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2364. Predictive Ability of mRNA COVID-19 Vaccines Against COVID-19 Disease Severity

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Background. Prior studies demonstrated the vaccine effectiveness and safety of mRNA COVID-19 vaccines, but additional data is needed regarding the effects of timing and number of doses on disease severity. This study determined predicted protection against severe COVID-19 by number of vaccine doses.

Methods. We enrolled adults hospitalized with acute respiratory infection (ARI) and/or related diagnoses at two Emory University hospitals from May 2021 – Aug 2022. This analysis included COVID-19 positive patients among unvaccinated and 2 or 3 doses of an mRNA vaccine. Vaccinations ≤ 14 days prior to admission were excluded. Medical and social histories were obtained from interviews, medical records, and the state vaccine registry. We used stepwise logistic regression to determine dose-specific odds ratios (OR) against severe outcomes (pneumonia (PNA), length of hospital stay (LOS) ≥ 4 days, ICU admission, mechanical ventilation, and death). Analysis was performed using SAS v9.4 software.

Results. Of the 1,677 total enrollments, 850 were positive for COVID-19. Another 168 were excluded due to lack of vaccine records or other vaccine dosages, 682 were eligible for analysis. Compared to those unvaccinated, vaccinated participants were older, male, and unemployed or on disability. Those with three doses obtained a higher education level than unvaccinated participants. Individuals with comorbidities – specifically blood disorders, chronic kidney disease, and immunocompromised – were more often vaccinated. When controlling for race, age, and employment, the odds of PNA (OR 0.5 (0.34, 0.74)) and ICU admission (0.61 (0.39, 0.97)) were less for those with two doses than those with none; whereas those with three mRNA doses had less odds of having PNA (OR 0.26 (0.15, 0.46) and LOS ≥ 4 days (OR 0.44 (0.25, 0.76)). Predicted protection against severe outcomes persisted 6 months from last dose for PNA, LOS ≥ 4 days, and ICU admission (Table 1).

Table 1. Adjusted odds ratios of mRNA SARS-CoV-2 vaccination by dose number and time since administration against severe disease outcomes in those SARS-CoV-2 positive. OR adjusted for race, age and employment. Unable to calculate (UTC) due to having no patients with the outcome during specified vaccination timeframe and dose count.

	Definite/Probable Pneumonia	Hospital stay ≥ 4 days	ICU Admission	Mechanical Ventilation	Death
	Adjusted Odds Ratios (95% confidence interval)				
2 dose of mRNA vaccine					
Overall	**0.50 (0.34, 0.74)**	0.69 (0.47, 1.01)	**0.61 (0.39, 0.97)**	0.86 (0.42, 1.78)	1.52 (0.62, 3.68)
<6 months since second dose	0.75 (0.42, 1.35)	0.90 (0.52, 1.56)	1.01 (0.56, 1.85)	1.62 (0.69, 3.8)	2.4 (0.86, 6.75)
≥6 months since second dose	0.40 (0.25, 0.65)	0.57 (0.36, 0.90)	0.42 (0.23, 0.78)	0.42 (0.14, 1.27)	0.99 (0.30, 3.31)
≥3 dose of mRNA vaccine					
Overall	**0.26 (0.15, 0.46)**	**0.44 (0.25, 0.76)**	0.58 (0.30, 1.15)	0.33 (0.08, 1.49)	0.60 (0.13, 2.90)
<6 months since third dose	0.28 (0.14, 0.56)	0.55 (0.29, 1.06)	0.64 (0.29, 1.43)	0.51 (0.11, 2.29)	0.93 (0.19, 4.51)
≥6 months since third dose	0.24 (0.10, 0.58)	0.29 (0.12, 0.71)	0.44 (0.14, 1.38)	UTC	UTC

Conclusion. Among COVID-19 positive adults hospitalized with ARIs, both two and three doses of a COVID-19 mRNA vaccine predicted protection against severe COVID-19 outcomes, with durability lasting more than 6 months. Future studies should explore the role of additional boosters and vaccine regimens in the prevention of severe COVID-19.