) | 2,558 (18.0%) | 2,992 (21.1%) | 3,245 (22.9%) | 3,069 (21.6%) |
| Florida | 2,587 (21.7%) | 2,303 (19.3%) | 2,938 (24.7%) | 2,384 (20.0%) | 1,703 (14.3%) |
| Minnesota | 12,232 (19.8%) | 13,050 (21.1%) | 12,395 (20.1%) | 12,092 (19.6%) | 12,048 (19.5%) |
| Wisconsin | 6,644 (21.4%) | 5,876 (18.9%) | 5,462 (17.6%) | 6,066 (19.6%) | 6,967 (22.5%) |
| Wave | | | | | |
| Pre-Delta Predominant | 6,547 (21.5%) | 6,486 (21.3%) | 5,911 (19.4%) | 5,760 (18.9%) | 5,794 (19.0%) |
| Washout Period 1 | 856 (20.6%) | 899 (21.6%) | 945 (22.7%) | 756 (18.2%) | 705 (16.9%) |
| Delta Predominant | 618 (3.1%) | 1,073 (5.4%) | 3,502 (17.6%) | 5,656 (28.4%) | 9,042 (45.5%) |
| Washout Period 2 | 316 (1.9%) | 889 (5.2%) | 2,902 (17.0%) | 4,841 (28.4%) | 8,117 (47.6%) |
| Omicron Predominant | 15,451 (32.7%) | 14,440 (30.5%) | 10,527 (22.2%) | 6,774 (14.3%) | 129 (0.3%) |
| MASS Category | | | | | |
| 0 | 22,240 (36.5%) | 16,970 (27.9%) | 10,683 (17.5%) | 7,917 (13.0%) | 3,085 (5.1%) |
| 1 - 3 | 1,191 (3.3%) | 5,857 (16.3%) | 9,533 (26.6%) | 8,960 (25.0%) | 10,359 (28.9%) |
| 4 - 6 | 353 (2.4%) | 888 (6.0%) | 2,796 (18.8%) | 4,365 (29.4%) | 6,468 (43.5%) |
| 7 - 9 | 4 (0.1%) | 72 (1.3%) | 635 (11.5%) | 1,901 (34.6%) | 2,889 (52.5%) |
| 10+ | 0 (0.0%) | 0 (0.0%) | 140 (7.9%) | 644 (36.4%) | 986 (55.7%) |
| Vaccination Status^c | | | | | |
| Unvaccinated | 14,787 (22.9%) | 11,687 (18.1%) | 13,363 (20.7%) | 13,361 (20.7%) | 11,311 (17.5%) |
| Partially Vaccinated | 565 (13.8%) | 627 (15.3%) | 885 (21.6%) | 871 (21.3%) | 1,147 (28.0%) |
| Fully Vaccinated | 8,436 (16.8%) | 11,473 (22.8%) | 9,539 (19.0%) | 9,555 (19.0%) | 11,329 (22.5%) |
| Monoclonal Antibody Type | | | | | |
| Bamlanivimab | 11 (0.4%) | 50 (1.7%) | 291 (9.7%) | 919 (30.7%) | 1,719 (57.5%) |
| Bamlanivimab and Etesevimab | 22 (1.5%) | 52 (3.6%) | 136 (9.5%) | 384 (26.8%) | 838 (58.5%) |
| Bebtelovimab | 44 (3.9%) | 180 (16.0%) | 350 (31.2%) | 526 (46.9%) | 22 (2.0%) |
| Casirivimab and Imdevimab | 62 (0.6%) | 141 (1.4%) | 634 (6.3%) | 2,116 (21.1%) | 7,069 (70.5%) |
| Sotrovimab | 127 (5.0%) | 281 (11.1%) | 505 (20.0%) | 870 (34.5%) | 741 (29.4%) |
| Comorbidities^d | | | | | |
| Myocardial Infarction | 52 (1.2%) | 199 (4.5%) | 679 (15.2%) | 1,384 (31.0%) | 2,154 (48.2%) |
| Congestive Heart Failure | 93 (1.4%) | 297 (4.4%) | 1,022 (15.1%) | 2,112 (31.3%) | 3,228 (47.8%) |

