Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Vaccinated patients have reduced rates of hospitalization after receiving casirivimab and imdevimab for COVID-19

For outpatients with COVID-19, casirivimab/imdevimab (brand name REGEN-COV), a neutralizing monoclonal antibody cocktail, received emergency use authorization in November 2020 and has been widely utilized since [1]. This medication reduces viral load and subsequent hospitalizations [2,3]. At the same time, adverse effects from this medication are rare [2-4]. Therefore, previous data support the use of casirivimab/imdevimab. However, these data do not account for the fact that a large number of patients now receiving casirivimab/imdevimab have been vaccinated against COVID-19. The CDC recommends the use of monoclonal antibody therapies regardless of vaccination status [5], but the benefit is uncertain. Thus, we performed a study to assess the outcomes after casirivimab/imdevimab treatment in vaccinated patients as compared to unvaccinated patients.

Our study was a multi-center, retrospective cohort analysis of patients with COVID-19 who received casirivimab/imdevimab at an ED in our hospital system. Sites included one tertiary care facility and two freestanding EDs. This study received approval by our primary hospital's institutional review board.

All patients who received casirivimab/imdevimab in our ED between December 9, 2020 (the day we began administering this medication) and August 20, 2021 were included. At our facilities, casirivimab/imdevimab is used for select non-hospitalized patients within 10 days of symptom onset per FDA guidelines [6].

For each patient, the following data were collected: age, gender, race, ethnicity, body mass index (BMI), and COVID-19 vaccination records. These data were pulled directly from Epic (Madison, WI), and vaccination data were verified on Florida SHOTS (Florida's vaccination records system). Outcome measures (within 28 days of casirivimab/imdevimab treatment) were hospitalizations, return visits to the ED, intensive care unit (ICU) admissions, and deaths. These were assessed by a combination of medical record review from our facility, review of Epic's Care Everywhere (which allows for a review of medical records from other facilities that use Epic), and phone follow up with patients.

Using these data, we compared patients who were fully vaccinated at the time of casirivimab/imdevimab treatment to those who were unvaccinated. Our primary outcome was the risk of hospitalization within 28 days of treatment as assessed by multivariate logistic regression. Secondarily, we assessed the rates of return visits to the ED, ICU admissions, and deaths within 28 days.

To analyze our data, we compared vaccinated to unvaccinated patients using univariate descriptive statistics and multivariate logistic regression analyses with hospitalizations within 28 days as the dependent variable. Age, gender, race, ethnicity, and BMI were chosen as predictor variables for the regression model based on consistency of documentation and prior studies demonstrating associations of these variables with worse outcomes form COVID-19 [7-11].

During the study period, 1318 patients received casirivimab/imdevimab in our three EDs. Follow up was successful for 1222 (92.7%), and these patients were used for analysis. Among them, 16.2% were fully vaccinated, 4.5% were partially vaccinated (had only received one dose of Pfizer or Moderna), and 79.3% were unvaccinated. Table 1 shows a comparison of fully vaccinated, partially vaccinated, and unvaccinated patients for baseline characteristics and outcomes.

In the fully vaccinated group, 3.0% required admission to the hospital within 28 days as compared to 6.2% in unvaccinated patients (difference: 3.2% [95% CI 0.3 to 6.0%]). Otherwise, there were no statistically significant differences in univariate outcomes.

Regarding the primary outcome, our multivariate regression analysis found that for patients receiving casirivimab/imdevimab for COVID-19, full vaccination was associated with a statistically significant reduction in hospitalization within 28 days with an odds ratio of 0.19 (95% CI: 0.05 to 0.54) ($p = 0.007$).

This is the first study to assess vaccination status in patients receiving monoclonal antibody therapy for COVID-19. Our study suggests that vaccination may further reduce the chance of hospitalization even after casirivimab/imdevimab. We did not find any evidence that vaccination reduces the risk of ICU admission or death in patients receiving casirivimab/imdevimab. However, our study was not powered to detect such differences, and in general, patients who receive casirivimab/imdevimab rarely require ICU care or die within 28 days, regardless of vaccination status. Interestingly, partially vaccinated patients trended towards having higher rates of hospitalizations and return ED visits, but the sample size for this group was too small to make definitive conclusions.

When interpreting the results of this study, there are some limitations to consider. As a retrospective study, the accuracy of our data is dependent upon the accuracy of documentation. Indeed, we did not include medical history in our analyses because upon initial review, chronic medical problems were noted to be inconsistently documented. That being said, vaccinated patients were older (Table 1) and thus likely had more chronic medical problems, so the inclusion of chronic medical problems in our regression model likely would have further favored the vaccination group. Another limitation to consider is that vaccinated patients may have had better outcomes due to a confounding variable that could not be assessed with our retrospective design. For example, vaccinated patients may have been more likely to have better access to outpatient healthcare resources, home monitoring, or health literacy.

In conclusion, for individuals treated with casirivimab/imdevimab for COVID-19, rates of subsequent hospitalization are lower for vaccinated individuals compared to those who are unvaccinated.

Prior presentations

None.

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Table 1
Demographic and clinical characteristics as well as univariate outcomes for vaccinated versus unvaccinated patients with COVID-19 who received casirivimab/imdevimab.

Characteristic or outcome	Fully vaccinated ($n = 198$)	Partially vaccinated ($n = 55$)	Unvaccinated ($n = 969$)	Total ($n = 1222$)
Median Age (IQR)	68 (56.3–76)	55 (42.5–68.5)	55 (41–68)	57 (43–70)
Male Sex	116 (58.6%)	29 (52.7%)	483 (49.8%)	628 (51.4%)
Median BMI[a] (IQR)	27.3 (24.8–30.1)	29.2 (25.1–36.1)	28.6 (25.7–32.4)	28.4 (25.5–32.1)
Race[b]				
White	165 (85.1%)	41 (75.9%)	751 (79.8%)	957 (80.6%)
Black	9 (4.6%)	2 (3.7%)	75 (8.0%)	86 (7.2%)
Hispanic[b]	93 (48.1%)	35 (64.8%)	557 (59.3%)	685 (57.7%)
Admission within 28 days	6 (3.0%)	4 (7.3%)	60 (6.2%)	70 (5.7%)
Return ED visits within 28 days	28 (14.1%)	15 (27.3%)	157 (16.2%)	200 (16.4%)
ICU admission within 28 days	2 (1.0%)	0 (0%)	3 (0.3%)	5 (0.4%)
Death within 28 days	1 (0.5%)	0 (0%)	2 (0.2%)	3 (0.2%)

[a] BMI = Body Mass Index; BMI was not documented on 190 patients.
[b] 35 patients either refused to report their race and ethnicity or they were not documented.

Conflicts of interest

All authors report no conflicts of interest.

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None.

Credit authorship contribution statement

Conceptualization: TZ, KJ, MTD, FQ, DAF. Data curation: KJ, TK, RN. Formal analysis: TZ, FQ. Funding acquisition: N/A. Investigation: TZ, KJ, RN, DAF. Methodology: TZ, KJ, MTD, FQ, DAF. Project administration: TZ, MTD, DAF. Resources: TZ, KJ, DAF. Software: TK. Supervision: TZ, KJ, MTD, DAF. Validation: TZ, KJ. Visualization: TZ, KJ. Writing – original draft: TZ. Writing – review and editing: TZ, KJ, TK, RN, MTD, FQ, DAF.

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