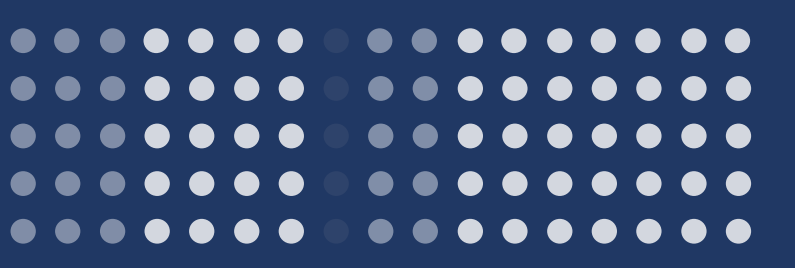


# COVID Sequelae: Evaluation of the Effect of Treatment on Healthcare Utilization and Health Status in the Months Following COVID-19 Infection



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## BACKGROUND

- COVID infection is associated with an increase in healthcare utilization in the 6 months following infection.<sup>1</sup>
- There are barriers that prevent equitable access to receiving COVID treatments.
- Black patients are 36% less likely and Hispanic patients are 30% less likely to be treated with nirmatrelvir/ritonavir following COVID diagnosis compared to white patients.<sup>2</sup>
- It is unknown how access to COVID treatment, including monoclonal antibody infusion, can affect downstream healthcare needs.

## PURPOSE

We sought to evaluate disparities in COVID treatment and its downstream effects by:

- Examining differences in sociodemographic factors between patients treated for COVID with bebtelovimab or nirmatrelvir/ritonavir and patients who qualified for treatment but did not receive it; and
- Investigating short-term and long-term healthcare utilization following COVID infection by treatment group and sociodemographic factors

## METHODS

Retrospective cohort study of patients who:

### Inclusion Criteria

- Are 18 years of age or older
- Tested positive for SARS-CoV-2 between 3/1/2022 and 12/31/2022
- Have established care within the health system ( $\geq 1$  primary or specialty care visit during 18-months prior to positive COVID test)
- Were at high-risk of developing severe COVID-19 based on CDC criteria, thus eligible to receive COVID treatment with bebtelovimab or nirmatrelvir/ritonavir

### Treatment Groups

Patients treated with bebtelovimab IV Infusion

656 patients

Patients treated with oral nirmatrelvir-ritonavir

5,407 patients

Patients who qualified for treatment, but were not treated

12,688 patients

**Statistical Analysis:** Non-parametric tests assessed differences across treatment groups; logistic regressions estimated odds of 1) receiving COVID treatment, 2) utilizing acute care within 14-days of COVID infection, and 3) utilizing acute care during 6-months following COVID infection based on health and sociodemographic factors.