Table S3. Characteristics of Patients with COVID-19 According to Propensity Group.[‡]

| Variable | PS Group: 1 (N=23,788) | PS Group: 2 (N=23,787) | PS Group: 3 (N=23,787) | PS Group: 4 (N=23,787) | PS Group: 5 (N=23,787) [†] |
|----------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--|
| Peripheral Vascular Disease | 62 (0.5%) | 443 (3.8%) | 1,743 (15.1%) | 3,788 (32.9%) | 5,494 (47.6%) |
| Cerebrovascular Disease | 131 (1.8%) | 487 (6.6%) | 1,253 (16.9%) | 2,286 (30.9%) | 3,253 (43.9%) |
| Dementia | 6 (0.5%) | 15 (1.3%) | 168 (14.7%) | 395 (34.7%) | 555 (48.7%) |
| Chronic Pulmonary Disease | 1,260 (4.3%) | 4,638 (15.9%) | 6,550 (22.4%) | 7,171 (24.5%) | 9,616 (32.9%) |
| Connective Tissue Disease | | | | | |
| Rheumatic Disease | 1 (0.0%) | 28 (0.7%) | 553 (13.7%) | 1,461 (36.2%) | 1,996 (49.4%) |
| Peptic Ulcer Disease | 109 (3.5%) | 331 (10.6%) | 571 (18.3%) | 900 (28.8%) | 1,217 (38.9%) |
| Mild Liver Disease | 113 (1.2%) | 813 (8.3%) | 2,079 (21.3%) | 2,919 (29.9%) | 3,849 (39.4%) |
| Paraplegia and Hemiplegia | 70 (5.2%) | 145 (10.7%) | 254 (18.8%) | 382 (28.3%) | 498 (36.9%) |
| Renal Disease | 11 (0.1%) | 289 (3.3%) | 1,426 (16.2%) | 2,838 (32.3%) | 4,218 (48.0%) |
| Cancer | 61 (0.7%) | 619 (6.9%) | 1,611 (18.0%) | 2,995 (33.4%) | 3,679 (41.0%) |
| Moderate or Severe Liver Disease | 29 (3.3%) | 87 (9.9%) | 174 (19.7%) | 244 (27.6%) | 349 (39.5%) |
| Metastatic Carcinoma | 77 (2.9%) | 268 (10.2%) | 569 (21.7%) | 755 (28.8%) | 957 (36.4%) |
| Diabetes | 15 (0.1%) | 198 (1.5%) | 2,505 (18.6%) | 4,109 (30.5%) | 6,642 (49.3%) |

[‡]Data are represented as counts and row percents. Missing data was present for Gender (N = 20), Ethnicity (N = 3,999) and BMI Classification (N = 14,512).

[†]Standardized Difference = difference in proportions divided by standard error; imbalance is defined as an absolute value greater than 0.1 and are shown in bold.

[‡]In the 'Other or Unknown Race' category, 540 patients were American Indian/Alaskan Native, 3,208 were Asian, 213 were Native Hawaiian/Pacific Islander, 2,850 were reported as 'other', and 2,748 were missing.

^bMinnesota includes Mayo Clinic Rochester and Mayo Clinic Health System in SE/SW Minnesota. Wisconsin includes Mayo Clinic Health System in NW/SW Wisconsin.

^cPatients are fully vaccinated if their COVID-19 positive test was 14 or more after their first shot of a viral vector vaccination or their second mRNA dose. Patients who have received at least one shot but are not considered fully vaccinated are categorized as partially vaccinated.

^dComorbidities are defined by standard ICD9/10 code sets. All diagnoses on or prior to the date of the COVID-19 test were included.

Table S4. Characteristics of Patients with COVID-19 According to Number Needed to Treat to Prevent One Hospital Admission.[‡]

| Variable | 1 - 5 Patients (N=12,355) | 5 - 20 Patients (N=18,985) | 20 - 100 Patients (N=27,990) | 100 - 400 Patients (N=26,317) | >400 Patients (N=33,289) [†] |
|---|------------------------------|-------------------------------|---------------------------------|-------------------------------------|--|
| Gender | | | | | |
| Female | 5,138 (8.2%) | 8,834 (14.1%) | 16,462 (26.3%) | 14,665 (23.4%) | 17,605 (28.1%) |
| Male | 7,217 (12.8%) | 10,151 (18.1%) | 11,527 (20.5%) | 11,642 (20.7%) | 15,675 (27.9%) |
| Age category at COVID-19 Test | | | | | |
| 18 - 39 yr | 331 (0.7%) | 2,088 (4.3%) | 11,316 (23.4%) | 15,075 (31.2%) | 19,455 (40.3%) |
| 40 - 59 yr | 2,245 (5.6%) | 7,147 (17.9%) | 9,654 (24.2%) | 8,169 (20.5%) | 12,676 (31.8%) |
| 60 - 69 yr | 2,924 (17.7%) | 5,270 (31.9%) | 4,647 (28.1%) | 2,526 (15.3%) | 1,151 (7.0%) |
| 70 - 79 yr | 3,741 (39.0%) | 3,376 (35.2%) | 1,960 (20.4%) | 505 (5.3%) | 5 (0.1%) |
| ≥ 80 yr | 3,114 (66.6%) | 1,104 (23.6%) | 413 (8.8%) | 42 (0.9%) | 2 (0.0%) |
| Race or ethnic group^a | | | | | |
| White | 11,161 (10.6%) | 17,177 (16.4%) | 24,378 (23.2%) | 22,447 (21.4%) | 29,838 (28.4%) |
| Black or African American | 512 (11.7%) | 659 (15.1%) | 1,291 (29.5%) | 1,121 (25.6%) | 793 (18.1%) |
| Other or Unknown Race | 682 (7.1%) | 1,149 (12.0%) | 2,321 (24.3%) | 2,749 (28.8%) | 2,658 (27.8%) |
| Hispanic or Latino | 608 (7.9%) | 1,207 (15.6%) | 1,931 (25.0%) | 2,172 (28.1%) | 1,819 (23.5%) |
| Not Hispanic or Latino | 11,557 (10.8%) | 17,429 (16.3%) | 25,432 (23.7%) | 23,238 (21.7%) | 29,544 (27.6%) |
| Hospital Location According to State^b | | | | | |
| Arizona | 2,135 (15.0%) | 3,005 (21.2%) | 3,138 (22.1%) | 2,631 (18.5%) | 3,280 (23.1%) |
| Florida | 1,652 (13.9%) | 2,177 (18.3%) | 2,836 (23.8%) | 2,455 (20.6%) | 2,795 (23.5%) |
| Minnesota | 5,526 (8.9%) | 9,030 (14.6%) | 14,575 (23.6%) | 14,490 (23.4%) | 18,196 (29.4%) |
| Wisconsin | 3,042 (9.8%) | 4,773 (15.4%) | 7,441 (24.0%) | 6,741 (21.7%) | 9,018 (29.1%) |
| Wave | | | | | |
| Delta Predominant | 3,550 (17.8%) | 4,439 (22.3%) | 6,073 (30.5%) | 3,177 (16.0%) | 2,652 (13.3%) |
| Omicron Predominant | 2,252 (4.8%) | 5,089 (10.8%) | 11,392 (24.1%) | 14,959 (31.6%) | 13,629 (28.8%) |
| Pre-Delta Predominant | 3,336 (10.9%) | 5,806 (19.0%) | 6,122 (20.1%) | 2,947 (9.7%) | 12,287 (40.3%) |
| Washout Period 1 | 752 (18.1%) | 894 (21.5%) | 783 (18.8%) | 1,128 (27.1%) | 604 (14.5%) |
| Washout Period 2 | 2,465 (14.4%) | 2,757 (16.2%) | 3,620 (21.2%) | 4,106 (24.1%) | 4,117 (24.1%) |
| MASS Category | | | | | |
| 0 | 387 (2.0%) | 3,063 (16.1%) | 7,946 (41.8%) | 5,085 (26.7%) | 2,542 (13.4%) |
| 1 - 3 | 3,623 (4.3%) | 10,348 (12.3%) | 18,151 (21.6%) | 21,195 (25.2%) | 30,734 (36.6%) |
| 4 - 6 | 4,869 (43.4%) | 4,539 (40.4%) | 1,784 (15.9%) | 29 (0.3%) | 9 (0.1%) |
| 7 - 9 | 2,695 (73.4%) | 877 (23.9%) | 91 (2.5%) | 6 (0.2%) | 3 (0.1%) |
| 10+ | 781 (81.4%) | 158 (16.5%) | 18 (1.9%) | 2 (0.2%) | 1 (0.1%) |
| Vaccination Status^c | | | | | |
| Fully Vaccinated | 3,418 (6.8%) | 5,436 (10.8%) | 11,478 (22.8%) | 13,668 (27.2%) | 16,332 (32.4%) |
| Partially Vaccinated | 554 (13.5%) | 756 (18.5%) | 862 (21.1%) | 980 (23.9%) | 943 (23.0%) |
| Unvaccinated | 8,383 (13.0%) | 12,793 (19.8%) | 15,650 (24.3%) | 11,669 (18.1%) | 16,014 (24.8%) |
| Comorbidities^d | | | | | |
| Myocardial Infarction | 2,583 (57.8%) | 1,268 (28.4%) | 417 (9.3%) | 155 (3.5%) | 45 (1.0%) |
| Congestive Heart Failure | 3,990 (59.1%) | 1,975 (29.3%) | 502 (7.4%) | 201 (3.0%) | 84 (1.2%) |
| Peripheral Vascular Disease | 5,865 (50.9%) | 3,670 (31.8%) | 1,427 (12.4%) | 464 (4.0%) | 104 (0.9%) |
| Cerebrovascular Disease | 3,313 (44.7%) | 2,212 (29.9%) | 1,257 (17.0%) | 344 (4.6%) | 284 (3.8%) |
| Dementia | 903 (79.3%) | 168 (14.7%) | 35 (3.1%) | 19 (1.7%) | 14 (1.2%) |
| Chronic Pulmonary Disease | 5,259 (18.0%) | 5,896 (20.2%) | 7,587 (26.0%) | 5,142 (17.6%) | 5,351 (18.3%) |
| Connective Tissue Disease Rheumatic Disease | 1,287 (31.9%) | 1,193 (29.5%) | 938 (23.2%) | 343 (8.5%) | 278 (6.9%) |
| Peptic Ulcer Disease | 931 (29.8%) | 877 (28.0%) | 644 (20.6%) | 357 (11.4%) | 319 (10.2%) |
| Mild Liver Disease | 2,618 (26.8%) | 3,111 (31.8%) | 2,527 (25.9%) | 1,182 (12.1%) | 335 (3.4%) |