## RESULTS

### Demographics and Treatment

Table 1. Comparison of Patient Sociodemographic Factors by COVID Treatment Group

	Total	Bebtelovimab	Nirmatrelvir-Ritonavir	None	p-value	
Age group	18-34 years	3083 (16.44)	558 (10.32)	43 (6.55)	2482 (19.56)	
	34-49 years	3727 (19.88)	1156 (21.38)	94 (14.33)	2477 (19.52)	
	50-64 years	4612 (24.60)	1631 (30.16)	199 (30.34)	2782 (21.93)	
	65-74 years	3532 (18.84)	1247 (23.06)	181 (27.59)	2104 (16.58)	
	75+ years	3797 (20.25)	815 (15.07)	139 (21.19)	2843 (22.41)	<.0001
Gender	Male	7352 (39.21)	2130 (39.39)	323 (49.24)	4899 (38.61)	<.0001
Interpreter needed		651 (3.47)	74 (1.37)	13 (1.98)	564 (4.45)	<.0001
Insurance type	Commercial	6651 (35.47)	207 (31.55)	2323 (42.96)	4121 (32.48)	
	Medicare	7234 (38.58)	340 (51.83)	1977 (36.56)	4917 (38.75)	
	Medicaid	2260 (12.05)	38 (5.79)	300 (5.55)	1922 (15.15)	
	Other/Unknown	2606 (13.90)	71 (10.82)	807 (14.93)	1728 (13.62)	<.0001
Race	White	15486 (82.59)	4779 (88.39)	585 (89.18)	10122 (79.78)	
	African American	1370 (7.31)	183 (3.38)	30 (4.57)	1157 (9.12)	
	Asian	956 (5.10)	215 (3.98)	28 (4.27)	713 (5.62)	
	Indigenous	127 (0.68)	30 (0.55)	1 (0.15)	96 (0.76)	
	Other/Unknown	812 (4.33)	200 (3.70)	12 (1.83)	600 (4.73)	<.0001
	Ethnicity	Hispanic	277 (1.48)	67 (1.24)	9 (1.37)	201 (1.58)
COVID vaccination status	None	2889 (15.41)	354 (6.55)	41 (6.25)	2494 (19.66)	
	Primary Series	2643 (14.10)	448 (8.29)	42 (6.40)	2153 (16.97)	
	Primary + $\geq 1$ Booster	13219 (70.50)	4605 (85.17)	573 (87.35)	8041 (63.37)	<.0001
Social Vulnerability Index, median (IQR)	0.81 (0.62, 0.92)	0.79 (0.56, 0.89)	0.83 (0.63, 0.93)	0.78 (0.57, 0.91)	<.0001	

### Short-Term Acute Utilization

Figure 2. Unadjusted odds ratios with 95% Wald confidence limits estimating acute care utilization within 14-days