Table S4. Characteristics of Patients with COVID-19 According to Number Needed to Treat to Prevent One Hospital Admission.[‡]

| Variable | 1 - 5 Patients (N=12,355) | 5 - 20 Patients (N=18,985) | 20 - 100 Patients (N=27,990) | 100 - 400 Patients (N=26,317) | >400 Patients (N=33,289) [†] |
|----------------------------------|------------------------------|-------------------------------|---------------------------------|-------------------------------------|--|
| Paraplegia and Hemiplegia | 585 (43.4%) | 362 (26.8%) | 217 (16.1%) | 102 (7.6%) | 83 (6.2%) |
| Renal Disease | 4,917 (56.0%) | 2,375 (27.0%) | 1,159 (13.2%) | 296 (3.4%) | 35 (0.4%) |
| Cancer | 2,480 (27.7%) | 2,755 (30.7%) | 2,031 (22.7%) | 877 (9.8%) | 822 (9.2%) |
| Moderate or Severe Liver Disease | 432 (48.9%) | 314 (35.6%) | 102 (11.6%) | 28 (3.2%) | 7 (0.8%) |
| Metastatic Carcinoma | 767 (29.2%) | 964 (36.7%) | 609 (23.2%) | 180 (6.9%) | 106 (4.0%) |
| Diabetes | 5,528 (41.0%) | 4,485 (33.3%) | 2,646 (19.6%) | 677 (5.0%) | 133 (1.0%) |

[‡]Data are represented as counts and row percents. Missing data was present for Gender (N = 20) and Ethnicity (N = 3,999).

[†]Standardized Difference = difference in proportions divided by standard error; imbalance is defined as an absolute value greater than 0.1 and are shown in bold.

^aIn the 'Other or Unknown Race' category, 540 patients were American Indian/Alaskan Native, 3,208 were Asian, 213 were Native Hawaiian/Pacific Islander, 2,850 were reported as 'other', and 2,748 were missing.

^bMinnesota includes Mayo Clinic Rochester and Mayo Clinic Health System in SE/SW Minnesota. Wisconsin includes Mayo Clinic Health System in NW/SW Wisconsin.

^cPatients are fully vaccinated if their COVID-19 positive test was 14 or more after their first shot of a viral vector vaccination or their second mRNA dose. Patients who have received at least one shot but are not considered fully vaccinated are categorized as partially vaccinated.

^dComorbidities are defined by standard ICD9/10 code sets. All diagnoses on or prior to the date of the COVID-19 test were included.

Table S5. Models of the Association of Neutralizing Anti-spike Monoclonal Antibody Treatment with COVID-19 Hospitalization in Nearby and Paneled .[‡]

| | No. of Patients | Estimated Relative Risk (95% CI) |
|---|-----------------|----------------------------------|
| Base Model | 73,123 | |
| MASS | | 1.35 (1.34, 1.36) |
| Infusion Status (Infused) | | 0.24 (0.21, 0.27) |
| Model 2 | 59,843 | |
| MASS | | 1.23 (1.22, 1.24) |
| Infusion Status (Infused) | | 0.21 (0.19, 0.25) |
| Vaccination Status (Partially Vaccinated) | | 0.82 (0.69, 0.96) |
| Vaccination Status (Fully Vaccinated) | | 0.29 (0.26, 0.31) |
| Wave (Delta Predominant) | | 2.61 (2.38, 2.86) |
| Wave (Omicron Predominant) | | 1.29 (1.17, 1.42) |
| Age at COVID-19 Test | | 1.04 (1.04, 1.04) |
| Gender (Male) | | 1.20 (1.12, 1.28) |
| Race (Non-White or Unknown) | | 1.40 (1.23, 1.59) |
| Model 3 | 59,059 | |
| MASS | | 1.13 (1.12, 1.15) |
| Infusion Status (Infused) | | 0.22 (0.19, 0.25) |
| Vaccination Status (Partially Vaccinated) | | 0.81 (0.69, 0.96) |
| Vaccination Status (Fully Vaccinated) | | 0.29 (0.26, 0.32) |
| Wave (Delta Predominant) | | 2.56 (2.34, 2.81) |
| Wave (Omicron Predominant) | | 1.26 (1.14, 1.39) |
| Age at COVID-19 Test | | 1.03 (1.03, 1.04) |
| Gender (Male) | | 1.21 (1.12, 1.29) |
| Race (Non-White or Unknown) | | 1.38 (1.21, 1.57) |
| BMI Classification (Overweight) | | 0.90 (0.82, 1.00) |
| BMI Classification (Class 1 Obesity) | | 0.99 (0.89, 1.10) |
| BMI Classification (Class 2 Obesity) | | 1.08 (0.96, 1.22) |
| BMI Classification (Class 3 Obesity) | | 1.43 (1.26, 1.61) |
| Peripheral Vascular Disease | | 1.48 (1.34, 1.63) |
| Renal Disease | | 1.24 (1.13, 1.36) |
| Mild Liver Disease | | 1.27 (1.17, 1.38) |
| Diabetes | | 1.21 (1.10, 1.32) |
| Congestive Heart Failure | | 1.28 (1.17, 1.41) |
| Cerebrovascular Disease | | 1.18 (1.08, 1.29) |
| Dementia | | 1.63 (1.44, 1.86) |
| Model 4^a | 73,123 | |
| MASS | | 1.27 (1.26, 1.28) |
| Infusion Status (Infused) | | 0.16 (0.14, 0.18) |
| Model 5^b | 27,496 | |
| MASS | | 1.26 (1.25, 1.27) |
| Infusion Status (Infused) | | 0.16 (0.14, 0.18) |

[‡]Relative risk regression models were constructed using a generalized linear model framework. A log link and the robust variance estimator (Poisson distribution) were included to correct for the misspecified variance structure. Models were only adjusted for the covariates listed. Models 4 and 5 also used the results of propensity matching.

^aModel 4 is weighted based on propensity scores calculated using a gradient boosting machine. Matching was based on age at COVID-19 test, gender, race, wave, hospital, BMI classification, myocardial infarction, congestive heart failure, peripheral vascular disease, chronic pulmonary disease, connective tissue disease rheumatic disease, mild liver disease, diabetes, renal disease, cancer, vaccination status and distance from hospital.

^bIn Model 5, the cohort was identified by using the propensity scores from the gradient boosted model as the distance metric in a 1:1 nearest neighbor matching algorithm with no replacement