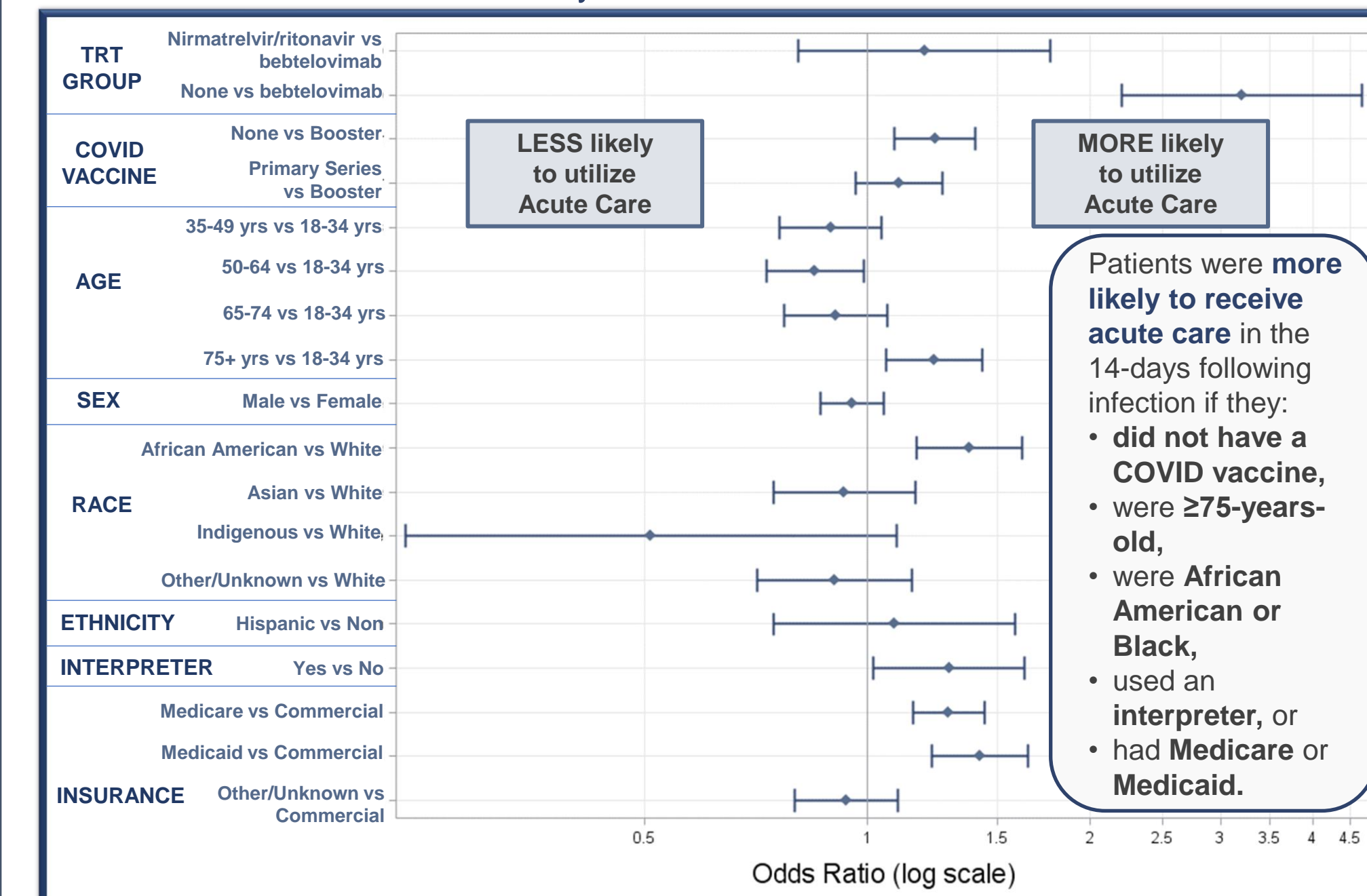
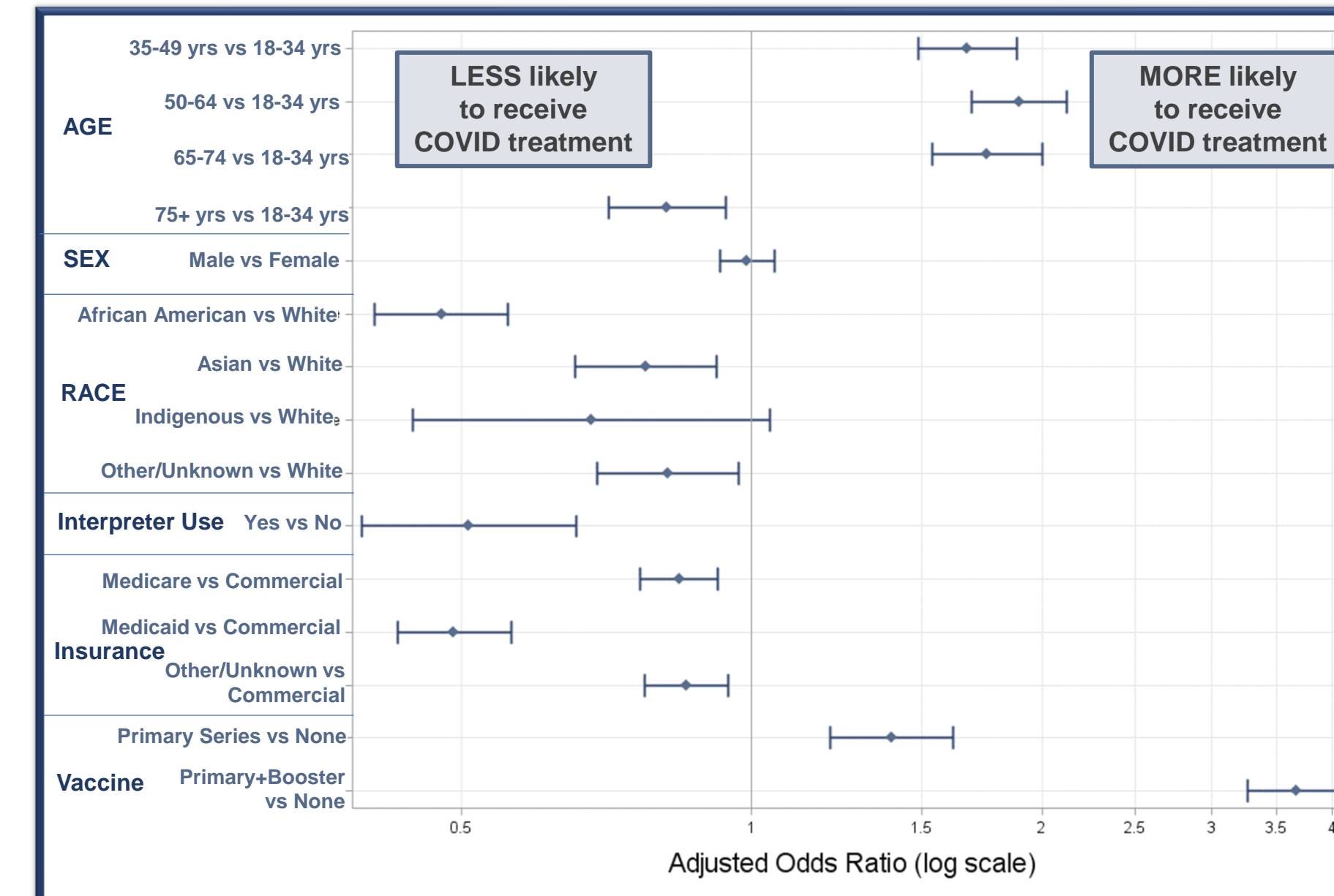


Figure 1. Adjusted odds ratios with 95% Wald confidence limits estimating treatment receipt based on sociodemographic factors



Patients were less likely to receive treatment for COVID if they:

- Required an interpreter: 2.0 times less likely than those not requiring an interpreter
- Had Medicaid insurance: 2.0 times less likely than those with commercial insurance
- Were African American/Black: 2.1 times less likely than white patients

Patients were less likely to utilize acute care in 14-days following COVID infection if they:

- Used bebtelovimab: 3.2 times less likely compared to patients not treated
  - Took nirmatrelvir/ritonavir: 2.7 times less likely compared to patients not treated
- 20% of non-treatment group required acute care in the 14-days following COVID infection,
- versus 4% of the bebtelovimab and 5% of the nirmatrelvir/ritonavir groups.

### Long-Term Acute Utilization

Table 2. Adjusted odds ratios with 95% confidence limits estimating acute care utilization during 6-months following COVID infection

Predictor	Category	aOR (95% CI)
Treatment	bebtelovimab	reference
	nirmatrelvir/ritonavir	1.05 (0.87, 1.26)
	No treatment	1.50 (1.25, 1.79)
Acute care utilization in 6-months prior to COVID	No	reference
	Yes	2.49 (2.34, 2.66)

Patients who did not receive COVID treatment were 1.5x more likely to utilize acute care in 6-months following infection compared to patients who received bebtelovimab, even after controlling for their previous acute care use.

## DISCUSSION

- Disparities in receiving COVID treatment exist by age, interpreter use, insurance type, and race.
- COVID treatment significantly reduces the need for acute care visits in the 14-days following infection.
- The need for acute care is 1.5x greater in the 6-months following COVID infection for those who are not treated compared to those who received bebtelovimab from home infusion.
- Sociodemographics associated with COVID treatment and healthcare utilization may be proxies for lower socioeconomic status or health literacy. Thus, this study portrays the need for unique education, communication and care such that we, as healthcare providers, can more equitably serve our patients.
- Home infusion services may fill the gap needed to alleviate physical and financial barriers to receiving treatments, even beyond COVID, and thus may create more equitable health outcomes downstream.

## CONCLUSION

- There are many barriers and disparities in receiving COVID treatment.
- Despite qualifying, less than 1/3 of patients receive treatment after testing positive.
- Not receiving treatment increases both short-term and long-term healthcare utilization following COVID infection.
- By proactively removing barriers to receiving COVID treatment, health systems may improve overall health outcomes, lower acute care usage, and save healthcare resources.

## FUTURE DIRECTIONS

- Identify and alleviate barriers to COVID treatment
- Implement quality improvement projects to improve medication accessibility, such as automatically screening after positive COVID test to identify patients who would benefit from treatment
- Further investigate how home infusion could alleviate barriers to care in disease states outside of COVID

## REFERENCES

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